
COLLECTION OF FISH AGGREGATING DEVICES MANAGEMENT PLANS

Prepared by: IOTC Secretariat, 26 April, 2014

At its 17th Session, the Commission adopted Resolution 13/08 *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 13/08:

“This Resolution shall apply to CPCs having purse seine vessels and bait boats fishing on Fish Aggregating Devices (FADs), 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 Secretariat in accordance with IOTC Resolution 13/08, to assist CPCs in analysing the FADs management plans as required in paragraph 3, in particular with the provisions of paragraph 2 of the Resolution:

“CPCs having vessels fishing on FADs shall submit, to the Commission, by the end of 2013, Management Plans for the use of FADs by their purse seiners and bait boat/vessels. 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.”

The following 12 CPCs have purse seine vessels and/or bait boats registered in the IOTC Record of Authorised Vessels: Australia, EU (France and Spain), Indonesia, Iran, Japan, Korea, Sri Lanka, Maldives, Mauritius, Philippines, Seychelles and South Africa.

From those twelve CPCs, seven have provided a FADs management plan (Annex 1):

- Australia (Received 01.05.14)
- European Union (Received on 15.01.14, Spain, and 17.03.14, France),
- Iran, Islamic Rep. of (Received 26.01.14),
- Japan (Received 25.12.13),
- Korea (Received 31.12.13),
- Maldives (Received 17.03.14),
- Mauritius (Received 14.03.14).

The 3 CPCs listed below have reported they will provide a FAD management plan:

- Mozambique has 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 and will keep IOTC informed on the progress,
- Seychelles has indicated that they will submit a FAD management plan.
- Sri Lanka has indicated that a plan will be submitted.

Annex 1

Collection of FADs management plans

Australia FADs Management Plan



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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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, debris 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 increase 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).

Ocean	Floating objects			Total	Free-swimming schools			Total
	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 writing¹.

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 reliably 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 maintain them, replace them as necessary and remove 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 MANAGEMENT

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*.



FAD Management Plan

Introduction

Definitions

Fishing activity: Any activity relating to locating fish, laying underwater, deploying, trolling or hauling fishing gear, hauling catch on board, transshipping, retaining, processing on board, transferring and unloading fish and fish products;

Beacon: Electronic device used for locating and monitoring FADs.

Fish Aggregating Device (FAD): Floating and drifting, natural or artificial, object deployed or used by a fishing vessel in order to aggregate tuna schools that are targeted to be caught by purse seine gears. FAD-related activities are: deployment/launch, beacon setting to monitor FAD trajectory (whether it is deployed or simply found by the vessel), FAD-aggregated school fishing, FAD visiting, maintenance, repair and removal;

Traceable Fish Aggregating Device (TFAD): Floating and drifting, natural or artificial, object equipped with a beacon allowing for its localisation and tracking, hence modifying markedly a vessel's fishing strategy and effort. TFAD-related activities are similar to FAD-related ones, with additional beacon setting, exchange or removal in order to monitor FAD trajectory;

Fishing vessel: Any vessel equipped for commercial exploitation of aquatic living resources;

Support vessel: Any vessel assisting a fishing vessel in its fishing activities. The support vessel doesn't have any fishing gear.

1. Objectives

The French FAD Management Plan has 3 objectives:

- **Improving knowledge on FAD-associated fishing activities:**

A deeper knowledge of this fishing practice will allow to better assess its potential impacts and define the most appropriate management measures. In this perspective, the scope of the information entered by vessel skippers on FAD activities, specifically, will be extended and made systematic.

In addition to details regarding the type of FAD fished (natural log, artificial draft, "classic" or "non-entangling" FAD) which are already recorded, information on FAD launch, recovery or transfer/modification will be collected through a "FAD" module in electronic logbooks (ELB) that will be adapted to tuna fisheries and RFMO requirements. These data are of major interest for scientific assessments because they allow to better quantify purse seine fishing effort and consequently improve stock assessments, and they can easily be cross-referenced with the information reported by scientific observers.

Moreover, the number of activated/deactivated beacons per vessel is subject to quarterly reports from beacon suppliers since January 1st, 2010. These reports are independent of skippers and shipowners. Two control levels can be implemented by the competent authority. On one hand, at the level of buoy suppliers (Each INMARSAT or IRIDIUM identifier is assigned to a vessel (or several vessels in the case of shared buoys). The identification of the vessel(s) can be checked with each buoy supplier). And, on the other hand, at the level of satellite communication providers (To allow satellite transmission of buoy information (position/sounder messages), all buoy suppliers must activate the buoy transmitter for their customers).

- **Limiting the use of FADs:**

For French shipowners, the main management measure for FAD fishing is to limit the use of FADs. This limitation must apply to FAD-associated beacons (about 90% of purse seine sets made under objects involve drafts or natural logs that have already been encountered before and equipped with beacons). Since these beacons are satellite-monitored, the most efficient and accurate way to know the effective number of drafts deployed at sea is to use the data provided by the beacons (including information on their activation and deactivation). A system based on systematic reporting of beacons in use, along with a "numerus clausus" mechanism, has therefore been implemented by shipowners.

- **Reducing potential impacts of FADs on ecosystems:**

In addition to the reduction of potential impacts resulting from limitation of the number of TFADs, the Management Plan also incorporates provisions of a more qualitative nature resulting from experimentations or additional research in the following fields: adoption of best practices (release of entangled turtles, for instance), improvement of selectivity (non-entangling FADs, "turtle/shark free FAD"), adaptation of fish-finding strategies, identification of fish sizes through echointegration on lateral sounders...

Given their level of use, the French FAD Management Plan does not provide, for the time being, for the supervision of support vessels that help mother vessels manage a fleet of FADs and multiply TFAD deployment and tracking.

2. Scope

Vessels involved

This FAD Management Plan applies to tuna purse seiners registered in a French port and operating in the waters of Atlantic, Indian or Pacific oceans, as well as to support vessels involved in tuna fishing activities.

Limiting the use of FADs

Ship-owners should keep their annual purchase of beacons within an average of 200 beacons per vessel.

No fishing vessel is allowed to have more than 150 active beacons at any time. For a vessel, the number of active beacons at a given time corresponds to the sum of:

- the number of active beacons owned, and
- the number of joint beacons (activated by a fishing or a support vessel) divided by the number of tuna purse seiners associated with them.

Since the latter ones can't be independently controlled, the use of HF beacons is forbidden from June 30th, 2012.

Vessel skippers and owners will continue to implement all necessary measures to prevent or limit the loss of FADs at sea.

Reporting procedure for DFAD deployment

DFAD deployment is reported in logbooks as provided for in paragraph 7.

Mitigation measures for catches of FAD-associated juveniles, small tunas and bycatch

All actions aiming at improving purse seiners' selectivity when fishing under objects are encouraged so as to limit discards and, in particular, harvesting of juveniles and small individuals of targeted species, or bycatch of non-targeted species (with particular attention to sensitive species such as sharks).

Shark conservation measures (mainly FAD-associated)

Shipowners encourage crews to implement methods for live release of sharks that seem the most efficient and least dangerous to them, develop standard procedures for different types of catch (big sharks, small sharks, mantas, whale sharks) and disseminate them.

Shipowners ask crews to facilitate the work of on board scientists who tag sharks before their live release to assess their survival rate.

Shipowners make available to crews the necessary information and training to improve live release practices for sharks caught by purse seiners, under optimal security conditions for the crew, by January 1st, 2012, and provide vessels with shark and ray handling and releasing devices by January 1st, 2014.

Monitoring and recovery plans for lost DFADs

Loss reporting is made under quarterly reports on beacon deactivation.

DFAD ownership

DFAD ownership is related to the associated beacon.

3. Institutional arrangements for managing DFAD Management Plans

Institutional responsibilities

The responsibility for monitoring drifting FAD Management Plans is entrusted with the organization of producers in charge of French-flagged vessels involved.

Authorization request process for deployment of DFADs and/or DFAD beacons

Under the Management Plan, the organization of producers allows vessels to set a maximum of 150 activated beacons at any time.

Vessel owner and skipper obligations regarding deployment and use of DFADs and/or DFAD beacons: beacon record and monitoring

The vessel skipper or owner holds a specific record of beacons used by the vessel, where each beacon is referenced:

- Its serial number;
- The vessel(s) having access to the localisation information of this beacon;
- The make and type of the beacon;

The use of DFADs is subject to monitoring through quarterly reports from beacon suppliers, who track their DFADs. This quarterly report establishes the number of active beacons at the beginning of the period, the number of activated beacons during the quarter, the number of deactivated beacons during the quarter, the number of active beacons at the end of the period and the number of beacons that transmitted during the quarter.

For scientific research and statistical purposes, this data, along with the recording of beacon positions, can be communicated to scientific institutions and relevant fisheries management bodies, in compliance with confidentiality requirements.

DFAD and/or DFAD beacons replacement policy

Ship-owners should keep their annual purchase of beacons within an average of 200 beacons per vessel. In parallel, from 2014 on, a gradual shift to biodegradable DFAD use will take place.

Reporting requirements

Reporting requirements are stated in paragraph 7.

Confidentiality measures regarding information on DFAD fishing

Any information reported in accordance with the present Management Plan must be treated as confidential and can only be used for scientific, statistical and/or control and surveillance purposes. Any other use of this information shall obtain the vessel owner's consent.

4. Specifications and conditions for the construction of DFADs

Design features of DFADs (description)

Shipowners make available to crews the necessary information to build DFADs with a very low, or even no, risk of entanglement for turtles and sharks, and provide vessels with material to build such DFADs. By January 1st, 2014, shipowners will implement workshops on the construction of non-entangling DFADs in each of the purse seiners home ports (Abidjan in Côte d'Ivoire, Seychelles and Mauritius).

It is forbidden for fishing and support vessels to launch a FAD that was not designed to reduce to zero the risk of turtle and shark entanglement.

These measures will enter into force on January 1st, 2012 for all vessels operating in the Indian Ocean, and on January 1st, 2013 for all vessels operating in the Atlantic Ocean.

FAD identification and marking

All TFADs launched by French tuna purse seiners are identified by a serial number on the associated beacon. This number must be visible without dismounting the beacon and designed to be sea water-proof and remain legible through the whole lifespan of the beacon. Visibility distance must be the shortest possible.

5. Implementation period of DFAD-MP

The current Management Plan is established for a duration of 3 years starting on January 1st, 2012. It will be jointly reviewed by relevant shipowners, administrative authorities and scientific institutions and shall be amended accordingly if necessary.

At the end of the current Management Plan, a new plan will have to be enacted based on the experience acquired during the implementation of the current plan and taking into account the changes in international regulations.

6. Monitoring and review methods for DFAD implementation

The monitoring and review of the DFAD-MP implementation is jointly exerted by the Ministry of Ecology, Sustainable Development and Energy (France) and the relevant organization of producers for French-flagged vessels that are involved.

7. "DFAD logbook"

Recording of FAD activities

The skippers of fishing or support vessels record in their logbooks the following activities:

- Deployment/launch of FADs
- Removal of FADs
- Visiting of FADs with or without handling (maintenance/exchange)

For each of these activities, the information collected is the following:

- Date and time;
- Position (latitude, longitude);
- Type of FAD (natural or anthropic log, artificial, "classic" or "non-entangling" draft) along with a short description (tree trunk, pile of straw, container, rope, ...) if necessary;

- Number of associated beacon in case of a TFAD;
- Number of removed beacon in case of a TFAD if the beacon belonged to the vessel, if not write "beacon of a third vessel";
- Any observation of entangled sharks or turtles when the FAD has net parts.

In addition to the information listed above, skippers of fishing vessels also record in their logbooks, for each FAD-associated fishing operation, the following information (already partly covered by regulations):

- In case of a TFAD, if the beacon belongs to their vessel or to a third vessel;
- Tons caught per species (targeted tunas or bycatch);
- Any discard quantities

For scientific research and statistical purposes, the data on FAD activities reported by vessel skippers can be communicated to scientific institutions and relevant fisheries management bodies, in compliance with confidentiality requirements (see below).

(NON OFFICIAL 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 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 studies on fishing gear selectivity and its environmental impact and to promote the results of the investigation as the basis to establish the management objectives.
- CE Council Regulation n 2371, 20th Dec 2002, on the conservation and sustainable exploitation of fisheries resources under 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.
- 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.
- 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”*.

2.- Obligations under the RFMOS regarding FADS.

Having into account the generalization of the use of these devices by the fleet all RFMO with competencies have adopted the following provisions:

WCPFC:

- **Conservation and Management Measure for bigeye and yellowfin tuna (CMM 2008-01)**. Pursuant to the provisions of points 23 and 24 of said measure, all the Parties in this Commission shall submit FAD management plans. Moreover, it sets out a FAD fishing closure for the 2009-2011 period
- **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

CTOI:

- **Resolution 10-02, on mandatory statistical requirements for IOTC members and cooperating non contracting parties (CPCS)**, sets that all parties shall submit on a quarterly basis the number of FADS deployed per vessel.
- **Recommendation 10-03, on the recording of catch and effort by fishing vessels in the IOTC area of competence**, establishes the obligation of the recording in the log book on board the information regarding the FAD deployment, just like sets and catches carried out in association with them.

IATTC:

- **IATTC Resolution 2009-01 on the multiannual program for the conservation of tunas in the East Pacific Ocean**, which sets the intention of this Commission to undertake a pilot program for research into and gathering information on FADS.

Apart of these, all measures to avoid accidental catches of sea turtles should be taken into consideration, given the incidence of certain sort of FADS on the incidental catch of these species.

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. 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.

5. 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 molluscs, 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**

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

- 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.
- Drifting raft without a net: Unanchored FADs composed of a panel—either continuous or grill-shaped.
- Natural FADs: Any FAD found at sea (e.g. plant remains, dead animals, man-made waste) used as a FAD.
- Other drifting FADs: Any FAD other than those above.
- FAD-related activities
 - Deployment: Operation by which a vessel release a FAD at sea.
 - 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.
 - Set: Fishing manoeuvre to catch shoals of fish associated with a FAD.
 - 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
 - GPS beacon: Beacon accompanied by a global positioning system (GPS)
 - Radio beacon: Beacon accompanied by a radio system
 - Visual beacon: Beacon without any electronic device, only identifiable by sight
- Oceanographic buoy: Buoys used for oceanographic research.

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 marking system may be established for all FADs used by the Spanish fleet.

7. Register and information-sharing regarding FADs

7.1. Inventory

As an initial measure, operators shall send the Deputy Directorate General for Agreements and Regional Fisheries Organizations, by 31 December 2010, a list of operative FADs being used by the fleet at that date.

This list shall include, for each FAD, the information contained in Annex I.

As far as possible, this information should be provided at the detail level of fishing vessels.

This list shall be promptly updated whenever a change takes place, and such updates must be sent at least quarterly.

The aim of this inventory is to provide as much information as possible on the characteristics of FADs being used, and to enable scientists to analyse the data collected in fishing logs thanks to the individual identification of each FAD.

7.2. Specific Activity Register

Operators shall keep a register where FAD-related activities shall be recorded.

The information that must be recorded in this register is included in Annex II of this plan.

If operators use any natural FADs, this information shall also be recorded, and in such cases deployment shall be understood as assigning a beacon, and hauling as withdrawing the beacon. Should this FAD be intended for periodical use, information regarding it shall be included within the inventory envisaged above.

Whenever an activity is conducted involving a FAD that does not initially belong to the fishing or auxiliary vessel that detected it, all the information regarding this activity shall also be reported. The word "external", together with the visible character sequence leading to its identification, shall be recorded in the section corresponding to identification.

Finally, for each activity conducted involving a FAD, every incident regarding accidental catches shall be recorded: species, number of specimens, and number of specimens released alive.

This activity register shall be sent at least quarterly to the Deputy Directorate General for Agreements and Regional Fisheries Organizations.

7.3. Records in fishing logs

In addition to the specific register set forth above, ship captains shall continue to record in the fishing logbook the following information relating to FAD activity.

- FAD sets: The position, date, identification and result of the set shall be recorded.
- As in the above section, all sets involving FADs that do not initially belong to the fishing vessels must be recorded, as well as sets involving natural FADs which will be part of the inventory.
- Catches associated with marine mammals, basking sharks, seamounts, or any element that could affect fish aggregation (dead animals, concentration of diverse materials, etc.), in order to provide the most complete information possible on the set, indicating position, date and result of the set.

8. Monitoring FADs

As far as possible, vessels must record monitoring information for each FAD that 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. 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

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

More selective methods shall be promoted in order to prevent the catch of juvenile fish and associated species, such as sorting grids incorporated into the purse seine, with the aim of reducing the catch of juvenile tuna and associated species.

The use of acoustic methods (sounders, echo sounders) shall be encouraged, aimed at more selective fishing, identifying undesired species or sizes, prior to the set.

Research on alternatives to nets hanging from FADs shall be promoted, in order to prevent the entanglement of some marine species, especially turtles, by using other materials or smaller mesh to minimize these adverse effects.

The Protocol for releasing turtles established for purse seiners by the Inter-American Tropical Tuna Commission (IATTC) shall be taken into account.

11. Specific closures on fishing with FADs

Between 1 July and 30 September, fishing with FADs is forbidden in the area of the Western and Central Pacific Fisheries Commission (WCPFC), where the following conditions have been established:

- During this closure, operators may not make sets within 1 nautical mile around the FAD.
- Operators may not catch the fish aggregated under a ship, nor may they move these fish, including the use of lights and chumming to attract them.
- FADs and beacons may only be hauled in, following authorization, provided that they are kept on board until disembarkation or the end of the closure, and that no set is made in the 7 following days or within 50 nautical miles around the FAD hauling point.
- Furthermore, regarding the above section, two ships may not cooperate to avoid this measure, and sets made by any ship within 1 nautical mile around the FAD hauling point are forbidden during the 24 following hours.

During the closure, FADs may not be deployed or hauled in.

In addition, all closures established in the rest of RFMOS on free school and FADS shall be taken into account:

- IOTC: purse seiner vessel shall not fish from 00:00 1st Nov to 24:00 1st Dec, within the area enclosed in the following coordinates: 0-10° N 40-60° E.
- IATTC: purse seiner over 182 TM of carrying capacity must cease their activity for 62 days in 2010, and 73 in 2011. Two different periods are to be chosen: for 2010, from 29th July to 29th Sep, or from 18th Nov to 18th Jan of 2011. For 2011, from 29th July to 29th Sep, or from 18th Nov to 18th Jan of 2012. A
- IATTC: apart of these periods, fishing for skipjack, bigeye and yellowfin carried out by purse seiners within area 96-110° W and 4°N 5°S shall be prohibited between 29 Sep and 24:00 of 29th Oct.
- ICCAT: from 1st Jan to 28th Feb each year, fishing for bigeye and skipjack on FADS is forbidden within the area enclosed by: African coast, 10° S; 5° W, and 5° E.

Finally, it is forbidden to make sets using oceanographic buoys as FADs, given the damage that such operations can inflict on these scientific instruments.

12. 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 the Sea may determine, in coordination with the IEO, the participation of other scientific bodies in order to fulfil 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 13.

Iran FADs Management Plan

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 managers 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 کشتی های پرساینر (Purse Seiner vessels logbook)

Sheet No / شماره صفحه	Master / ناخدا	Name&No Vessel / نام و شماره ثبت شناور	ورود به/ Arrival TO بندر/ Port <input type="checkbox"/> لنگرگاه/ Loch <input type="checkbox"/>				خروج از/ Departure From بندر/ Port <input type="checkbox"/> لنگرگاه/ Loch <input type="checkbox"/>											
			نام بندر / Name Port :				نام بندر / Name Port :											
			تاریخ / Date :				تاریخ / Date :											
			ساعت / Hour :				ساعت / Hour :											
Date تاریخ	Position موقعیت تور ریزی (طول و عرض جغرافیایی)- ۱	Set تور ریزی		Estimated catch صید تخمینی								Association صید از طریق این تجهیزات		Current جریان آب				
		Successful موفق	Nill ناموفق	specify time زمان تور ریزی - 2	Well شماره مخزن ماهی	گیر yellowfin میان صید kg average catch size kg	هورر مسقطی sk ipjack میان صید kg average catch size kg	چشم درشت bigeye میان صید kg average catch size kg	هورر دم دراز longtail میان صید kg average catch size kg	زرد kawkaw میان صید kg average catch size kg	سایر گونه ها Other (غالب) Species نام گونه میان صید kg average catch size kg	گونه های غالب Discards میان صید kg average catch size kg	Free school گله آزاد	* log لاگ	supply vessel کشتی پشتیبان	beacan بویه	shark wale نهنگ کوسه نهنگ	5- degree/ direction جهت
تاریخ استقرار: موقعیت جغرافیایی: (طول) عرض: شماره سریال: (ارادین بویه) گیرنده ماهواره ای: ابزار قد: (طبیعی / مصنوعی) (سایر لاگ: ۲*۲، ۳*۳) (مواد بکار رفته:) (نوع بازید: (استقرار / کنترل / برداشت / تعمیر))																		
نام و نام خانوادگی تکمیل کننده :						عنوان شغلی در شناور:						تاریخ تکمیل :				امضاء :		
توضیحات :																		

DFAD Management Plan for Japanese tuna purse seine fishing vessels

Fisheries Agency of Japan (FAJ)

December, 2013

1. Objective

This document describes Drifting FAD s (DFAD) Management Plan to be applied for Japanese tuna purse seine fishing vessels, in order to fulfill paragraphs 2 and 6 of IOTC Resolution 13/08. The primary objective of this DFAD Management Plan is to reduce captures of juvenile bigeye and yellowfin tuna associated with fishing on DFADs. Fisheries Agency of Japan (FAJ) is the responsible authority to implement this DFAD Management Plan.

2. Scope

(1) Vessels, areas and period concerned

This DFAD Management Plan will be applied to Japanese tuna purse seine fishing vessels during their fishing operation in the Indian Ocean for the period of year 2014 and thereafter unless otherwise decided.

(2) DFAD concerned

This DFAD Management Plan deals with the DFADs that have been deployed or have been attached man-made devices either by the Japanese purse seiners or by their supply vessels.

3. DFAD managements

Japanese purse seiners are required following tasks to implement DFAD managements:

- To record the type of operation (DFADs or non - associated operation) for each set in their logbooks;
- To place scientific observers at least 5% coverage to monitor the fishing operations; and
- To recover the DFADs that they deployed as many as possible.

4. Research activities to reduce juvenile tuna and non-target species catch

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

Following research activities have been conducted:

- To develop methods separating juvenile yellowfin and bigeye tuna from skipjack schools using intermittent lights;
- To investigate effectiveness of larger mesh size nets to reduce juvenile tuna catch;
- To develop simulation models visualizing under-water shapes of purse seine nets to understand how larger meshes work to reduce juvenile tuna; 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 progress of effectiveness to mitigate juvenile bigeye and yellowfin tuna catch and also to discuss further improvements.

Korea FADs Management Plan

The Korean Management Plan for the use of FADs in the IOTC area of competence

1. Introduction

This Management Plan (MP) has been established in pursuance of the IOTC resolution 13/08; 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 Reduced the Incidence of Entanglement of Non-Target Species.

2. Objective

To ensure that the Korean management of the use of fish FADs by purse seine vessels is consistent with the conservation and management measures and the data collection and reporting requirements of the Indian Ocean Tuna Commission.

3. Scope :

This management plan applies with respect to:

- Vessel-types and support and tender vessels : Korean flagged purse seine vessels
- DFAD numbers and/or DFADs beacon numbers to be deployed : Maximum 300 sets per vessels
- Reporting procedures for DFAD deployment : Fishing boats record the deployment of each DFAD in the FAD logbook (Attachement 1) and fishing logbook and report to the National Fisheries Research and Development Institute (NFRDI) generally in monthly basis or shorter period basis, if necessary.
- Incidental bycatch reduction and utilization policy :
Korea does not have FAD-specific incidental bycatch reduction or utilization policies. The idea for bycatch mitigation and utilization will be sought from captains/fishing masters by holding workshops and the research, if necessary, will be conducted in collaboration with the NFRDI.
- Consideration of interaction with other gear type : Collecting information and data
- Plans for monitoring and retrieval of lost
Satellite buoys are attached to every single DFADs for monitoring their movements. Vessel masters are encouraged to prevent, as far as possible, loss of FAD sets 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 FAD logbook its last known date and position.
- Statement or policy on "DFAD ownership"
Each fishing boats will attach satellite buoys to every single DFADs and company name will be marked on satellite buoys to state the ownership.

4. Institutional arrangements for management of the DFAD Management plans:

- Institutional responsibilities
The captain is responsible for the use of FADs under the management and supervision of his/her company.
- Application processes for DFAD and /or DFAD beacons deployment approval
The decision of DFADs deployment is made by the captain or fishing master taking account of FAD closure area and period. The company will supply satellite buoys to each fishing that will attach the buoys to DFADs prior to deployment at sea. In order to comply with FAD management plans, each fishing boats will record the relevant information in relation to the DFADs deployment in the FAD logbook and fishing logbooks and report to the NFRDI in monthly basis.
- Obligations of vessel owners and masters in respect of DFAD and/or DFAD beacons deployment and use
The Company shall encourage and supervise its fishing boats to observe the DFADs management plans and the masters shall be in comply with DFADs management plans and the conservation and management measures related to the use of FADs.
- DFAD and/or DFADs beacons replacement policy

In case deployed DFADs are worn out or needed to be replaced, the captain/fishing masters will replace it and record in the FAD logbook and fishing log books.

- Reporting obligation

Each captain/masters will record the information in relation to DFADs deployment in the FAD logbook and fishing logbooks and report to the NFRDI in monthly basis.

5. DFAD construction specifications and requirements

Korea does not have requirements yet related to FAD design characteristics, FAD markings/ identifiers, lighting requirements, radar reflectors, visible distance, reporting of radio buoy serial numbers or reporting of satellite transceiver serial numbers. Those will be set in the course of implementing MP based on the study outlined in item 9.

6. Applicable areas

The areas will be according to the conservation and management measures of the IOTC.

7. Applicable periods for the DFAD-MP

The DFAD-MP will be applicable for the whole periods while the fishing boats are in the IOTC area of competence.

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

Each DFADs will be monitored by satellite buoys attached and the masters will record the information in relation to DFADs deployment in the FAD logsheet and fishing log books and report to the NFRDI in monthly basis.

9. Scientific research

In order to meet the objective outlined in the IOTC Resolution 13/08, the NFRDI will implement scientific research programs for purse seine vessels fishing largely around FADs, which include:

- face to face interviews to benefit from fishermen's knowledge and experience, to increase gear selectivity and to avoid juvenile tuna;
- Identifying catch, species composition, size distribution, spatial distribution of tunas by type of FADs; and
- Assessing the catchability of STFO (small tuna on floating objects) in relation to the FAD designs (depth of FAD appendages, electronics, non-tuna associated fish, artificial light, etc.)

Attachment 1

FAD 조업일지 (logbook)

선박명 : _____

작성자명 : _____

연도 : _____

일자		FAD 수				FAD 형태			FAD 규격			부표	
월	일	설치	관찰	수거	유실	표식	유형	재질	폭 (m)	길이 (m)	높이 (m)	표식	형태

※ 작성요령

- * 일자 : FAD를 설치, 관찰(FAD 상태 관찰 후 유실된 것으로 확인된 경우에도 기록), 또는 수거한 날짜를 기입
- * FAD 수 : 설치, 관찰 (조업은 하지 않고 단지 기존에 설치한 FAD의 상태를 확인하는 경우로, 조업에 계속 사용하는 경우에는 관찰에, 유실된 것으로 확인된 경우에는 유실에 기록), 또는 수거한 FAD 수를 기입
- * FAD 유형 : 부유식 또는 고정식 FAD인지를 기입
- * 부표 형태 : GPS를 사용, 인공위성과 수음향기를 사용, 인공위성과 소나를 사용, 수음향기/소나 없이 인공위성만을 사용 등을 기록

Maldives FADs Management Plan

Ministry of Fisheries and Agriculture
Male'

Anchored Fish Aggregating Device (AFAD) Management Plan of Republic of Maldives

Introduction

The use of Anchored Fish Aggregating Devices (AFADs), locally known as *Oivaali Kandhufathi*, is very popular among the fishers of the Maldives. The AFAD project which started as an experimental project funded by the Food and Agriculture Organisation (FAO) of the United Nations has proven to be successful and expanded into to a country wide AFAD installation programme.

This AFAD Management Plan is prepared on a condition under Indian Ocean Tuna Commission (IOTC) Resolution 13/08 *“Procedures on a fish aggregating devices 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”*.

AFAD in the Maldives

Anchored fish aggregating devices (AFADs) are an important aspect of the Maldivian pole and line fishery. AFADs are intended to be used only by pole and line fishery targeting skipjack tuna and are deployed in oceanic waters some 8 – 20 nautical miles from the shore.

As mentioned earlier, Experiments with AFADs began in the Maldives in 1981. The first attempt was an FAO-assisted experimental project (1981-82) to study the effectiveness and demonstrate the possible use of AFADs. Thereafter, the United Nations Development Programme (UNDP) sponsored the installation of AFADs during 1985- 1988. From the very first trials, AFADs have been a great success in the Maldives and since their deployment there have been a marked increase in catch. Due to the favourable outcomes of the two projects, government decided to implement a countrywide programme of FAD construction, installation and maintenance programme.

Since skipjack tuna fishery in the Maldives is based on live-bait pole and line fishing, fishermen often spend long time searching for surface-swimming schools of fish. AFAD helps not only to reduce searching time and fuel costs, but they also have significantly contributed to increase in production. It has now become normal practice and routine for the small scale fishermen to visit the closest AFAD first thing in the morning after collecting live bait. Only if fishing were poor around the AFADs would they search for free swimming schools. The larger fishing vessels generally venture further into the sea in search of large free swimming fish schools and mostly stop at the AFADs if the catch is bad. This is because the guaranteed fish catch at the AFAD, though in small numbers, facilitated to cover the day's fuel and other running cost of the vessel. Thereby, AFADs in the Maldives plays a vital role in the sustainability of fisheries and fisher's livelihood for small scale fishers and larger fishing boats.

The first few AFADs were installed on a cost shared basis with government and the fishermen. based on the finance of fishermen and government. Later on, private companies funded 50 percent of the total cost, while the other 50 percent was financed by the government. Now the government fully funds the construction, installation and maintenance cost of the AFADs. All this work is carried out from the start till now by the FAD Unit of MOFA. The government of Maldives tries to maintain a network of about 50 AFADs across Maldives and takes the sole ownership of AFADs installed in the Maldives (See Annex 1 for current deployments). Since MOFA is the only allowed institution to construct, maintain and deployment of AFADs, it ensures that the AFADs are not deployed in protected areas, reserves and shipping lanes.

MOFA announces the deployment of AFAD (new or repaired) through various media channels and it will be published in government gazette. The deployment information is also relayed to the public via MOFA website and various social media. The FAD unit of MOFA maintains an inventory of the AFAD deployment,

their geographic coordinates, dates of deployment and lost and other information. This information is also regularly updated and is available for public upon request. The anchored FADs are clearly numbered by the AFAD number and labeled “Ministry of Fisheries and Agriculture”.

According to article 17 of fisheries regulation, using of live bait trolling, handline are not allowed within the limit of 3 nautical mile radius around AFADs restricting the access of AFAD to only pole and line fishery. As the pole and line tuna fishery is highly targeted, there is very limited number of incidental bycatch and if there is any, it would be reported in the logbooks. However, the interaction with handline fishing vessels and the pole and line fishing vessels have been a pressing issue for MOFA.

Since AFADs are widely used by the fishermen, they take the responsibility of monitoring the AFADs. If there are damages or if AFADs are lost, the fishermen report it to MOFA or the island office about the incident. In some cases, the AFADs are retrieved by the fishermen and are brought back to the island.

AFAD Construction and design

The AFAD construction in the Maldives has taken several years for it to be perfected. Figure 1 shows the schematic diagram of FAD system used in the Maldives.

The floating section of the Maldivian AFAD consists of a spherical buoy, five feet in diameter, made of Fiberglass Reinforced Plastic (FRP) material that is then filled with polyurethane foam (see figure 1). To make it easier for the fishermen to locate the AFAD, some buoys include a mast to accommodate a light, a power source (usually solar panels with rechargeable batteries) a radar reflector and a flag (Shainee & Leira, 2011).

The anchoring section consists of sixteen individually reinforced concrete blocks are arranged to form two large anchor slabs (see figure 1), each weighing approximately 1200 – 1300kgs. The individual blocks are designed to lock onto each other. Furthermore, corrugated iron bars are driven through prefabricated holes in the individual blocks and welded to further hold the blocks together. These anchor slabs weigh enough to hold the FAD in position (Shainee & Leira, 2011).

The mooring section consists of 15% nylon rope, 75% polypropylene rope, 10% wire rope (plastic jacketed). Both these ropes are 20mm in diameter. In addition, long link chains, which are approximately 15mm in diameter, are applied at the bottom of the mooring line in order to prevent the synthetic rope from touching the bottom sediments.

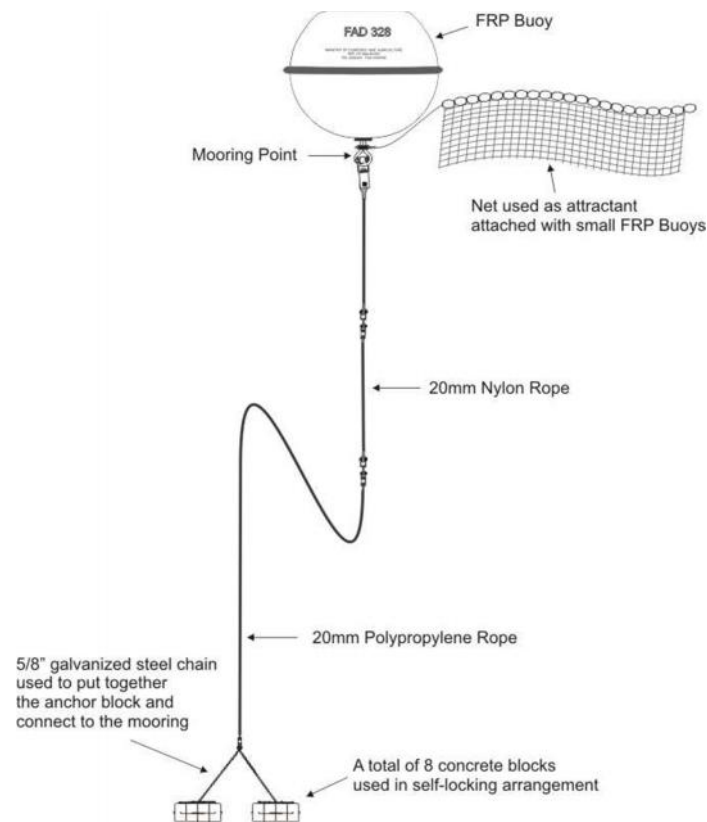


Figure 1: Schematic diagram of an AFAD system used in the Maldives

In Maldives, for the attraction section, nets of large mesh size (4sq inch) with thick twine (6mm in diameter) are used an attractant is connected to the floated buoys as shown in figure 1.

Current Regulatory Framework

Article 13 of Fisheries Regulation states the responsibilities of MOFA in deployment of the AFADs and states that the information of the deployment should be announced to the public including installation and locations of FADs.

The article also states that the size information (estimated length and weight) and catch log information within 5 mile radius from AFADs should be reported to MOFA via island offices.

The article further states that use of drop line, live bait trolling, fishing of sharks, trolling, hand line fishing, and mooring of vessels or any action which can damage the AFAD is banned within 3 mile radius from an AFAD.

Article 18 of Fisheries Regulation states that private parties desiring to install an AFAD on its own expenses may make a request to MOFA. Half of the expenses incurred in the installation of the device shall be borne by MOFA. AFAD will only be installed if MOFA deems fit to install it in the desired location. The article reiterates that such FADs shall be accessible to all fishermen.

Article 3 of Yellowfin tuna fishing and export regulation also re-iterates that handline fishing targeting yellowfin tuna fishing within 3 mile radius from an AFAD is banned and fishermen to observe the 3 mile radius based on current and wind.

Current data collection

Logbooks are issued to all fishing vessels and are mandatory for all vessels to report their catch in log sheets after each trip. The revised log books, disseminated during 2013, requires that the catch be reported based on the school type (association), allowing for the differentiation of FAD and free school associated catch,

MoFA has in place, mechanisms to ensure reporting of catch via the logbooks. License issued to a vessel may be terminated if a vessel fails to report its logbook data for a consecutive 6 month period. Catch from such a vessel cannot be sold for export, processed for export or utilized for a commercial purpose.

Objectives

The major objectives of the AFAD management plan are:-

1. Improvement of the design of AFADs to reduce incidence of entanglement of marine turtles, sharks and other species.
2. Improvement in information dissemination of deployment and lost AFADs.
3. Strengthening monitoring, control and surveillance of fishing activities near AFADs.

Scope

The AFAD management plan will apply to all licensed fishing vessels operating under Fisheries Act (5/87), 1987 fishing for tuna near Anchored Fish Aggregating Devices installed by the government in the Maldivian waters.

Since MOFA is the only legal binding body to construct, install and maintain Anchored Fish Aggregating Devices in the Maldives under fisheries regulation's article 17 and 18, most of the actions in the management plan falls under their jurisdiction.

Objective 1: Improvement of the design of AFADs to reduce incidence of entanglement of marine turtles, sharks and other species.

Strategies	Actions
Reduce incidence of entanglement of ETP species in AFADs.	Ensure only small meshed nettings are used in the attractant section of the AFAD, as currently practiced, to reduce incidence of entanglement of marine turtles, sharks and other species.
Increase the use of environmentally friendly materials in the construction of AFADs	<p>Conduct research in the usage of biodegradable materials in the construction of attractant section of the AFADs.</p> <p>Ensure that requirements and specifications in IOTC Resolution13/08 regarding construction of AFADs are fulfilled.</p>

Objective 2: Improvement in information dissemination of deployment and loss of AFADs.

Strategies	Actions
Use of various forms of media to inform the public on the deployment and loss of AFADs.	<p>Announce the deployment of AFADs via MOFA website, TV and Radio stations and social media</p> <p>Establish an effective mechanism to report lost AFADs.</p> <p>Improve mechanism to locate and retrieve lost AFADs.</p>

Maintain a registry of AFADs installed in various locations in the country.

Objective 3: Strengthening monitoring, control and surveillance of fishing activities near AFADs

Strategies	Actions
Strengthening data collection of AFAD fishery	<p>Strengthening existing data collection through the revised (2013) logbooks.</p> <p>Strengthen the mechanism to take actions against vessels which do not submit logbook data.</p> <p>Ensure that the reporting of AFAD catches are consistent with standards for provision of catch and effort data set out in IOTC Resolution 13/03.</p>
Reduction of incidental bycatch.	<p>Fully utilize the bycatch caught in the AFAD fishery.</p>
Minimise activities that could be detrimental to the lifespan and effectiveness of the AFAD.	<p>Monitor the activities of the fishing vessels through satellite based Vessel Monitoring System (VMS) programme.</p> <p>Increase surveillance of fishing operations near AFADs.</p> <p>Establish a mechanism to report activities that could decrease the lifespan and effectiveness of the AFAD.</p>

Institutional arrangements for management of the AFAD Management Plan

Since, under fishery regulation, construction, maintenance and deployment of AFADs lies under the responsibility of Ministry of Fisheries and Agriculture (MOFA), most of the implementation of actions and objectives in the management plan lies with MOFA. They also are responsible to collect data and analyze the distribution and pattern of catches in AFADs. MOFA is also responsible for creating awareness and the development of AFAD fishery in the Maldives.

Marine Research Center of MoFA is responsible for the collection of scientific data from the AFAD associated catch.

Fishermen and Island councils assist MOFA to monitor the status of AFADs in the country. It is also the responsibility of the fishermen and fishing vessel owner to ensure the logbook data are reported to MOFA.

MOFA, Coast Guard and Marine Police are responsible to investigate and identify illegal fishing activities near AFADs and take legal action against it.

Monitoring and reviewing implementation of the Management Plan

MOFA and MRC shall monitor the level of implementation of actions prescribed in the management plan and report to the Fisheries Advisory Board annually. The issues identified in the report shall be addressed and the management plan will be reviewed under the guidance of the Fisheries Advisory Board.

Annex 1: EXISTING ACTIVE AFADS (as of 24 November 2013)

	AFAD No	Atoll	Island	Location	Latitude	Longitude
1	272	Ha.Alifu	Ihavandhoo	16.5 miles NW of Thuraakunu	07 18 26 N	72 42 40 E
2	371	Ha.Alifu	Huvarafushi	20 miles W of Hathifushi	07 01 00 N	72 30 15 E
3	372	Ha.Alifu	Dhidhdhoo	17 miles N of Kelaa	07 14 20 N	73 12 42 E
4	279	Ha.dhaalu	Bodunaagoshi	16 miles W of Bodunaagoshi	06 41 17 N	72 37 28 E
5	175	Shaviyani	Komandoo	13.4 miles NW of komandoo	06 08 18 N	72 49 60 E
6	281	Shaviyani	Funadhoo	11.5 miles NE of Funadhoo	06 12 32 N	73 28 30 E
7	370	Shaviyani	Komandoo	23 miles SW of komandoo	06 00 15 N	72 41 39 E
8	369	Noonu	Maafaru	8.5 miles E of Maafaru	05 49 52 N	73 37 32 E
9	315	Raa	Kandholhudhoo	16.8 miles W of Hura, near Kandholhudhoo	05 42 40 N	72 34 29 E
10	333	Raa	Meedhoo	16 miles W of Maafaru	05 25 23 N	72 35 16 E
11	390	Baa	Thulhaadhoo	12.6 miles NW of Thulahadhoo	05 08 04 N	72 40 13 E
12	351	Lhaviyani	Olhuvelifushi	12 miles SE of Olhuvelifushi	05 13 47 N	73 48 13 E
13	365	Lhaviyani	Faadhoo	10.25 miles NE of Faadhoo	05 30 02 N	73 47 23 E
14	389	Kaafu	Gaafaru	14 miles E of Gaafaru	04 45 18 N	73 43 45 E
15	334	Kaafu	Maafushi	12.6 miles SE of Maafushi	03 52 01 N	73 41 17 E
16	388	Kaafu	Dhiffushi	13 miles E of dhiffushi	04 25 29 N	73 55 40 E
17	317	Alifu/N	Maalhos	15 miles SW of Maalhos	03 54 09 N	72 29 04 E
18	377	Alifu/N	Ukulhas	15 miles NW of Mathiveri	04 16 23 N	72 32 06 E
19	381	Vaavu	Keyodhoo	17 miles NE of Keyodhoo	03 35 05 N	73 48 25 E
20	323	Meemu	Maduvvari	12 miles NE of Raiymandhoo	03 08 37 N	73 49 29 E
21	335	Meemu	Mulah	10.5 miles SE of mulaku kandhu	02 50 39 N	73 47 47 E
22	346	Meemu	Dhithudi	16 miles SE of dhithudi	02 33 39 N	73 34 58 E
23	385	Faafu	Nillandhoo	14 miles SW of Himithi	03 07 00 N	72 36 55 E

					N	E
24	382	Dhaalu	Hulhudheli	15.5 miles W of Hulhudheli	02 50 53 N	72 34 58 E
25	386	Dhaalu	Kudhahuvadho	14 miles SW of Kudhahuvadho	02 33 03 N	72 40 04 E
26	341	Thaa	Guraidhoo	9 miles SE of Guraidhoo	02 16 07 N	73 27 15 E
27	383	Thaa	Hirilandhoo	15 miles SW of Hirilandhoo	02 12 22 N	72 42 11 E
28	347	Laamu	Hithadhoo	12 miles SE of Hithadhoo	01 38 10 N	73 30 34 E
29	378	Laamu	Maavah	14 miles SW of Maavah	01 45 12 N	73 04 23 E
30	379	Laamu	Fares	10 miles S of Fares	01 38 30 N	73 16 35 E
31	384	Laamu	Maabaidhoo	11 miles E of Maabaidhoo	02 02 22 N	73 43 16 E
32	261	Ga.Alifu	Dhaandhoo	16 miles E of Dhaandhoo	00 37 16 N	73 44 05 E
33	337	Ga.Alifu	Dhevvadhoo	17 miles NW of Meradhoo	00 46 00 N	72 52 00 E
34	354	Ga.Alifu	Kolamafushi	14 miles NW of Kolamafushi	01 00 36 N	73 03 54 E
35	348	Ga.Dhaalu	Thinadhoo	16.5 miles SW of Thinadhoo	00 25 83N	72 45 11 E
36	367	Ga.Dhaalu	Fiyori	12.5 miles S of Fiyori	00 00 59 N	73 06 26 E
37	368	Ga.Dhaalu	Gadhdhoo	13 miles S of Gahdhoo	00 02 39 N	73 30 21 E
38	327	Gnaviyani	Fuamulah	10 miles E of Foamulah	00 16 59 S	73 36 30 E
39	391	Seenu	Gan	13 miles SW of Gan	00 54 31 S	73 08 51 E
40	355	Seenu	Maradhoo	20 Miles E of Villigili	00 44 32 S	73 27 79 E
41	362	Seenu	Hithadhoo	13 miles NW of Hithadhoo	00 31 53 S	72 52 44 E
42	376	Seenu	Feydhoo	17 miles SW of Gan Kandhu	00 49 44 S	72 55 59 E
43	292	Gnaviyani	Fuamulah	11.5 miles SE of Foamulah	00 30 43 S	73 27 55 E

Mauritius FADs Management Plan

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				Numéro d'immatriculation				
LOCH / CORREDERA / LOCH	0	LOCH / CORREDERA / LOCH	1400		MAREE		Port d'immatriculation				
						EXEMPLE		Signal d'appel international			
								Numéro OMI			
								Numéro CFR			

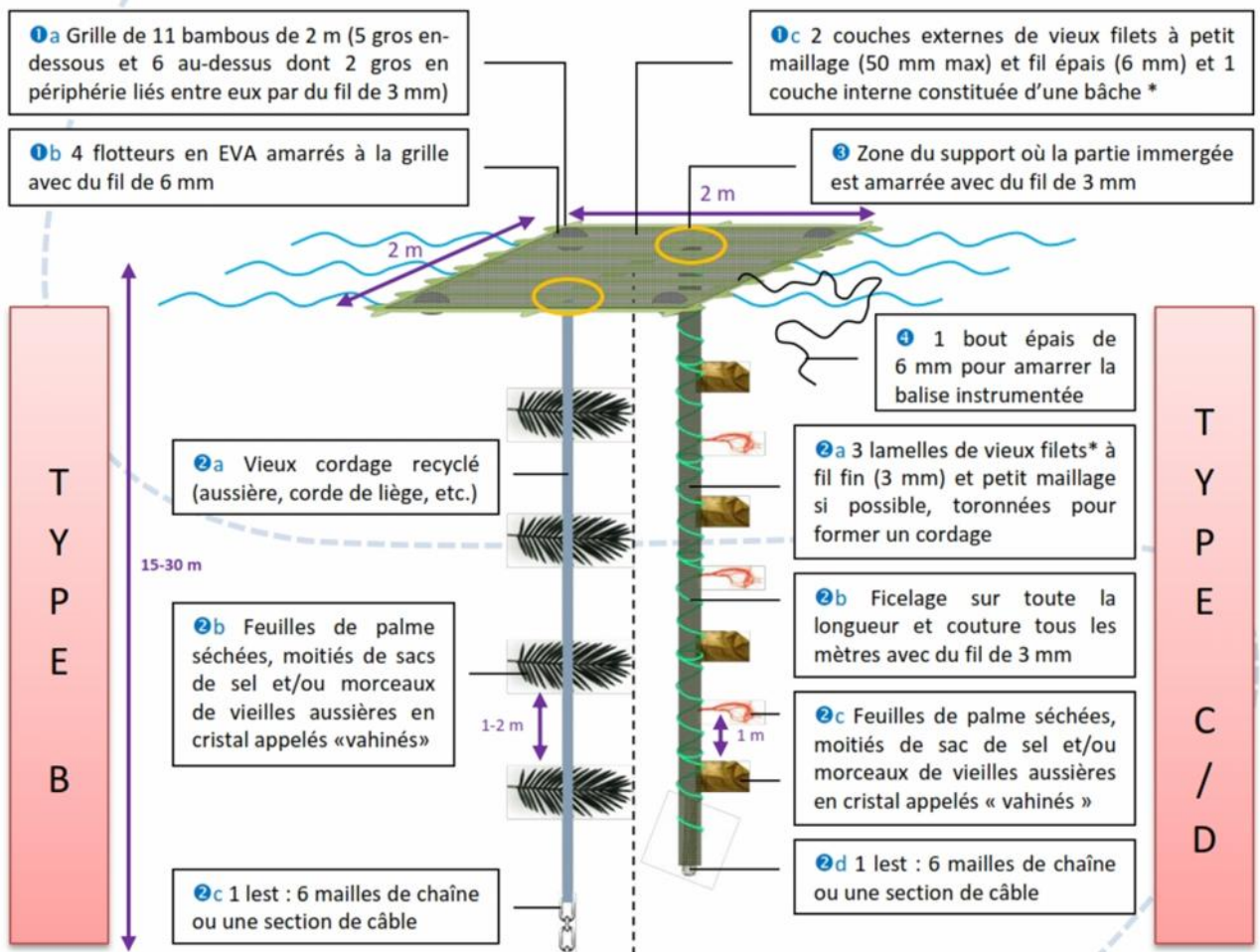
DATE	POSITION (chaque calée ou à midi)	CALEE LANCE SET	CAPTURE ESTIMEE (en tonnes) ESTIMACION DE LA CAPTURA (en toneladas) ESTIMATED CATCH (metric tons)												ASSOCIACION ASSOCIATION ASSOCIATION				Balise Boyas Buoy		DCP DCP FAD		ZEE ZEE EEZ	COMMENTAIROS COMENTARIOS COMMENTS	VENT VIENTO WIND		
			1 ALBACORE RABIL YELLOWFIN	2 LISTAO LISTADO SKIPIACK	3 PATUDO PATUDO BIGEYE	4 GERMON ALBACORA ALBACORE	AUTRE ESPECE Préciser Nom(s) OTHER SPECIES give name(s)	REJETS Préciser le / les nom(s)			Banc/ligne/banco/línea/free school # (nombre/cantidad) A (artibolo/artibulo) Bateau d'assistance Barco de apoyo / Supply Balise / Baliza / Beacon Requin Baleine Tiburón Baleina / Shark Whale Baleine / Baiena / Whale	Type :	MSI M3I M4I	CRÉER UNE LIGNE PAR EVENEMENT SUR DCP NATUREL OU ARTIFICIEL	NOM DE LA ZEE (hors zee indiquer eaux internationales)	Problèmes divers Prise accessoire Taille du banc Autres associations Autres remarques	T° Mer / Mar / Sea	Direction / Dirección / Direction Grados / Grados / Degree	Vitesse / Velocidad / Speed Nudos / Nudos / Knots								
								DESCARTES dar el / los nombre(s)												DISCARDS give name(s)			NOMÉRO	VISITE AVEC PECHE VISITE SANS PECHE RETRAIT PERTE / FIN TRANSMISSION BALISE			
								YFT+10		YFT-30										SIKJ		BET			ALB		
			Taille	Capture	Taille	Capture	Taille	Capture	Taille	Capture										Taille	Capture	Taille			Capture		
Size	Catch	Size	Catch	Size	Catch	Size	Catch	Size	Catch	Size										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							Listao	1 kg	3 t	A	X	MSI 17024	VISITE AVEC PECHE	Eaux Internationales		27,8 °	135 °	5 nds		
10/01/2013	2°21N 11°20W		10:00														A	X	M3I 17035	MISE A L'EAU DCP ECO	Eaux Internationales		28 °	135 °	5 nds		
10/01/2013	2°25N 9°W		12:00														N	X	M3I 17046	VISITE SANS PECHE	Eaux Internationales	Bille de bois	27 °	135 °	4 nds		
10/01/2013	2°20N 10°5W		13:00														A	X	M4I 80170	CHANGEMENT DE BALISE	Eaux Internationales	Transfert sur radeau koréen	28 °	157 °	5 nds		
10/01/2013	2°15N 9°5W		14:00															X	D+ 22330	RETRAIT	Eaux Internationales	balise décrochée du DCP	28 °	155 °	4,5 nds		
10/01/2013			15:00																M3I 60870	PERTE / FIN TRANSMISSION BALISE	Eaux Internationales	Balise volée 4°26S - 2°27W					

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 ?

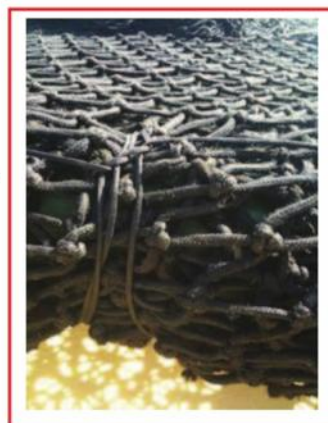
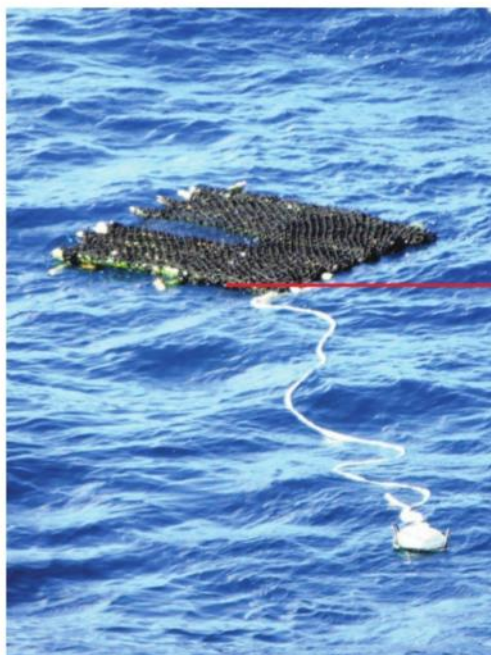
- ✓ Par des « vahinés », des sacs de sel et/ou des feuilles de palme séchées qui permettent d'agrandir la surface de la structure immergée pour jouer le rôle d'ancre flottante (renforcement de la prise aux courants) et le rôle de refuge (augmentation des niches et interstices).



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

ANNEXE 3 : PHOTOS DE DCP NON-MAILLANTS

a) DCP non-maillants en mer



b) DCP non-maillants déployés dans l'océan Indien

Design B



Design C/D

