

## **The Spanish Fish Aggregating Device Management Plan from 2010-2013**

by

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### **ABSTRACT**

*This document analyzes the Fish Aggregating Device National Management Plan undertaken by the Spanish General Secretariat of Maritime Fisheries (Ministry of the Environment, Marine and Rural Affairs), in collaboration with the Spanish Institute of Oceanography (Ministry of Economy and Competitiveness), which is compulsory since January 2011 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 document also presents the data collected in the Spanish FAD management plan since 2011.*

*Key words: Atlantic Ocean, tropical tuna, purse seine, catches, fishing effort, artificial floating objects, bycatch species, sizes, catch-per-unit-of-fishing-effort*

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## 1 Introduction

Tuna purse seiner FAD fishery started around 1990 when various purse-seiner fleets began to attach buoys to natural floating objects to facilitate retrieval and also start deploying artificial floating objects. This change in the fishing practices led to a rapid increase in the purse seiner tropical tuna catches due to an increase in fishing efficiency for the fleet. Currently, around 50% of sets made by these fleets on a worldwide scale are done using FADs; whereas this percentage is around 70% in the Indian Ocean.

The tuna fishery over floating objects results in characteristic catches, of mainly skipjack but it is also catching in a less extent juvenile of yellowfin and bigeye in mixed schools. The catch of juvenile bigeye and yellowfin has arisen some concerns on Tuna regional fisheries management organizations (RFMO) Scientific Committees about the effects of those catches in their respective populations which has led to various initiatives taken in different RFMOs. The dynamics of association and behaviour of the different species of tuna over floating objects is not known and is, thus, considered a high priority line of research which may contribute and help to improve the selectivity of this type of fishing. Moreover, specimens from other taxonomic groups (osteichthyan and chondrichthyan fish, and turtles) are also caught together with the target species. An example of these floating objects that the Spanish purse seine fleet uses in the tropical areas can be observed in the Image 1 constructed with non-entangling materials, to avoid catches of other species.

Although the purse seiner fleet in the Indian Ocean have provided the fishery statistics from the beginning of this fishery, the information provided has not been traditionally used in the stock assessment due to the methodological difficulties when standardizing the catch-per-unit-of-fishing-effort (CPUE)). This is not a particular issue for the Indian Ocean, it is a general difficulty that all Tuna RFMOs are facing with (ISSF, 2012). During a recent workshop held in 2012 the Purse seiner CPUE index issue was discussed and several recommendations, such as the use of FAD information for improving the CPUE standardization, were developed. Recent PS CPUE index developed for juveniles caught on FADs has been presented and used as recruitment index for bigeye (WPTT, 2013) in the assessment process, providing a coherent information with the models used.

Thus, the debate on FAD fishing, in terms of improving selectivity, stock assessment and their effect on the populations, is being taken place since the development of this mode of fishing, and measures to manage FAD fisheries have been adopted as early as in 1997 in ICCAT and 1998 in IOTC. During last years, this discussion in the Scientific Committees of Tuna RFMOs has showed that there is a need for a more comprehensive, standardized and routine data collection on the use of FADs and, thus, several tuna RFMOs have agreed resolutions whereby all parties are required to establish fish aggregating device (FAD) management plans. In the particular case of the Indian Ocean Tuna Commission, Resolution 13-08 established that CPCs having vessels fishing on FADs shall submit a FAD management plan which includes a part of FADs inventory, where the number of FADs per vessel, characteristics and identifiers of the different FADs, efforts to mitigate bycatch, institutional agreements, etc...are included and a component of FAD activities (FAD logbook) where FADs fishing activities are recorded. The information contained in Resolution 13-08 shall be submitted to IOTC in the usual aggregated levels for the PS fishery statistics from 2015 onwards.

The purpose of the agreed FAD management plan is to gather information and monitor the FAD fishery which will contribute to understand better the effect of this fishery on the populations, to improve the CPUE standardization of this fishery, to contribute to the mitigation of non-target and juvenile BET and YFT catches and, hence, to provide a better management framework for the tuna and ecosystem sustainability when considering in conjunction with the data provided by other countries and fisheries.

## 2 FAD Management Plan for the Spanish tropical purse-seine fleet

Although the FAD management plan resolution has been agreed in IOTC in 2013, in light of the discussion held by different RFMOs, the Ministry of Agriculture, Food and Environment, in close collaboration with the Instituto Español de Oceanografía and the Spanish tropical tuna purse seine fleet organisations, laid down a Fish Aggregating Device Management Plan for the national fleet in 2010 which has been running since then. 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.

## Background of the Spanish FAD Management Plan

The prevailing fisheries regulations include several requirements that justify the implementation of a national FAD management plan for the tropical tuna fleet, such as the United Nations agreement on the conservation of fish stocks, the FAO code of conduct for responsible fisheries and Council Regulation (EC) No. 2371 on the conservation and sustainable exploitation of fisheries resources, etc. Moreover, the four RFMOs to which the tropical fleets belong have adopted several requirements that oblige the different administrations to monitor the FADs. In particular, the objectives of the Spanish Management Plan are:

- To produce a register of floating objects and their characteristics,
- To improve information collection,
- To improve knowledge of FAD catch composition,
- To further knowledge of FADs and their impact on the ecosystem,
- To establish mechanisms for information exchange between scientists and administrations.

In addition, the plan will facilitate compliance with a series of regulation of the UN doctrine on the marking of fishing gear (including FADs), and prevent and avoid residue and waste being dumped at sea.

Justification of objectives:

The application of such a plan by all members that practise fisheries over floating objects will provide the RFMO managing these resources with important information about the following:

- Number and characteristics of the deployed objects that are picked up and remain in the fishery,
- Catches made (bycatch species) over each object and their characteristics (per area, composition by species),
- Possibility of the individualized follow-up of each object: lifetime, trajectory followed, catches made (target and bycatch species, sizes, etc.) throughout the lifetime of the object.

Scope:

The regulations are binding for the entire tuna purse-seine fleet and its supply boats operating in all three oceans and flying the Spanish flag.

## Format to collect the information

The first two years (2011 and 2012) of the plan has provided a lot of information based on the formats initially developed (Tables 1 and 2). During this initial period, the vessels sent information in a variety of formats, using multiple names for the same material or for a similar event and, in many cases, the information was sent in text files. Thus, the processing of the information is taking longer than expected for these early records due to the variety of format used. However, the data compilation exercise done in 2011 and 2012 has provided a very valuable information on FAD inventory as well as activities but, more importantly, has allowed to fine-tune and develop new tables to more easily collect the data as well as standardized terminology to be used when filling in the new tables. This process has been done in close collaboration with the fleet and using fleet knowledge and feedback during the process. As such, in 2013, the format for data collection was refined and homogenized for some key elements. Table 3 shows the new information collection format for FAD inventory. All information pertaining to the type, shape and material of the object and type of buoy is included in this format. Each object is marked so as can be followed up throughout its lifetime. The information is provided in an Excel sheet containing several drop-down options in the fields that require defining or specifying. Table 4 provides an example of one of these drop-down sections and Table 5 lists all the drop-down tables in the inventory form.

Table 6 shows the new format for gathering information about activity over FADs or FAD logbook, which has been refined in 2013. This form contains a field to include the FAD identifier which will allow relating the activity of each FAD with the information of this FAD (characteristics, etc...) contained in the inventory form. Other fields are provided for buoy identification, information about the fishery activity over the object ( visit, loss, change of buoy, etc.), date and time, position and (in the event of a set) estimated total of tuna and bycatch. Tables 7 and 8 also show an Excel sheet, containing explanatory comments and drop-down sections.

**Preliminary analysis of the Fish Aggregated Management Plan information**

Since the beginning of the implementation of the plan in 2010, information started to be registered in 2011, vessel by vessel by each quarter for the Pacific, Atlantic and Indian Ocean. Information has been collected for a total of 41 vessel operating in the three oceans during this period with 56045 records registered up to now. Before the new excel version for collecting information was introduced, vessels provided a total of 42566 records of activities and inventory issues related with the FADs operations. After the implementation of the new collection format, the process of collecting and processing data has become more dynamic and easy to manage, and, in 2013, 13479 records have been obtained.

Table 9 shows the information recorded by year and quarter since 2011. This information is very exhaustive, valuable and innovative and needs to be further analyzed for scientific purposes. However, in this preliminary phase, the development and fine-tuning of the data format is the priority since the data presented for 2011 and 2012 in several formats (pdf, excel, word) are currently being converted to the new format implemented in 2013. This task requires a very exhaustive and time-consuming work of selecting and validating information from the initial records.

**Conclusions**

Spain has been pioneer in the development and implementation of the plan, and this has provide a new opportunity to improve the collaboration between the Spanish fleet and the scientists, learning both parties in an adaptative process of managing the available information on FADs with the goal of improving the scientific knowledge of populations.

As it was mentioned before, in recent IOTC meetings a proper measure of effective fishing effort definition for fishing on FADs is needed. This is a key point to define a standardized CPUE index of abundance for the purse seine fishery to be accepted as a representative measure of real abundance of juveniles of tropical tunas. The information collected in the Spanish Fish Aggregated Management Plan will be fundamental to investigate new measures of effort for PS fleet and, hence, for the tropical tuna PS CPUE standardization. Also, the collaboration between EU PS fleets is needed to better understand the effect of fishing on FADs on the populations of the whole PS fleet as well as with other countries to assess the overall effect of the FAD (drifting and/or anchored) in the populations.

Furthermore, from a general management point of view, this plan could serve as a model for other fleets to imitate the process of collecting information from activities related to FADs and it is a good example of cooperation between science and the fishing industry.

During this period the goals of the Spanish Management Plan have been successfully achieved regarding to produce a register of floating objects and their characteristics, to improve information collection, to improve knowledge of FAD catch composition, to further knowledge of FADs and their impact on the ecosystem, and to establish mechanisms for information exchange between scientists and administrations.

The Spanish purse seine fishery in the Pacific, Atlantic and Indian oceans is relatively easy to manage due to several reasons: it is an industrial fishery with few vessels with a high level of cooperation to provide information to administration and scientists and also, easier for implementation of control measures than other fisheries on tropical tunas. But also it is important to remember that in the framework of the tropical tunas RFOs the implementation of an efficient management of the tuna stocks, not only the effect of FADs must be investigated, but also the rest of the fisheries involved in the tropical tuna catches.



ANEX I: Inventory												
Vessel				Registration								
FAD				FAD Dimensions			Rabo/Tail			Identification associated buoy	Type of associated buoy	Withdrawal or loss of FAD
Identification	Description	Material		width (m)	length (m)	height (cm)	depth (m)	material				

Table 3. New information collection format for FAD inventory (introduced in 2013).

A	B	C	D	E
ANEXO I: Inventario				
Buque:				Matricula:
DCP				
Identificación	Descripción	Material		
	Balsa de cañas y red Balsa (estructura metálica, PVC o plástico) Objeto no enmallado: Cualquier tipo de balsa o parrilla sin recubrimiento Natural (tronco, tecoys, paja, hierbas)			

Table 4. Example of drop-down sections in the new information collection format for FAD inventory.

Description
Raft of nets and reeds
Raft (metal, PVC or plastic structure)
Object with no mesh: Any kind of raft or rack with no covering
Natural (tree trunk, rope, pallet, grasses)

Drop-down tables ANNEX I (Inventory)

Type of buoy	FAD materials	Net or rabo/tail materials
GPS type SHERPE (ball)	Bamboo	Nylon
Satellite + echo sounder	PVC / Plastic	Piece of netting
Satellite without echo sounder/sonar	Metal	Tail-like
Satellite + sonar	Floats, corks, buoys, containers ...	Mesh material
	Piece of netting	Ropes
	Anti-fouling netting	Palm leaves

Table 5. Drop-down tables in the FAD inventory form.

ACTIVITY REGISTER

Vessel: \_\_\_\_\_ Registration: \_\_\_\_\_

Date	Time	FAD identification	Buoy identification	Activity	Position		Estimation of school (ton)	Estimation of accidental bycatch				Observations
					Lat	Long		Group	In no. specimens or weight (t)	No./W	No. specimens released alive	
D/M/Y	H/Min				Degree/Min	Degree/Min						

Table 6. New information collection format for activity over FADs (introduced in 2013).

Table 7. Explanatory comments inserted in the activity register.

Groups	Activity	Bycatch
Turtles	Deployment	N
Billfish, marlins	Verification	W
Swordfish	Set	
Frigate tuna	Collection	
Atlantic little tuna	Change of buoy	
Whale shark	Natural floating object	
Marine mammals	Loss	
	Recovered in port	

Table 8. Drop-down tables in the FAD activity form.

INVENTORY AND ACTIVITY on FADs Pacific, Atlantic and Indian Ocean		
Number PS Spanish vessels (2011-2013)		41
Number of records		
Year	2011	15364
	2012	26889
	2013	13792
Format	Initial format	42566
	Actual format	13479
	TOTAL	56045

Table 9. Number of records of Spanish Fishing aggregate Devices management plan from 2011 to 2013.



Image 1. Example of non entangling FAD in a Spanish Purse Seiner vessel.