

**CRFM Technical & Advisory Document Series  
Number 2015 / 04**

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**Report of  
WRITE-SHOP ON FAD FISHERIES MANAGEMENT**

A joint activity of the  
CRFM PELAGIC FISHERIES WORKING GROUP &  
CRFM/WECAFC/JICA/IFREMER WORKING GROUP ON FISHERIES USING  
FISH AGGREGATING DEVICES (FADs)



**23-25 June 2015  
Kingstown, St. Vincent & the Grenadines**

# CRFM Technical & Advisory Document - Number 2015 / 04

## Report of Write-shop on FAD Fisheries Management

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# **CRFM TECHNICAL & ADVISORY DOCUMENT – Number 2015 / 04**

## **Report of Write-shop on FAD Fisheries Management**

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Correct Citation:

CRFM, 2015. Report of Write-shop on FAD Fisheries Management. Kingstown, St Vincent and the Grenadines, 23-25 June 2015. *CRFM Technical & Advisory Document*, No. 2015/ 04. 24p.

**ISSN: 1995-1132**

**ISBN: 978-976-8257-13-0**

Published by the Caribbean Regional Fisheries Mechanism Secretariat,  
Belize and St. Vincent and the Grenadines.

## **ACKNOWLEDGEMENTS**

Funding for this Write-Shop on FAD Fisheries Management was made possible through the core funds of the Mechanism, derived from financial contributions of the CRFM Member States, as well as from other partners of the CRFM/WECAFC/JICA/IFREMER Working Group on Fisheries using Fish Aggregation Devices, in particular the Caribbean Fisheries Co-management Project (CARIFICO Project) and the French Research Institute for Exploitation of the Sea (IFREMER). The financial support of the following institutions is also acknowledged: the French Embassy in Saint Lucia, the Pôle Agroalimentaire Régional Martinique (PARM), the Comité Régional des Pêches et des Elevages Marins (CRMEM) of Guadeloupe and Impact Mer.

The CRFM is grateful to all participants of the Write-Shop for their time and expertise in drafting the various sections of the Manual on Best Practices in FAD Fisheries Management. We also would like to express our gratitude to Consultant Dr Henri Vallès Rodriguez, who was engaged to develop a Sub-Regional Fisheries Management Plan for FAD Fisheries in CRFM Member States, for presenting the second draft of this document for review and feedback at the write-shop.

Ms Pamela Gibson, Administrative Secretary of the CRFM Secretariat, is also gratefully acknowledged for her assistance in the formatting, general review and minor editing of the content of the report.

## **LIST OF ACRONYMS AND ABBREVIATIONS**

CARIFICO	Caribbean Fisheries Co-management project
CRFM	Caribbean Regional Fisheries Mechanism
DED	Deputy Executive Director
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization of the United Nations
FMP	Fisheries Management Plan
ICCAT	International Commission for the Conservation of Atlantic Tunas
IFREMER	L'Institut Français de Recherche pour l'Exploitation de la Mer (French Research Institute for Exploitation of the Sea)
IUU	Illegal, Unreported and Unregulated fishing
JICA	Japan Overseas Cooperation Agency
MAGDELESA	Moored fish AGgregating DEvice in the LESser Antilles
PMRRA	Programme Manager, Research and Resource Assessment
RFB	Regional Fishery Bodies
RFMO	Regional Fishery Management Organization
WECAFC	Western Central Atlantic Fishery Commission

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## 1. BACKGROUND

FAD fisheries have been introduced in several CRFM Member States as a means of relieving pressure on overexploited inshore resources, reducing the overall cost of fishing, improving the livelihood of fishers and food security of the respective countries. Efforts in the exploration of FAD technology and development of FAD fisheries in some CRFM Member States have yielded tremendous experience and knowledge regarding the range of management issues and possible solutions associated with FAD fishing. Recent initiatives, through the CRFM/JICA Study on Formulation of Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean (JICA Master Plan Study - JICA, 2012), the MAGDELESA Project implemented by IFREMER (Reynal *et al.*, 2015) and now the JICA CARIFICO Project, as well as collaborative research with the University of Florida, have sought to share information on the best practices in the design, construction, deployment and use of FADs, as well as information on fisheries dynamics, gear selectivity, fish quality and overall governance. Specific solutions to addressing conflicts between FAD fishers with other users of the ocean space, safety issues as well as data collection on FAD fisheries have also been explored.

Recognizing the need for regional collaboration in the management of FAD fisheries and the respective pelagic resources the CRFM-JICA CARIFICO/WECAFC-IFREMER MAGDELESA Workshop on FAD Fishery Management convened in December 2013 posed several recommendations to the 15<sup>th</sup> Session of WECAFC (CRFM, 2013). Among these recommendations was the regional harmonization of national FAD fishery management plans in accordance with the best available information and consistent with international best practices. The Workshop also recommended the development of a “*Manual for Good Practices*”, to include, but is not restricted to, *FAD construction and deployment, FAD preservation and quality, FAD harvesting practices and FAD Fishery Management*. This commitment is also reflected in the Terms of Reference of the CRFM/WECAFC/JICA/IFREMER Working Group on Fisheries using Fish Aggregating Devices (WECAFC, 2014), now led by the CRFM with WECAFC, JICA and IFREMER as partners, and with the Dominica Fisheries Division as Convener. It is also consistent with the Terms of Reference of the CRFM Pelagic Fisheries Working Group (CRFM, 2015). Consequently, the related activities have been approved by the 13<sup>th</sup> meeting of the Caribbean Fisheries Forum for completion in the 2015-2016 programme year with a write-shop to be convened to advance development of the Manual (CRFM, 2015a).

In March 2015 the CRFM Secretariat convened an e-meeting of the partners of the CRFM/WECAFC/JICA/IFREMER Working Group on Fisheries using Fish Aggregation Devices to discuss a possible format for the Manual on Best Practices in FAD Fisheries Management and to identify potential authors. It was agreed that the manual would comprise five main sections: (1) FAD Fisheries Governance; (2) FAD Design, Construction and Maintenance; (3) FAD Deployment, Use, Fisher Safety and Work Conditions; (4) Fish Quality and Marketing; and (5) Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs. Both English-speaking and French-speaking section leaders were proposed and subsequent to the meeting other authors were proposed (Appendix 1). The meeting also agreed that draft sections of the Manual would be submitted for review prior to the write-shop. A DropBox was created for the sharing of all documents relevant to development of the Manual.

In keeping with the recommendation of the December 2013 workshop pertaining to harmonization of national FAD fishery management plans (CRFM, 2013), a consultant was engaged to develop a Sub-Regional Management Plan (FMP) for FAD Fisheries of CRFM Member States as one of the activities of the CRFM Pelagic Fisheries Working Group for the 2015-2016 programme year. It is expected that the recommendations contained in both the FMP and Manual would be complementary, with the overall management objective to optimize the long-term socio-economic benefits from FAD fisheries while at the same time seeking to ensure the long-term sustainability of the respective resources.

## **2. OBJECTIVES OF THE WRITE-SHOP**

The specific objectives of the Write-Shop were to:

- a. Discuss and agree on a final format and table of contents for the Manual of Best Practices in FAD Fisheries Management, a timeline for submission of final versions of articles, review, editing and publication of the final output;
- b. Review, discuss and make recommendations for improving the content of draft sections of the Manual at (a) submitted by meeting participants prior to the write-shop;
- c. Write sections of the Manual at (a) and based on (b) improve those sections already written;
- d. Determine the process for finalization of the Manual;
- e. Review, discuss and make recommendations for improving the draft Management Plan for FAD fisheries.

## **3. APPROACH**

The Write-Shop was conducted as an informal session at the CRFM Secretariat's Eastern Caribbean Office in St Vincent and the Grenadines from 23 to 25 June 2015. It focused mainly on development of the Manual on Best Practices in FAD Fisheries Management (the Manual). Although a draft agenda was proposed there was opportunity for flexibility in order to advance the writing process. The agenda, as reflective of the actual activities, is given in Appendix 2.

There was an informal welcome delivered by the Deputy Executive Director (DED) of the CRFM Secretariat, Dr Susan Singh-Renton. The DED in her welcome statement reminded the meeting participants of previous efforts leading to the convening of the write-shop, the main objectives of the write-shop and the relevant regional instruments, including the Caribbean Community Common Fisheries Policy and the Castries Declaration on Illegal, Unreported and Unregulated Fishing. She expressed her continued support for development of the Manual and wished the participants a successful write-shop.

The Programme Manager, Research and Resource Assessment (PMRRA), Ms Elizabeth Mohammed, said the opening prayer and chaired the discussion sessions of the write-shop.

## **4. INTRODUCTION OF PARTICIPANTS**

The write-shop participants were invited to introduce themselves and to indicate their expertise and areas of interest pertaining to the writing of the Manual. The full list of participants is provided at Appendix 3. Dr Kai Lorenzen, Fisheries Specialist of the Florida Sea Grant Extension Program, joined via skype for the presentation and discussions concerning the background, objectives and expected outputs of the Write-Shop. The DED also participated in this session as well as the session at which the Draft Sub-regional FMP on FAD Fisheries was presented and discussed on the first day. JICA Expert (Fisheries Management), Mr Minoru Tamura, of the CARIFICO Project participated in the sessions of the first day.

## **5. BACKGROUND, OBJECTIVES AND EXPECTED OUTPUTS OF THE WRITE-SHOP**

The PMRRA delivered a powerpoint presentation on the background, objectives and key outputs of the Write-Shop. She reminded the participants of the following Terms of Reference of the CRFM/WECAFC/JICA/IFREMER Working Group on Fisheries using Fish Aggregating Devices (FADs):

- a. To consider data on FAD fisheries in analyses of pelagic fish resources;

- b. To collaborate with JICA on the CARIFICO Project, and to share the outputs with Member States;
- c. To collaborate with IFREMER on research of key pelagic species associated with FAD fisheries;
- d. To develop Manuals on best practices in the fisheries using FADs. The Manuals are to address issues of safety in the construction and deployment of FADs, user conflicts associated with activities around FADs and improvements in FAD technology.

The PMRRA indicated that an E-meeting of the Working Group was convened in March 2015 at which the broad content of the Manual (including the focus of the 5 sections) was agreed and possible authors identified. It was also agreed that a first draft of the Manual would be submitted by 05 June 2015 for review prior to the Write-Shop and a DropBox was created to facilitate the sharing of documents. The PMMRA identified those who have contributed in writing towards the Manual thus far and noted that some sections were written in English and others in French. She advised that all sections would have to be written in English for publication. She also advised of the need for discussion among section leaders and between section leaders and co-authors so as to standardize the writing styles and format. She requested that an outline be developed to structure each section so that all co-authors are aware of the overall content and they could be assigned accordingly to write specific components depending on their expertise.

Four outputs of the Write-Shop were envisaged: (1) a brief report of the Write-Shop (including agreement on the way forward, timeline and milestones); (2) an outline of the Manual; (3) a first draft of the Manual; and (4) an updated Draft Sub-regional Fisheries Management Plan for FAD Fisheries. The PMRRA advised that the Write-Shop would be conducted in an informal manner with a general presentation and discussion session on what had been written thus far and designated rapporteurs to record the key recommendations to inform further development of the respective sections of the Manual. Section leaders were to guide the writing and persons who were authors for more than one section were to organize their time and inputs accordingly with section leaders. On the final day authors would highlight the main changes to their respective sections and there would be discussion and agreement on the way forward. The key discussion points following the presentation are outlined below.

- a. It was noted that draft components were submitted by the following for the respective sections:
  - i. Section 1- FAD Fisheries Governance: Katia Frangoudes (in English) and Elizabeth Mohammed (in English);
  - ii. Section 2 - FAD Design, Construction and Maintenance: Paul Gervain (in English and French) and Mitsuhiro Ishida (in English);
  - iii. Section 3 - FAD Deployment, Use, Fisher Safety and Work Conditions: Yvon Le Roy (in French);
  - iv. Section 4 - Fish Quality and Marketing : Sonia Eugène and Cylena Andrews (in English and French);
  - v. Section 5 - Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs: Lionel Reynal, Clément Dromer and Heloise Mathieu (in English and French).
- b. The draft sections of the Manual were written by technical experts. Consequently the language used was not likely to be understood by the diverse target audience (fishers, scientists, managers and other industry stakeholders). It was agreed that the sections would be re-written with the target audience in mind.
- c. The draft sections of the Manual were written in different formats. Although section leaders were encouraged to discuss and agree among themselves on an appropriate format for the Manual this was not possible due to the language barriers and time commitments of the respective persons. Consequently, although the draft components of the Manual all incorporated the respective best

practices there was need to standardize the format across sections for ease of reading and understanding of the target readers. It was agreed that the sections would be written focusing first on the areas of interest, the corresponding key messages and then the corresponding best practices. Each section is to contain a brief summary which could later be extracted and mass-produced for distribution to fishers. As well the references of source documents should be included in footnotes rather than a general reference section. As far as possible, the use of photographs and graphics should be maximized so as to most effectively convey the key messages and best practices.

- d. It was noted that none of the leaders for sections 1 and 3 of the Manual were present at the write-shop. Dr Lorenzen offered to assist with the writing of section 1, once the outline is agreed upon. This matter is to be followed up with the section leaders as well as Dr Lorenzen and Mr Defoe through an e-meeting soon after the write-shop. Mr Le Roy provided an English version of section 3 and through email communication with the PMRRA during the course of the write-shop it was clarified he should focus only on safety in relation to the aspects of the FAD (construction, deployment, use and maintenance) as opposed to general safety in fishing which has already been addressed extensively by the Food and Agriculture Organization. He should also focus on working conditions specific to the FAD fishery. Safety in relation to the construction of fishing vessels would not be addressed unless there are specific requirements for construction of a fishing vessel to be used in the FAD fishery.

## **6. PRESENTATIONS AND DISCUSSION ON DRAFT SECTIONS 2, 4 AND 5 OF THE MANUAL**

Sections 2, 4 and 5 were presented by Mr Gervain and Mr Ishida, Ms Andrews and Mr Reynal respectively with Mr Defoe, Mr Ferrari and Ms Mathieu serving as rapporteurs for the respective sections. Following the 1.5 day writing session the main changes to the sections were presented by Mr Defoe, Ms Andrews and Ms Mathieu respectively. Persons who worked on the respective sections at the write-shop are indicated below:

Section 2 - FAD Design, Construction and Maintenance: Paul Gervain, Jullan Defoe, Mitsuhiro Ishida and Seon Ferrari.

Section 4 - Fish Quality and Marketing: Sonia Eugène, Cylena Andrews, Clément Dromer, Mitsuhiro Ishida.

Section 5 - Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs: Lionel Reynal, Héloïse Mathieu, Elizabeth Mohammed.

Below are the main elements of discussion arising from sessions on the first day (when the original versions of each section were presented and reviewed) and the afternoon of the last day (following modifications of the sections to varying degrees based on suggestions from the review of the first day).

### Section 2: FAD Design, Construction and Maintenance

This section was submitted in four components. The first, component (A), or main document, addressed general information on FAD design such as FAD conception, selection of the FAD location and then described in detail the key aspects regarding selection of material and construction of the various components of a FAD (floatation, mooring, anchoring and aggregating structures). The second, component (B), comprised the Annexes to the first component with focus on FAD loss, local currentology applied to FAD conception and various calculations pertaining to the weight in water and rope

specifications. The third, component (C), comprised detailed drawings of four FAD models (artisanal, MAGDELESA, PLK600 FAD and 2-heads FAD) and the fourth, component (D), provided details on seamanship associated with FADs with detailed drawings on various splices and lashings. This section was the most extensive (69 pages) among the three sections presented and was written in highly technical language. Although there were suggestions to simplify the language those with experience in FAD design and construction felt it necessary that the majority of technical details be retained. The Table of Contents of components A, C and D are provided in Appendix 4. In addition, Mr Ishida provided specific details concerning FADs being introduced under the CARIFICO Project. He gave suggestions for selection of an appropriate location for setting FADs, how to choose the materials for the various components of the FAD (buoyancy and sinking force, depth and rope length, buoys, anchors, mooring rope and appendage). He also described calculations to determine the number of buoys and anchor for planning purposes, safety-at-sea related to the setting of FADs (using the single and dual-boat methods of deployment) and FAD construction techniques (balancing the buoys and how to make sandbag anchors). It was agreed that his contribution would be incorporated into the detailed section developed by Mr Gervain.

Generally the discussions on the first day focused on simplifying and shortening the section, with suggestions to maximize the use of tables, drawings or diagrams. It was suggested that the components of the section be re-arranged to represent the structure of the FAD, beginning with the floatation system (and the importance of buoyancy) at the top and end with the anchoring system at the bottom and the relevant text should be linked to a drawing showing the respective structures. Hence some rearrangement of the information in this section was necessary. As well, there was some overlap with *Section 3: FAD Deployment, Use, Fisher Safety and Work Conditions* which should be addressed through collaboration between the leaders of the two sections. It was also felt that the component pertaining to FAD maintenance would be better addressed under “FAD monitoring” in *Section 1: FAD Fisheries Governance*. Consideration should also be given to environmental concerns regarding material used as aggregators e.g. use of old nets which can be a potential hazard to turtles and inclusion of the economical aspects of FAD design and construction in this section. Other specific recommendations for modification of this section are given in Appendix 5.

During the discussion period of the third day the group updated participants on the changes made to the section thus far. Finalization of the section would entail making the section more concise, inclusion of a two-page summary at the back of the section and final checking of grammar, spelling, etc. in the English version of the document, before submission for review.

#### Section 4: Fish Quality and Marketing

The original Table of Contents for this section is given in Appendix 6. Generally the section was considered too technical for the target audience and so should be simplified in language. The idea of the “boat to throat” concept was proposed for re-organization of the section. As well, the cold-chain could be used to organize the section, beginning first with best practices on the boat and ending at the point of sale (similar to the “boat to throat” concept). Regarding the use of technical terms, there were many suggestions for simplification, including use of the term “pithing” instead of “demedulation” to represent severing of the spinal cord. Specific temperatures for “chilled” and “frozen storage” should be included in the document wherever it is applicable. Also, links should be made between good and bad practices to emphasize certain points. More photographs could be included to provide a sensory evaluation of different species. It was also advised that the carbon monoxide (tasteless smoke) used in the modified atmosphere packaging should be reconsidered since this method makes the fish appear fresher than it really is and its use is a controversial issue in maintaining fish quality. Since the section title suggests a detailed treatment of the broad subject of marketing of FAD fish, all aspects of which are not considered in the section, it was recommended that the title of the section be adjusted to best reflect the respective content.

During the session of the third day the group demonstrated that the suggestions of the first day were considered in re-writing and re-organization of the section. The language was simplified for the target audience and more photographs included. Finalization of the section would entail inclusion of additional photographs, ensuring that the agreed format regarding areas of interest, the corresponding key messages and the best practices is followed, inclusion of a two-page summary at the back of the section and final checking of grammar, spelling, etc. in the English version of the document, before submission for review.

#### Section 5: Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs

The original Table of Contents for this section, adapted from a previous MAGDELESA Project report on “Resources, Ecosystem and Fishery” is presented at Appendix 7. This section was written in a technical and descriptive style and although the best practices were incorporated the content should be re-arranged to make it easier to understand. Various suggestions for its format were discussed with final agreement on the proposed general format (area of interest, key messages and best practices). The section leader was cautious to point out that the species caught in FAD fisheries are subject to different levels of governance (national, regional and international) which must be considered in proposing best practices. These practices should be precautionary e.g., do not catch juvenile fish regardless of stock status. Concern was also expressed that the majority of best practices for this section are based on scientific research conducted on FAD fisheries in Martinique and Guadeloupe. Since the seasonality and other aspects of the biology and ecology of the respective species may vary from one location to another, as well as the fishing strategies, gear selectivity and species composition of the catches, it is not guaranteed that application of best practices in the two French islands would provide the same results in other countries. This fact must be stated upfront in this section and the need for specific country data collection and research to inform the best practices as well as harmonization of catch and effort data collection in the region should be emphasized. The selection of technical and other measures to control the catches (size of catches, sizes of species in the catch and the composition of species in the catch) in order to maximize the benefits from the fishery while at the same time ensuring that the resources are sustained in the long-term, was discussed.

During the session of the third day the main areas of interest (emboldened text) and key messages (italicized text) for this section were presented (see below):

#### **Optimize the benefits from the resource**

- *Optimize the profits*
- *Optimize the employment*

#### **Ensure the sustainability of the exploitation**

- *Replacement of the resource*
- *Take in consideration the economical competitiveness*
- *Increase the well-being of fishers*
- *Implement a data collection system to provide information for decision making on FADs Fisheries*

#### **Protect the vulnerable species that may be captured**

The section was re-written with best practices (technical, behavioral, market, governance and other measures) listed under each key message. It was suggested that the benefits in the FAD fishery could also be optimized through the value-chain approach which is also likely to contribute to an increase in employment. Concern was also expressed that turtles may be captured in FAD fisheries, however, it was noted that turtles are likely to become entangled in the FAD itself if old fishing nets are incorporated as part of the structure. It was suggested that this issue be addressed in the section on FAD construction. The perception that development of the FAD fishery would result in reduced fishing pressure on inshore resources also came into question and it was felt that a statement be included in the introduction to the section and could be developed further in *Section 1: FAD Fisheries Governance*.

The authors brainstormed on appropriate graphics to best convey the messages and articulated a brief summary for the section. They also suggested an alternative title for the section: “FAD Resources and Business Management Strategies for a Sustainable Fishery”, which better reflects the revised content of the section. Further work on this section would entail writing of an introduction, further development of the areas of interest and key messages, formatting and inclusion of graphics as well as finalization of the summary section and final checking of grammar, spelling, etc. in the English version of the document before submission for review.

## **7. PRESENTATION AND DISCUSSION OF THE DRAFT SUB-REGIONAL FISHERIES MANAGEMENT PLAN FOR FAD FISHERIES IN CRFM MEMBER STATES**

This presentation was delivered by the Consultant hired by the CRFM to develop the Sub-Regional Fisheries Management Plan (FMP) for FAD Fisheries in CRFM Member States, Dr Henri Vallès Rodriguez. The Table of Contents of the draft FMP is provided in Appendix 8. Dr Vallès highlighted the main literature reviewed and provided an outline of the FMP. He reviewed the objectives and expectations concerning introduction of moored FADs for each country and provided statistics on the fisheries in the region (number of FADs, number of FAD fishers and fishing vessels, FAD fishery catches, species composition, seasonality, selectivity). He also elaborated on management systems addressing components related to FAD funding, regulation of FAD fishing and different attributes of public (government-funded) and private FADs to be considered. Dr Vallès outlined the socio-economic, biological, ecological, and governance issues concerning FAD fisheries, the respective opportunities as well as key management objectives for the fishery. He also outlined data, monitoring and research considerations. Specific and detailed management advice was provided related to the precautionary approach, institutional and legal arrangements at the sub-regional level, legal and policy interventions at the national level (general as well as those specific to FAD fisheries), strengthening fisherfolk organizations and post-harvest and infrastructure support. He also briefly made reference to implementation, co-management, financing and monitoring, control and surveillance in relation to implementation of the FMP.

An earlier version of the FMP had already been reviewed by the CRFM Secretariat, some CRFM Member States and the FAO (WECAFC Secretary). Based on these reviews Dr. Vallès noted the additional work required towards improving the FMP, including: consideration of information on FAD design in Saint Lucia and Dominica as well as lessons learnt from the respective FAD Pilot Projects under the JICA Master Plan Study, updating data and information for Member States from the CARIFICO Project, considering that the proposed “jigging” technique for the capture of blackfin tuna may be too labour intensive, consideration of ICCAT’s 2014 recommendations on bigeye and yellowfin tuna in FAD fisheries, possible draft standard regulation, consideration of the Billfish Project under the WECAFC/OSPESCA/CRFM/CFMC/IGFA Working Group on Recreational Fisheries, re-consideration of the reference points for management of FAD fisheries, consideration of issues of IUU fishing around FADs, rights-based/tenure rights management and the fact that some Member States had articulated National Plans of Action for the conservation and management of sharks.

The discussions focused mainly on matters concerning research and management of FAD fisheries. With respect to research some consideration should be given to examining possible impacts of FAD fisheries on pelagic fish migration. There is also need to ascertain the optimal number of fishers that can fish around a FAD while still maintaining economic viability of the operation as well as to examine the linkages between different fishing techniques or strategies on the species composition of the catches. Research on the status of blackfin tuna, a species caught around FADs, and which is of economic

importance to the region but not currently the focus of ICCAT assessments. Exploring the feasibility of the diamondback squid as an alternative target species in the fishery is another possible area of research.

Regarding the management of FAD fisheries it was felt that marine spatial planning is essential, both to avoid conflict as well as to contain FAD debris. Although the ICCAT recommendation on yellowfin and bigeye tuna caught in purse seines fleets may not apply it is still necessary that the ICCAT recommendation be followed to the extent possible. As well, even though there is currently insufficient information to develop appropriate reference points for the FAD fishery, the idea of reference points is still valid in the overall fisheries management context and therefore should be incorporated in the FMP. Regarding management partnership arrangements, the FMP should make reference to Regional Fisheries Bodies (RFBs) and indicate the need to cooperate in development of FMPs, taking into account the distribution ranges of the respective species. It was also noted that FMPs developed by Regional Fisheries Management Organizations (RFMOs) are legally-binding<sup>1</sup>. With respect to monitoring of implementation of the FMP, this responsibility will fall on the CRFM Pelagic Fisheries Working Group but management partnership is also relevant here.

It was intended that the FMP would first be taken out for stakeholder review and feedback within the CRFM Member States and through the CRFM's process be amended and endorsed through resolution. The resolution is to outline the specific management measures agreed upon at the regional level. To identify such measures the Secretariat should give guidance to Member States on the expected outputs of stakeholder consultations. Once endorsed at the CRFM level, the FMP would then be presented to the WECAFC in an effort to seek broader collaboration in the management of shared fisheries resources in the region.

Further work on the FMP during the course of the write-shop focused on addressing the review comments, including updating of country data, incorporation of the Terms of Reference for the respective Working Group, including research recommendations and more detailed development of the national level legal provisions. Further work after the write-shop will focus on inclusion of the section on the bio-physical geography of the region, integration of information on the Caribbean Billfish Project, and development of the executive summary to the FMP and translation of the summary into French. It was noted however that the Caribbean Billfish Project promotes development of the billfish fishery as a recreational fishery and that the impacts on commercial fishing and food security must be considered. It was suggested that perhaps an additional week following submission of the next draft, could be allowed for any final review and feedback of the CRFM Secretariat before the final version is submitted.

## **8. THE WAY FORWARD**

The way forward in respect of finalization of the draft sections of the Manual and the timing of certain key events leading to publication in December 2015 was discussed and agreed upon as follows:

- a. Since the CARIFICO Project has kindly offered to assist with publication of the Manual the timing of the events leading to this realization is based on JICA's programme year and respective administrative and financial requirements. The agreed timeline for the respective activities are outlined in the table below.
- b. The Secretariat will write a foreword as well as an introductory section to the Manual giving a historical background on FAD fisheries, the reasons for their introduction, the mandate for

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<sup>1</sup> Note that although FMPs developed by RFMOs are de jure legally binding, FMPs for shared stocks developed by other arrangements between two or more States, including RFBs, can be legally binding if the states so agree.

production of the Manual and explaining how the Manual will be published (if all sections will not be published at once). If each section of the Manual is published separately the same foreword and introductory section would be used for each section;

- c. Although the original intention was to publish the five sections in one Manual it may be more practical to publish each section of the Manual separately given the variation in length of each section. Section 2 in particular was over 40 pages long while the other two sections were less than 20 pages. There are likely to be cost implications with this approach however, it was suggested that consideration be given to printing fewer hard copies as well as publishing the appendices or the entire sections online.
- d. All sections are to be written giving consideration to the main areas of interest, the key messages to be conveyed and the respective best practices concerning the specific subject;
- e. Where effective, the style could be instructive and based on the situation in the field, examples could be given of practices that are “less than best” with the respective explanations;
- f. As far as possible technical jargon should be avoided;
- g. All opportunity must be taken to use photographs and other graphics to make the Manual easier to understand and more “pleasing to the eyes”;
- h. The titles of the sections may be changed to more accurately reflect the final content;
- i. The Secretariat plans to engage an artist to do drawings for the Manual but it must be informed of the detailed requirements from the group leaders in order to facilitate in good time;
- j. Each section should conclude with a two-page summary which could later be extracted and published separately for mass distribution to stakeholders;
- k. English-speaking authors are advised to ensure that their sections are properly checked for grammar and spelling before final submission for review;
- l. If time allows, the Secretariat could seek review of the sections by fishers given the concerns that the Manual may be written in a language that is too technical;
- m. Regarding *Section 1: FAD Fisheries Governance* and *Section 3: FAD Deployment, Use, Fisher Safety and Work Conditions* for which the respective leaders were not present at the write-shop, the Secretariat would seek to convene an electronic meeting among the authors for Section 1: to agree on the way forward and Mr Reynal would work with Mr LeRoy in explaining the writing requirements so that Section 3 could be completed. Whether or not these sections would be published in December 2015 depends on whether or not a final draft of each section could be delivered by the end of July 2015. If these sections are not published by December 2015 alternative arrangements would have to be made for their publication at a later date.
- n. The final draft of each section must clearly state the names of the authors in the order in which they are to be published;
- o. Several persons have expressed interest in reviewing the Manual once completed, including Dr Freddy Arocha, Dr Susan Singh-Renton (CRFM Secretariat), Dr Tarub Bhari (FAO), Dr Robert Lee (FAO, and co-author of the document on Anchored Fish Aggregating Devices for Artisanal

Fisheries in South and South-East Asia: benefits and risks) and Ms Elizabeth Mohammed (CRFM Secretariat). The Secretariat will contact the respective persons to ascertain their availability in late September and October 2015 when editing of the Manual is scheduled.

<b>Table: Timeline of activities Leading up to Publication of the Manual</b>																												
<b>Months</b>	<b>July</b>					<b>Aug</b>				<b>Sept</b>					<b>Oct</b>					<b>Nov</b>				<b>Dec</b>				
<b>Activity</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Second draft</b>																												
<b>Review</b>																												
<b>Amendments</b>																												
<b>Final Draft</b>																												
<b>Editing</b>																												
<b>Final Adjustments</b>																												
<b>Layout</b>																												
<b>Final Review</b>																												
<b>Publication</b>																												

## 9. OUTPUTS

The two expected outputs of the write-shop were: (a) a complete draft of Manual on Best Practices in FAD Fishery Management in a form ready for finalization; and (b) a Draft Sub-regional FAD fishery management plan, with all inputs of the write-shop incorporated and, in a state of readiness for distribution to CRFM Member States to facilitate review by the broad range of stakeholders. As these two outputs are still in draft form they are not included in the report of the write-shop. The final documents would be published and disseminated separately as the write-shop outputs.

## 10. CLOSING REMARKS

The PMRRA delivered the closing remarks. She thanked the participants for their commitment and time as well as their diligence over the three days. She considered the write-shop a success in bringing together the authors to discuss in detail the respective sections and to have a common understanding of the format, content and way forward in finalization of the Manual. It also provided a forum for review, feedback and improvement of those sections of the Manual which were already drafted as well as the draft Sub-Regional FMP for FAD fisheries, and to ensure complementarity between the outputs of the two initiatives. The PMRRA expressed the support of the Secretariat in working with the authors over the coming months to realize the publication of the Manual in December 2015. She wished the participants a safe journey back home.

The write-shop was concluded at 4:45 p.m. on 25 June 2015.

## REFERENCES

- CRFM, 2013. Report of the CRFM - JICA CARIFICO / WECAFC - IFREMER MAGDELESA Workshop on FAD Fishery Management, 09 - 11 December 2013, St. Vincent and the Grenadines. *CRFM Technical & Advisory Document*, No. 2013 / 9. 42p.
- CRFM. 2015. CRFM Working Groups: Terms of Reference. *CRFM Special Publication* No. 3. 41p.
- CRFM 2015a. Draft Report and Proceedings of the Thirteenth Meeting of the Caribbean Fisheries Forum, St. George's, Grenada, 30 – 31 March 2015. Volume 1. *CRFM Management Report – PY 2015 / 16*. 136 pp.
- JICA. 2012. Study on the Formulation of a Master Plan on the Sustainable Use of Fisheries Resource for Coastal Community Development in the Caribbean Final Report March 2012. CRFM/JICA/ICNET Limited RDD JR 12-022. 153p. (plus appendices).
- Reynal L., Dromer C., Eugène F., Frangoudes K., Gervain P., Guyader O., Le Roy Y., Mathieu H., Pau C., Regina F., Thouard E., Magloire A., Archibald M., Cruickshank-Howard J., Diaz N., Ishida M., Lay M., Le Quellec J., Medar P., Mohammed E., Moran M., Saddler K., Theophile D., Volny-Anne C, 2015. Rapport de la réunion finale du projet MAGDELESA. R.INT.RBE/BIODIVENV 2015-1, 186 p.
- WECAFC, 2014. Draft Working Group Terms of References (2014-2015). Working Document WECAFC/XV/2014/17 presented at the Fifteenth Session of the Commission, 26 to 28 March 2014, Port of Spain, Trinidad and Tobago. 20 p.

**APPENDIX 1: BROAD SECTIONS OF THE MANUAL ON BEST PRACTICES IN FAD FISHERIES MANAGEMENT AND CORRESPONDING PORPOSED LEADERS AND AUTHORS**

<b>Section</b>	<b>Leaders (E = English; F = French)</b>	<b>Proposed Authors</b>
1. FAD Fisheries Governance	Andrew Magloire (E) Katia Frangoudes (F)	Olivier Guyader Jullan Defoe Elizabeth Mohammed
2. FAD Design, Construction and Maintenance	Paul Gervain (F) Andrew Magloire (E)	Jullan Defoe Mitsuhiro Ishida Seon Ferrari
3. FAD Deployment, Use, Fisher Safety and Work Conditions	Andrew Magloire (E) Yvon Le Roy	
4. Fish Quality and Marketing	Sonia Eugène (F) Cylena Andrews (E)	Clément Dromer Mitsuhiro Ishida Andrew Magloire
5. Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs	Lionel Reynal (F) Elizabeth Mohammed (E)	Clément Dromer Heloïse Mathieu

## APPENDIX 2: FINAL AGENDA FOR WRITE-SHOP ON FAD FISHERIES MANAGEMENT



### FINAL AGENDA

#### FAD Fisheries Management Write-Shop

#### CRFM Pelagic Fisheries Working Group and the CRFM/WECAFC/JICA/IFREMER Working Group on Fisheries using FADs

(Hours of Work are from 8:30 a.m. to 5:00 p.m. daily, with coffee breaks at 10:00 a.m. and 3:00 p.m., and a lunch break from 12:30 p.m. to 1:30 p.m.)

#### DAY 1: Tuesday 23 June 2015

##### *Morning Session*

1. Informal welcome by the Secretariat
2. Opening prayer
3. Introduction of participants
4. Presentation on the Background, Objectives and Expected Outputs of the Write-Shop – *Elizabeth Mohammed*
5. Presentations on the respective sections of the Manual on Best Practices in FAD Fisheries Management – the discussion session following each presentation provided guidelines on any additional content to be included or improvement in the existing content and format as well as suggestions for appropriate graphics/photographs.

Section 2: FAD Design, Construction and Maintenance – *Paul Gervain*

##### *Afternoon Session*

1. Presentation of the Draft Sub-Regional Fisheries Management Plan (FMP) for FAD Fisheries – *Henri Vallès Rodriguez*
  2. Continuation of Presentations on the respective sections of the Manual on Best Practices in FAD Fisheries Management
- Section 4: Fish Quality and Marketing – *Cylena Andrews*
- Section 5: Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs – *Lionel Reynal*

DAY 2: Wednesday 24 June 2015

*Morning & Afternoon Sessions*

The entire day was spent amending the respective sections of the Manual as well as the Draft Sub-regional FMP on FAD Fisheries based on the discussions and suggestions of the previous day.

DAY 3: Thursday 25 June 2015

*Morning Session*

This entire session was spent amending the respective sections of the Manual as well as the Draft Sub-regional FMP on FAD Fisheries.

*Afternoon Session*

1. Reports on Progress
  - a. Sub-regional FMP on Fad Fisheries - *Henri Vallès Rodriguez*
  - b. Section 5: Harvesting Practices, Gear Selectivity and Ecosystem Impacts of FADs - *Heloïse Mathieu*
  - c. Section 4: Fish Quality and Marketing - *Cylena Andrews*
  - d. Section 2: FAD Design, Construction and Maintenance – *Jullan Defoe*
  - e. Section 1: FAD Fisheries Governance – JICA Master Plan Study – Dominica Case Study – *Jullan Defoe*
2. General Discussion on the Way Forward towards finalizing and publishing the Manual on Best Practices in FAD Fisheries Management.

## APPENDIX 3: LIST OF PARTICIPANTS

### WRITE-SHOP ON FAD FISHERIES MANAGEMENT 23-25 June 2015, St. Vincent & the Grenadines

#### List of Participants (in alphabetical order of surname)

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**APPENDIX 4: DRAFT TABLE OF CONTENTS FOR SECTION 2: FAD DESIGN, CONSTRUCTION AND MAINTENANCE**

A. general information on FAD design

- 1. Introduction .....2
- 2. FAD conception .....3
- 3. Site selection .....3
  - Depth.....3
  - Setup site selection .....3
  - The relative density of the sea water .....5
  - Currentology .....6
  - The geographical coordinates of the setup site.....6
- 4. Float selection .....7
  - Buoyancy .....7
  - Selecting buoyancy .....8
  - FAD types .....8
  - Floats .....9
- 5. Rope selection .....10
  - General information on FAD mooring lines .....10
  - The different types of ropes .....11
  - Rope resistance .....11
  - Selecting the diameter of the ropes .....12
  - The rope density .....13
- 6. Calculating the length of the ropes .....13
  - The total length of the mooring line .....13
  - Length of the floating rope, length of the sinking rope .....13
  - The length of the combination cable .....13
  - The length of the inter-float ropes .....14
  - The watch circle .....14
- 7. The ballast option for PP or PE mooring lines .....14
- 8. Selecting the anchoring system .....14
  - The weight of the anchoring system.....14
  - Blocks of concrete .....15
  - Metal ballasts .....15
  - Sand bags .....15
  - Anchors and chains .....16
- 9. Aggregators .....16
  - Description .....16
  - The maintenance of the aggregators, aggregator kits .....16

Fad design, Construction & Maintenance

B. Annex

Annex 1: FAD loss.....2  
    Three ways of losing a FAD: .....2  
    Causes of loss .....2  
Annex 2:Local currentology applied to FAD conception.....4  
    Local currentology.....4  
    The type current.....4  
    A. The types of ropes used to make FADs.....6  
        1. Stranded ropes .....6  
        2. Braided ropes .....6  
        3. Comparative table between stranded ropes and square braided ropes .....7  
        4. The other types of ropes .....7  
    B. The materials of the fibers used to make the ropes.....7  
    C. The linear weight and the resistance of the ropes .....9  
    D. The lengthening and resiliency of the rope .....11  
    E. To recognize a rope:.....12  
Annex4: Calculation of the weight in water.....13  
Annex5: Calculation of a rope density .....14  
    Calculation of a rope density .....14  
    Calculation of the density of a combination rope .....15  
Annex6: Rope length calculation .....16  
    Basic diagram of a mooring line (without current).....16  
    Calculation and formulas used.....17

D. Seamanship for FAD making

Seamanship ..... 1  
Seamanship works on a FAD ..... 2  
Spliced eye with 3-strand rope ..... 3  
Spliced eye with an eight-strand braided rope ..... 7  
Long splice..... 12  
End-to-end splice with 8-strand braided ropes ..... 17  
Spliced eye on 6-strand combination rope ..... 21  
Lashings..... 26

## **APPENDIX 5: DISCUSSION POINTS ON SECTION 2: FAD DESIGN, CONSTRUCTION AND MAINTENANCE**

**Rapporteur:** Jullan DeFoe

### **INTRODUCTION**

- Transfer information on technical aspect of deployment to section 2.
- Suggestion to separate information on private and public FADs

### **SECTION 2 FAD CONCEPTIONS**

- Seek clarification on what is considered as “deep FADs” (500-3000m)
- Revision of the term “high depth”

### **SECTION 3 SITE SELECTION**

- Propose to include “current” in list of things to consider for site selection
- Consider whether the information on currentology is relevant in the Manual
- Propose that currentology information and FAD calculation software can be listed as references
- Sub section “Geographical coordinate of set-up site” be transferred to Technical deployment section

### **SECTION 4 FLOAT SELECTION**

- Suggestion to re-arrange the order of information to begin with why buoyancy is important. Illustration figure or diagram is also proposed for this section and to be linked to the various sections pertaining to different structures of the FAD beginning with the flotation system and ending with the anchoring system.
- Proposed that sub section on FAD TYPES can be arranged in a table format to simplify.

### **SECTION 5 ROPE SELECTION (No comments)**

### **SECTION 6 CALCULATING THE LENGTH OF THE ROPE**

- In addition to best practices this section also into consideration the existing reality of fishers situation
- Revise sub section on “length of inter float ropes”
- Subsection “The watch circle” transferred to technical deployment section

### **SECTION 7 (No comments)**

### **SECTION 8 SELECTION OF THE ANCHORING SYSTEM**

- Propose use of diagrams to identify the various FAD components

## SECTION 9 AGGREGATORS

- Consideration should be given to environmental concerns regarding material used as aggregator e.g. use of old nets on which can be a potential hazard to turtles
- Maintenance sub section should be linked to FAD Fisheries Governance chapter to include monitoring

## ANNEX B1

- Transfer FAD loss sub section to first document (main document)

## ANNEX D FAD FISHERIES MANAGEMENT

- Include illustration of FAD with only floating rope

## BEST PRACTICE POWERPOINT (Ishida)

- Incorporate and develop further sub section on “safety” in main document (Manual)
- Consider inclusion of sub section on “economical aspect”.

## **APPENDIX 6: TABLE OF CONTENTS FOR SECTION 4: FISH QUALITY AND MARKETING**

1. Composition and Nutritional Interests of Fish Flesh
2. Degradation Processes of Fish Flesh after Capture
3. Hazards associated with the Consumption of Pelagic Fish
  - 3.1 Chemical Hazards
  - 3.2 Biological Hazards
  - 3.3 Physical Hazards
  - 3.4 Allergens
4. Good Hygiene Practices
  - 4.1 Fishing Conditions and On Board Handling
  - 4.2 Landing, Storage and Sale
5. References

**APPENDIX 7: TABLE OF CONTENTS FOR SECTION 5: FISHING STRATEGIES, GEAR SELECTIVITY AND ECOSYSTEM IMPACTS OF FAD FISHERIES**

**Resources, ecosystem and fishery**

**Table des matières**

1	Introduction.....	2
2	What do we know on resources and fishing around FADs?.....	2
2.1	Resources around FADs and their exploitation.....	2
2.1.1	List of species identified around the FADs (Martinique and Guadeloupe).....	2
2.1.2	The impact of anchored FAD fishing on totemic species.....	2
2.1.3	Professional fisherfolk’s takes around FADs.....	3
2.2	Optimization of sustainable exploitation of the resources aggregated around FADs.....	3
2.2.1	Description of the aggregations around FADs.....	3
2.2.2	Description of the gears, techniques and catches around FADs.....	5
2.2.2.1	Gears and fishing techniques.....	5
2.2.2.2	Quantification et localization of the catches around the FADs.....	7
2.2.3	Methods contributing to fishing selectivity around FADs.....	8
2.2.3.1	The mode of exploitation of FADs and the targeted species.....	8
2.2.3.2	FAD spacing regarding the coast.....	9
2.2.3.3	Fishing season.....	9
2.2.3.4	Fishing gears and techniques.....	10
2.2.3.5	Hooks shape.....	12
2.2.3.6	The baits used on drifting vertical longlines.....	12
2.3	Exploited populations (stocks) of pelagic species.....	13
2.4	Other resources exploited by FAD fishing boats.....	13
3	Recommendations.....	14
4	Documents.....	14

## **APPENDIX 8: TABLE OF CONTENTS OF DRAFT SUB-REGIONAL MANGEMENT PLAN FOR FAD FISHERIES IN CRFM MEMBER STATES**

### **Preface**

### **2. Scope and Mission**

### **3. Guiding principles and vision for the future**

### **4. Geography**

#### *4.1. Physical geography*

#### *4.2. Political geography*

### **5. Biology and ecology of main large oceanic and coastal pelagic species caught on moored FADs**

#### *5.1. Large oceanic pelagics*

#### *5.2. Large coastal pelagics*

### **6. Legal aspects**

#### *6.1. International law and agreements*

#### *6.2. National laws and regulations*

#### *6.3. Relevant regional fishery management organisms*

- The International Commission for the Conservation of Atlantic Tunas (ICCAT)*
- The Caribbean Regional Fisheries Mechanism (CRFM)*
- The Western Central Atlantic Fishery Commission (WECAFC)*

### **7. Management unit**

### **8. Characteristics of the moored FAD fishery**

#### *8.1. Ecosystem services of the pelagic ecosystem*

#### *8.2. Initial objectives and expectations of the moored FAD fishery*

#### *8.3. Historical overview of moored FAD development in the region*

#### *8.4. Relevant aspects of the moored FAD fishery*

##### *8.4.1. Fishing vessels, fishing techniques and postharvest sector*

##### *8.4.2. Socio-economic status of fishers*

##### *8.4.3. Moored FAD design and location*

##### *8.4.4. Moored FAD landings*

##### *8.4.5. FAD management systems*

##### *8.4.6. A community-based participatory approach to FAD fishery management: Dominica*

##### *8.4.7. The JICA/CARIFICO project*

##### *8.4.8. Monitoring of moored FAD landings*

##### *8.4.9. Moored FADs: Links between coastal and pelagic ecosystems*

### **9. Status of the fishery**

#### *9.1. Stock status*

#### *9.2. Issues*

##### *9.2.1. Socio-economic issues*

##### *9.2.2. Biological issues*

##### *9.2.3. Ecosystem issues*

##### *9.2.4. Governance issues*

#### *9.3. Opportunities*

### **10. Harvest strategy**

#### *10.1. Management objectives and indicators*

*10.2. Reference points*

*10.3. Stakeholder perceptions*

*10.4. Harvest control rule*

**11. Data, monitoring and research requirements**

*11.1. Catch/effort and vessel data*

*11.2. Economic, social and ecological information*

*11.3. Research needs*

**12. Management advice and implementation of the plan**

*12.1. Management advice*

*12.1.1. Precautionary approach*

*12.1.2. Institutional & legal arrangements at the sub-regional/regional level*

*12.1.3. Legal and policy interventions at the national level*

*12.1.4. License system for FAD fishing*

*12.1.5. Strengthening of fisherfolk associations and cooperatives*

*12.1.6. Post-harvest and infrastructure support*

*12.2. Implementation*

*12.3. Co-management*

*12.4. Monitoring, control, surveillance and enforcement*

*12.5. Institutional strengthening*

*12.6. Financing*

*12.7. Monitoring and evaluation of the implementation plan*

**13. References**

## **CRFM**

The CRFM is an inter-governmental organisation whose mission is to “Promote and facilitate the responsible utilisation of the region’s fisheries and other aquatic resources for the economic and social benefits of the current and future population of the region”. The CRFM consists of three bodies – the Ministerial Council, the Caribbean Fisheries Forum and the CRFM Secretariat.

CRFM members are Anguilla, Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and the Turks and Caicos Islands.

