



## Report of the 4<sup>th</sup> IOTC Working Group on FADs

---

Online, 29 – 30 May 2023

---

**DISTRIBUTION:**

Participants in the Session  
Members of the Commission  
Other interested Nations and International  
Organizations  
FAO Fisheries Department  
FAO Regional Fishery Officers

**BIBLIOGRAPHIC ENTRY**

IOTC-WGFAD04 2023. Report of the 4<sup>th</sup> Session of  
the IOTC Working Group on FADs, Online, 2023.  
*IOTC-2023-WGFAD04-R[E]: 24 pp.*

---



The designations employed and the presentation of material in this publication and its lists do not imply the expression of any opinion whatsoever on the part of the Indian Ocean Tuna Commission (IOTC) or the Food and Agriculture Organization (FAO) of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

This work is copyright. Fair dealing for study, research, news reporting, criticism or review is permitted. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgment of the source is included. Major extracts or the entire document may not be reproduced by any process without the written permission of the Executive Secretary, IOTC.

The Indian Ocean Tuna Commission has exercised due care and skill in the preparation and compilation of the information and data set out in this publication. Notwithstanding, the Indian Ocean Tuna Commission, employees and advisers disclaim all liability, including liability for negligence, for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon any of the information or data set out in this publication to the maximum extent permitted by law.

Contact details:

Indian Ocean Tuna Commission  
Blend Seychelles  
PO Box 1011  
Victoria, Mahé, Seychelles  
Ph: +248 4225 494  
Fax: +248 4224 364  
Email: [IOTC-secretariat@fao.org](mailto:IOTC-secretariat@fao.org)  
Website: <http://www.iotc.org>

---

## ACRONYMS

|         |   |
|---------|---|
| AFAD    | Anchored Fish Aggregating Device  |
| ALD     | Abandoned, Lost or Discarded  |
| CECOFAD | Catch, effort and ecosystem Impacts of FAD fishing                                  |
| CMM     | Conservation and Management Measures (of the IOTC; Resolutions and Recommendations) |
| CPCs    | Contracting Parties and Cooperating Non-Contracting Parties                         |
| CPUE    | Catch per unit of effort  |
| DFAD    | Drifting Fish Aggregating Device  |
| EMS     | Electronic Monitoring Systems   |
| EPO     | eastern Pacific Ocean   |
| FAD     | Fish Aggregating Device   |
| FOB     | Floating Object   |
| IOTC    | Indian Ocean Tuna Commission  |
| ROS     | Regional Observer Scheme  |

## KEY DEFINITIONS

|                       |  |
|-----------------------|--|
| Bycatch               | All species, other than the 16 species listed in Annex B of the IOTC Agreement, caught or interacted with by fisheries for tuna and tuna-like species in the IOTC area of competence.                    |
| Discards              | Any species, whether an IOTC species or bycatch species, which is not retained onboard for sale or consumption.  |
| Large-scale driftnets | Gillnets or other nets or a combination of nets that are more than 2.5 kilometres in length whose purpose is to enmesh, entrap, or entangle fish by drifting on the surface of, or in, the water column. |

## STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

### HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

**Level 1: *From a subsidiary body of the Commission to the next level in the structure of the Commission:***

**RECOMMENDED, RECOMMENDATION:** Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g., from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

**Level 2: *From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***

**REQUESTED:** This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalise the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

**Level 3: *General terms to be used for consistency:***

**AGREED:** Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.

**NOTED/NOTING:** Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

**Any other term:** Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g., **CONSIDERED; URGED; ACKNOWLEDGED**).

---

**TABLE OF CONTENTS**

|  |           |
|--|-----------|
| <b>1. OPENING OF THE MEETING.....</b>  | <b>7</b>  |
| <b>2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION .....</b>                              | <b>7</b>  |
| <b>3. THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS.....</b>                                      | <b>7</b>  |
| <b>4. REVIEW OF DATA AVAILABLE AT THE SECRETARIAT ON FADS.....</b>                                   | <b>8</b>  |
| <b>5. COMMISSION REQUESTS TO THE SC UNDER RESOLUTIONS 23/02, 23/03 AND 23/04.....</b>                | <b>10</b> |
| <b>6. REVIEW OF ANY NEW INFORMATION AVAILABLE ON FADS .....</b>                                      | <b>14</b> |
| <b>7. ADOPTION OF THE REPORT OF THE 4<sup>TH</sup> SESSION OF THE WORKING GROUP ON FADS .....</b>    | <b>17</b> |
| <b>Appendix I List of participants .....</b>   | <b>18</b> |
| <b>Appendix II Agenda for the 4th Ad-Hoc Working Group on FADs Meeting .....</b>                     | <b>21</b> |
| <b>Appendix III List of documents .....</b>  | <b>22</b> |
| <b>Appendix IV Intersessional Workplan for the WGFAD (2023) .....</b>                                | <b>23</b> |
| <b>Appendix V Consolidated recommendations of the 4th Session of the Working Group on FADs .....</b> | <b>24</b> |



## EXECUTIVE SUMMARY

The 4th Indian Ocean Tuna Commission (IOTC) Working Group on FADs (WGFAD) was held Online on Zoom from 29-30 May 2023. A total of 75 participants (111 in 2022, 93 in 2021 and 48 in 2017) attended the Session. The list of participants is provided in Appendix I. The meeting was opened by the Co-Chairs, Dr Gorka Merino and Mr Avelino Munwane, who welcomed participants and formally opened the meeting.

The following are the complete recommendations from the WGFAD04 to the Scientific Committee which are also provided in [Appendix V](#).

WGFAD04.01 (Para 26) The WGFAD **NOTED** that when looking into the effectiveness of measures within Resolutions which CPCs have objected to such as those contained within Resolution 23/02, the consequences of not having full implementation of measures should be considered in relation to future catch trends. However, the WGFAD **NOTED** that this is not specifically requested by the Commission and so **RECOMMENDED** that the SC request clarification from the Commission on this.

WGFAD04.02 (Para 55) The WGFAD acknowledged the paper with information on FADs recoveries and, considering the various initiatives discussed by participants on FAD recovery across the Indian Ocean, the WGFADs **RECOMMENDED** the development and adoption of data form standards for collecting and reporting the information of the recovery of abandoned, lost, and discarded fishing gear (ALDFG) to the IOTC Secretariat. In this regard, the WGFADs **SUGGESTED** that FAD (and other gear) recovery experiences from Seychelles, and any other country, are presented to the next WGFADs in October 2023.

## 1. OPENING OF THE MEETING

1. The 4<sup>th</sup> Indian Ocean Tuna Commission (IOTC) Working Group on FADs (WGFAD) was held Online on Zoom from 29-30 May 2023. A total of 75 participants (111 in 2022, 93 in 2021 and 48 in 2017) attended the Session. The list of participants is provided in [Appendix I](#). The meeting was opened by the Co-Chairs, Dr Gorka Merino and Mr Avelino Munwane, who welcomed participants and formally opened the meeting.

## 2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

2. The WGFAD **ADOPTED** the Agenda provided in [Appendix II](#). The documents presented to the WGFAD are listed in [Appendix III](#).

## 3. THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS

### 3.1 Outcomes of the 25<sup>th</sup> Session of the Scientific Committee

3. The WGFAD **NOTED** the report of the 25th Session of the Scientific Committee (SC25) IOTC–2022–SC25–R, particularly the issues specifically related to the work of the WGFAD.

*(Para. 85) The SC **THANKED** the WGFAD for their work and the chair for the presentation which included a summary of the progress made on the terminology and definitions related to FAD-fishing as proposed by a Small Working Group on FAD definitions who worked intersessionally between the WGFAD and the WPDCS.*

*(Para. 86) The SC **NOTED** the presentation of the three updated forms for reporting FAD-related data to the Secretariat, **NOTING** that the resolution of the data is higher than in the previous form 3FA (i.e., at vessel and operational levels) to better reflect the data requirements set in Resolutions 15/02 and 19/02.*

*(Para. 87) The SC **NOTED** that the new 3FA forms would become available for download on the IOTC website in the forthcoming weeks and that they could be used for the 2023 data cycle, i.e., for reporting data for the statistical year 2022.*

*(Para. 88) The SC **NOTED** that several FAD-related definitions were agreed on by the Small Working Group that was held after the WGFAD, but that no consensus was reached on the general definition of a FAD, **NOTING** further that two alternate definitions were proposed by the Small Working Group.*

*(Para. 89) The SC **AGREED** that both definitions have some merit and that each one could be used if all FAD-related data are included as part of the submissions to the Secretariat, **NOTING** however that the definition derived from the EU-funded CECOFAD project (i.e., a FAD is a floating object constructed and deployed by fishers with the purpose to aggregate fish) makes a clear distinction between man-made rafts and natural floating objects, which is essential for some scientific analyses, e.g., to assess the contribution of FAD-fishing to marine pollution.*

*(Para. 90) The SC **REQUESTED** the WGFAD to discuss further the FAD definition and report to the WPEB and WPDCS in 2023.*

*(Para. 91) The SC **NOTED** that the implementation of time-area closures for FAD fishing has been discussed for several years at the IOTC while found to be an effective management tool in other oceans, e.g., to reduce fishing mortality on juveniles of tuna. The SC **ACKNOWLEDGED***

*the need to provide clear guidance to the Commission on this matter and REQUESTED the WGFAD to prioritise this undertaking.*

*(Para. 92) The SC **NOTED** that no agreement was reached by the WGFAD regarding the potential efficacy of time-area closure for FAD fishing in absence of scientific assessment on their location and duration, further **NOTING** that FAD purse seine fishing grounds are widely spread in the Indian Ocean as compared to other oceans (e.g., Atlantic Ocean).*

*(Para. 93) The WGFAD **NOTED** that some research is currently conducted by some CPCs to assess the feasibility and effects of seasonal closing of FAD fishing.*

*(Para. 94) **NOTING** that the WGFAD endorsed the need to move towards biodegradable FADs and **RECALLING** that the transitioning to biodegradable FADs is explicitly included in Resolution 19/02, the SC **NOTED** that more guidance might be required by the Commission so support the concrete implementation of biodegradable FADs.*

### **3.2 Outcomes of the 6th Special Session of the Commission and the 27th Session of the Commission and previous decisions of the Commission in relation to FADs**

4. The WGFAD **NOTED** the CMMs adopted during the 6<sup>th</sup> Special Session (SS6) and 27<sup>th</sup> Session of the Commission (S26).
5. The WGFAD **NOTED** the following CMMs that were of particular interest to the WGFAD.

#### **SS6**

- Resolution 23/01 *On management of Anchored Fish Aggregating Devices (AFADs)*
- Resolution 23/02 *On Management of Drifting Fish Aggregating Devices (DFADs) in the IOTC area of competence*

#### **S27**

- Resolution 23/03 *On Establishing a Voluntary Fishing Closure in the Indian Ocean for the Conservation of Tropical Tunas*
- Resolution 23/09 *On a Fish Aggregating Devices (FADs) Working Group*

### **3.3 Resolution 23/09 On A Fish Aggregating Devices (FADs) Working Group**

6. The WGFAD **NOTED** that the Commission adopted Terms of Reference for a FAD Working group. The new Terms of Reference remove the uncertainty as to the role and reporting structure of the WGFAD and clarify that the working group should be technical in nature. It also establishes the WGFAD as a permanent WG, removing its ad hoc status with effect from this meeting.
7. The WGFAD **NOTED** that the new Terms of Reference do not include specific mention of the election of the Chair and Vice-Chair (as had been included in [Res. 15/09](#)). As the WGFAD is no longer an ad hoc WG, it was **AGREED** that the future selection of chairs should follow the usual IOTC procedures in accordance with Rule VII of the [IOTC Rules of Procedure](#) (2022), which govern *mutatis mutandis* the Scientific Committee and its sub-bodies.

## **4. REVIEW OF DATA AVAILABLE AT THE SECRETARIAT ON FADS**

### **4.1 Review of the statistical data available for FADs**

8. The WGFAD **NOTED** paper [IOTC-2023-WGFAD04-05\\_Rev1](#) on the review of the data on drifting fish aggregating devices which provides an overview of the information available on the dynamics of drifting Fish Aggregating Devices (DFADs) and DFAD-related fisheries operating in the Indian Ocean,



based on satellite-tracked buoy data made available to the IOTC since January 2020, with the following abstract provide by the authors:

*“In 2021, catches from large-scale purse seiners on drifting floating objects (FOBs) amounted to 410,000 t, representing 86.6% of the total industrial purse seine catch, 76.4% of the total purse seine catch, and 35.1% of the total catch of Indian Ocean tropical tunas. Between January 2020 and December 2022, the daily number of distinct satellite-tracked buoys monitored by the large-scale purse seine fishery of the western Indian Ocean varied between a minimum of 8,408 and a maximum of 11,536. Initial points of buoy trajectories, which reflect both a combination of DFAD deployments and transfers of buoys on FOBs encountered at sea by the purse seiners and their support vessels, cover the main fishing grounds of the purse seine fishery of the western Indian ocean. Trajectories of FOBs derived from daily buoy positions over that period show that the median distance travelled by a FOB was 2,562 km with some of them that travelled more than 20,000 km during their time at sea. The daily number of buoys activated in the fishery was on average of NA buoys per day during 2020-2022, with some large variability over the period. Since early January 2020, the cumulative number of buoys activated and attached to drifting FADs and natural floating objects has reached 25,690, 48,338, and 72,068 at the end of the months of December 2020, 2021, and 2022, respectively”. Excerpts of this document are also found in [Appendix IV](#).*

9. The WGFAD **RECALLED** that only minor updates were incorporated in the public datasets released for this meeting, and namely those related to new information on daily buoys' positions (form 3-BU) received in the meantime, whereas all other datasets remain unchanged since the last session of this working group ([WGFAD03](#), October 2022) due to the structure of the data submission cycle of the IOTC.
10. The WGFAD also **RECALLED** how data reported through form 3-FA are affected by inherent quality issues due to the lack of agreement among CPCs on the reporting methodology and on the classifications to be used for both FOB types and FOB activity types, and therefore **SUGGESTED** not to use these data for scientific analysis yet.
11. The WGFAD **NOTED** that catches from large-scale purse seiners on drifting floating objects (FOBs) amounted to 410,000 t in 2021, representing 86.6% of the total industrial purse seine catch, 76.4% of the total purse seine catch, and 35.1% of the total catch of Indian Ocean tropical tunas.
12. The WGFAD **NOTED** that between January 2020 and December 2022, the daily number of distinct satellite-tracked buoys monitored by the large-scale purse seine fishery of the western Indian Ocean varied between a minimum of 8,208 and a maximum of 11,534.
13. The WGFAD **NOTED** that data covering the period Jan 2020 - Dec 2021 for the Korean purse seiners are currently being processed by Secretariat as the formats of submission were not by IOTC standards. The complete data set of daily buoy position data for 2020-2022 should be soon made available.
14. The WGFAD **NOTED** that the trajectories of FOBs derived from daily buoy positions over that period show that the median distance travelled by a FOB was 2,562 km with some of them that travelled more than 20,000 km during their time at sea.
15. The WGFAD **NOTED** that buoys can be re-used several times during their lifespan, and **QUERIED** whether the period between two activations could be estimated, **RECALLING** that the buoy can only be reactivated once it has been brought back to port as per IOTC [Res. 19/02](#) (para 8). The WGFAD **NOTED** that quick re-activation of buoys at sea after retrieval from a FOB might be difficult to identify

from the data as the period between two successive buoy emissions may extend to 2-3 days in some cases, concealing real re-activations.

16. The WGFAD **NOTED** that the daily number of buoys activated in the fishery was on average of 65 buoys per day during 2020-2022, with some large variability over the period.
17. The WGFAD **NOTED** that the time series of buoys deactivations should also be included in the description of the DFAD dynamics to illustrate the high turnover and complement the information on buoys activations and buoy standing stock.
18. The WGFAD further **NOTED** that charts including the numbers of buoys activated, de-activated, and at sea per purse seiner would be useful to better understand the dynamics and trends of the fishery.
19. The WGFAD **NOTED** that about 25,000 distinct buoys have been activated annually during 2020-2022, but that the numbers of new DFADs built and deployed at sea might be way smaller as the rafts are often re-used in the fishery through transfers of buoys at sea. To assess the numbers of DFADs used in the fishery, the WGFAD **ENCOURAGED** the CPCs to estimate the proportion of each buoy deployment (i.e., new deployments vs. transfers), further **NOTING** that data available at the Secretariat from form 3FA could also be used to derive such figures.
20. Considering the high frequency in changes of buoys attached to dFADs and the importance of assessing the level of re-utilization of the latter, the WGFAD **NOTED** how this information could be reported through form 3-FA together with details related to the activation of buoys on *new* FADs, while **ACKNOWLEDGING** that the current ROS specifications do not include any provision to report these same details as part of their mandatory requirements.
21. The WGFAD **SUGGESTED** that in the future data be presented also through an interactive dashboard, providing indicators and standardised annual figures that would be useful for the SC to review the performance of the FADs, and **RECALLED** how in this regard IATTC already developed a set of FAD indicators which could be tailored to the IOTC case.
22. The WGFAD **RECALLED** how the SC agreed on supporting the use of daily buoys positions for scientific purposes and **NOTED** that prior to the release of this dataset to the public additional work is still required to identify the minimum set of information to be maintained, and the desirable level of aggregation and anonymization to enable proper scientific analysis.
23. Similarly, the WGFAD **AKCKNOWLEDGED** that further work is required to reach consensus on the proposed re-structuring of form 3-FA, which was last discussed intersessionally in November 2022 without a formal agreement on the classifications to be used for some of its key data elements (FOB type and FOB activity type).

## **5. COMMISSION REQUESTS TO THE SC UNDER RESOLUTIONS 23/02, 23/03 AND 23/04**

24. The WGFAD **NOTED** that the recently adopted Resolutions explicitly request analysis to be conducted by the SC in 2023.

### **5.1 Resolution 23/02 On Management of Drifting Fish Aggregating Devices (DFADs) in the IOTC Area of Competence**

25. The WGFAD **NOTED** the following requirement outlined in Resolution 23/02:

*(Para 26) The IOTC Scientific Committee shall provide advice and recommendations no later than 31 December 2023 on appropriate DFAD management options, in particular a DFAD closure, including the area, period and other details, with the objective of achieving a high probability of reducing fishing mortality of juvenile tropical tuna, in particular bigeye and*

*yellowfin tuna. If the IOTC Scientific Committee concludes that it does not currently possess access to sufficient scientific data to provide recommendations to the Commission, it shall provide advice on the data necessary for science-based recommendations.*

*(Para 27) In producing its advice and recommendations, the IOTC Scientific Committee shall take into account, inter alia:*

- a) available IOTC fisheries data;*
- b) experiences of implementing similar management measures with similar objectives, including DFAD closures, from other RFMOs; and*
- c) fishing behaviours/patterns in the Indian Ocean, both historically and those anticipated as a consequence of the implementation of any new management measures, including a DFAD closure.*

*(Para 28) The Commission, at its 28th Session in 2024, shall consider the advice and recommendations, if any, from the IOTC Scientific Committee, and take a decision on the adoption of a DFAD closure in accordance with the received advice and recommendations.*

26. The WGFAD **NOTED** that when looking into the effectiveness of measures within Resolutions which CPCs have objected to such as those contained within Resolution 23/02, the consequences of not having full implementation of measures should be considered in relation to future catch trends. However, the WGFAD **NOTED** that this is not specifically requested by the Commission and so **RECOMMENDED** that the SC request clarification from the Commission on this.
27. The WGFAD **NOTED** that advice and recommendations that this group can report back to the Commission (via the SC) for all three Resolutions can be achieved through a variety of different analytical approaches using IOTC fisheries data, existing stock assessment models and drawing on experience from other oceans. However, in many cases further simulation modelling approaches will be required, in particular to estimate the effect of measures such as full closures and FAD closures. The WGFAD **AGREED** to create a work plan for the required analytical techniques to address the requests ([Appendix IV](#)).
28. The WGFAD **NOTED** that it will be necessary to take account for the impact of other (non FAD set) fisheries on juvenile tropical tuna in order to obtain a better picture of the effect that certain measures will have on achieving the objective of reducing fishing mortality on juvenile tunas. For instance, options of voluntary fishing closures as described in RES 20/03 should be evaluated in addition to the dFAD closure.
29. The WGFAD **NOTED** that the wording of the Resolution does not explicitly state the reduction of fishing mortality of juveniles required in relation to their stock status or other outputs from standards stock assessments.

#### **5.2 Resolution 23/03 On Establishing a Voluntary Fishing Closure in the Indian Ocean for the Conservation of Tropical Tuna**

30. The WGFAD **NOTED** the following requirement outlined in Resolution 23/03:

*(Para 3) The IOTC Scientific Committee shall provide advice and recommendations no later than 31st December 2023 on appropriate fishing closures applicable to all fishing gears. These recommendations need to consider the area, closure period and any other details, with the objective of achieving a high probability of reducing fishing mortality of juvenile tropical tuna, in particular bigeye and yellowfin tuna. If the IOTC Scientific Committee concludes that it does not currently possess access to sufficient scientific data to provide recommendations to the*

*Commission, the SC shall provide recommendations relating to the data necessary for science-based recommendations for the information of the Commission.*

*(Para 4) In producing its advice and recommendations, the IOTC Scientific Committee shall take into account, inter alia:*

*a) available IOTC fisheries data;*

*b) fishing behaviours/ patterns in the Indian Ocean, both historically and those anticipated as a consequence of the implementation of the closure or any new management measures.*

31. The WGFAD **NOTED** that the requirements for this Resolution overlap with those for 23/02 as the objective of both is to achieve a high probability of reducing fishing mortality of juvenile tropical tuna but they differ in scope with 23/02 being focused on dFAD management options including closures while 23/03 covers closures for all fishing gears.

### **5.3 Resolution 23/04 On Establishing Catch Limits for Bigeye Tuna in the Area of IOTC Competence**

32. The WGFAD **NOTED** the following requirement outlined in Resolution 23/04:

*(Para 13) The IOTC Scientific Committee shall conduct a comparative analysis of the contribution of all fishing gears to the mortality of bigeye tuna, which shall include both absolute and relative contributions to mortality and stock depletion.*

*(Para 14) The IOTC Scientific Committee shall develop a table as shown in Annex 2 that quantifies the expected impact on maximum sustainable yield (MSY) and SSB<sub>msy</sub> for bigeye tuna resulting from replacing fishing mortality/catches of any major fishing gear/fishery (e.g., Longline, DFAD fisheries, AFAD fisheries, Purse seine on free school, other fisheries) for consideration by the Commission at its 2025 Session. The IOTC Scientific Committee shall also provide advice on FAD management options, including on, limits on FADs sets, that may be necessary to achieve a replacement of fishing mortality of FAD fisheries with free school fisheries. This analysis shall be conducted for DFADs and AFADs fleets separately.*

33. The WGFAD **NOTED** that the table in Annex 2 in Resolution 23/04 is unclear and open to interpretation regarding how the dFAD bigeye catch/fisheries will be replaced as there is no bigeye purse seine free school fishery and distributed to other fisheries. The WGFAD however **NOTED** that Resolution 23/04 asks the work to be completed by 2024 and therefore agreed that this issue be discussed further in October meeting before requesting the SC to seek clarification from the Commission.
34. The WGFAD **NOTED** that it would be useful for this group to be able to provide advice to the SC and Commission on the quality of data available for analysis and what data improvements are required in order to improve the analyses to be conducted. The WGFAD **NOTED** that for many fisheries there is extremely limited information on juvenile catches, particularly for bigeye, due to a lack of size data being reported to the Secretariat. The WGFAD **NOTED** that while the Secretariat does provide a score on the quality of data reported, this score relates to how well the data submitted has met the minimum reporting criteria rather than providing an indicator of the accuracy of the data. The WGFAD **NOTED** that the Secretariat provides estimations of total retained catches but does not attempt to estimate size, age or species composition of catches.
35. The WGFAD **NOTED** that this Resolution will also fall more under the remit of the work of the WPTT with some inputs from the WGFAD.
36. The WGFAD **NOTED** issues that are likely to arise as a result of replacing dFAD catches with catches on free schools due to the differing species composition in each type of fishery meaning that fishing

on free schools will lead to higher catches of adult yellowfin which will have implications on stock levels relative to MSY and will cause vessels to quickly use up their yellowfin TAC. On the other hand, a free school fishery does not really exist for bigeye tuna and so this is not a feasible solution. Therefore, the WGFAD **SUGGESTED** that it would be useful to make recommendations to the WPTT on plausible scenarios to be considered.

#### **5.4 Plan of work for the WGFAD leading up to the next session in October**

37. The WGFAD **NOTED** that for Resolutions 23/02 and 23/03 the deadline for providing advice to the Commission is at the end of this year (2023) while for 23/04 the deadline is the 2025 Commission meeting and so work to be done to address these requests should be prioritised accordingly.
38. The WGFAD **DISCUSSED** a range of approaches to be taken to address the requests of the Commission in each of the Resolutions and these were streamlined into a plan of work. While some approaches can be carried out using existing models and work such as the stock assessment models which can be adapted into a fishing impact analysis, other approaches will require simulation modelling to best estimate the impact of changing aspects of the fisheries under different scenarios.
39. The WGFAD **NOTED** that evaluating fishing mortality and stock recovery will be relatively straightforward using the existing stock assessment models through a fishing impact analysis. However, the WGFAD **NOTED** that the stock assessments are not set up on a fine spatial scale which will limit how effectively the model can deal with spatial and temporal FAD closures. The WGFAD **NOTED** that other temporal and spatial modelling work may be required in order to establish a link between FAD density and catch rates and fishing mortality and to simulate how different fleets will respond to a FAD closure.
40. The WGFAD **NOTED** that it will be necessary to estimate the level of reduction in juvenile mortality that will be required in order to achieve a good stock status assuming that F for other components of the stock remains constant. The WGFAD **NOTED** that projections can be made under various assumptions relating to the distribution of catch and that the current Kobe 2 matrix can be used to assist with these projections.
41. The WGFAD **NOTED** that with regards to area closures, it will be necessary to account for the potential impacts of effort displacement over the stocks under consideration, through the evaluation of various plausible scenarios.
42. The WGFAD **NOTED** that an issue that will be encountered when looking at the reallocation of effort is the fact that there are thought to be no major spatial or temporal patterns in species composition around the Indian Ocean and so it will be very difficult to predict the average species composition in a given area. The WGFAD **NOTED** that fisher behaviour will also be a key factor as often sets will be made only on species that certain fishers would specifically like to target but further **NOTED** that this will be difficult to simulate so different assumptions and scenarios will need to be modelled.
43. The WGFAD **NOTED** that it will be necessary to consider other unwanted consequences of FAD closures such as the potential for increased FAD strandings. Therefore, the WGFAD **SUGGESTED** that a holistic approach should be taken that will monitor several indicators (not only juvenile yellowfin and bigeye tunas) to predict possible unintended consequences of measures such as increases in shark bycatch, FAD loss, etc.
44. The WGFAD **NOTED** that it would be useful to conduct a review of measures that have been introduced in other RFMOS and how these have been assessed for effectiveness.
45. The WGFAD **NOTED** that it may be useful for the Secretariat to provide an inventory of the datasets available (and data that are missing) for analyses but further **NOTED** that it would be extremely

helpful if the group could provide some guidance to the Secretariat on the types of data and indicators that will be required for analyses so that the inventory can be made as relevant as possible. The WGFAD **NOTED** that there are several known data gaps that may affect this work..

46. The WGFAD **NOTED** that the group should draw on information and work already done by WGFAD such as paper [IOTC-2021-WGFAD02-04](#) which presented a table of different management options and how these could address various objectives.
47. The WGFAD **ADOPTED** a plan of work to be completed leading up to the next session in October ([Appendix IV](#)). The co-Chairs will correspond with suitable researchers intersessionally to determine the best way to proceed with the agreed work to be completed.

## 6. REVIEW OF ANY NEW INFORMATION AVAILABLE ON FADS

48. The WGFAD **NOTED** paper IOTC-2023-WGFAD04-06 regarding an update on biodegradable dFADS, including their current status and prospects, with the following abstract provided by the authors:

*“Document IOTC-2023-WGFAD04-06 updates different aspects related to biodegradable FADs, such as the review of the recommendations previously adopted by the group, the current resolutions/recommendations regarding biodegradable FADs in different t-RFMOs, the status of the definition and categories of biodegradable FADs adopted by the group compared with these included in the new Resolution 23/02, the data collection requirements of Resolution 23/02 to classify biodegradable FADs and difficulties observed from available data sources (FAD logbooks and observers) to response to it, past, current and future trials of new materials and models around the world and, finally, the document reviews the recommendations made to the groups to advance in the development of biodegradable FADs in the Indian Ocean.”*

49. The WGFAD **THANKED** the author for the presentation and **NOTED** the interesting update on the status and prospects of biodegradable dFADS.
50. The WGFAD **NOTED** paper IOTC-2023-WGFAD04-07 which provided details on energy efficiency of the purse seine fishery while contrasting FAD vs free swimming schools strategy, with the following abstract provided by the authors:

*“This study aims to evaluate the energy efficiency of the purse seine fishery and to determine the differences between fishing strategies (FAD vs FSC) in the Atlantic Ocean within a FAD closure period, for an isolated assessment of the free-swimming school fishing and for providing carbon footprint indicators in line with Rec. 2022-13. The analysis has been performed with data provided ANABAC and OPAGAC on purse seiner and supply vessels (i.e., vessel specifications, departure and entry date to port, miles navigated by trip, fuel levels at departure and entry to port, bunkering at sea, catch by set type (FAD and FSC) including species and size composition and reference sale prizes. Fuel consumption (L), FUI (L/t) and profitability indicators were estimated for pure FAD, pure FSC and mixed trips. On average, Atlantic purse seiners have a FUI of 856 L fuel/t catch. By fishing strategy, FAD trips (675 L/t) are more efficient and show lower carbon footprint (1839.6 ± 839.6 kgCO<sub>2</sub>/t) than FSC trips (FUI: 2044 L/t; 5569.9 ± 5176.4 kgCO<sub>2</sub>/t).”*

51. The WGFAD **THANKED** the authors for providing information on a topic that is not commonly considered by the IOTC technical working parties.
52. The WGFAD **NOTED** that the study did not take into account sets on followed FADs versus those that were opportunistically encountered. This additional factor could have an impact on the fuel

consumption. The WGFAD **SUGGESTED** that this be included in future analysis as the data is available and used in CPUE standardisations.

53. The WGFAD **NOTED** that the economic indicators did not include all running costs (e.g. supply vessels, FAD/buoy expenses). The authors acknowledged this and clarified that the aim of the study was not to provide a precise economic analysis, but rather to compare indicators of fuel consumption and greenhouse (GHG) emissions per unit of fish caught between FAD and free school sets.
54. The WGFAD **NOTED** paper IOTC-2023-WGFAD04-08 on data from abandoned, lost or discarded drifting fish aggregating devices recovered at sea and ashore in the IOTC area, with the following summary provided by the authors:

*“The use of drifting fish aggregating devices (dFADs) continues to threaten endangered, threatened, and protected species (ETP), as well as the broader marine environment in the form of marine litter and abandoned, lost, and discarded fishing gear (ALDFG) that can damage fragile coastal ecosystems. In the Indian Ocean, as in all other ocean regions, there is an urgent need to improve the management of dFADs, primarily to reduce catches of juvenile tropical tunas, but also to help mitigate the other ecological impacts associated with drifting FADs, including marine plastic pollution, ghost fishing and the bycatch of turtles, sharks and marine mammals. The lack of transparency in how dFADs are deployed, tracked and retrieved and the lack of responsibility dFAD owners take for the ecosystem and habitat damage and the pollution caused by these devices is of great concern.”* – see document for full abstract

55. The WGFAD acknowledged the paper with information on FADs recoveries and, considering the various initiatives discussed by participants on FAD recovery across the Indian Ocean, the WGFADs **RECOMMENDED** the development and adoption of data form standards for collecting and reporting the information of the recovery of abandoned, lost, and discarded fishing gear (ALDFG) to the IOTC Secretariat. In this regard, the WGFADs **SUGGESTED** that FAD (and other gear) recovery experiences from Seychelles, and any other country, are presented to the next WGFADs in October 2023.
56. The WGFAD **NOTED** that several of the photos in the document show FADs that under current IOTC measures should be fully non-entangling. In addition, for the FADs that did not meet this criterion, it was difficult to determine if they were deployed before Res 19/02 came into effect in January 2020.
57. The WGFAD **NOTED** paper IOTC-2023-WGFAD04-09 which argued that there is no evidence from long-term analysis of yellowfin tuna condition that Drifting Fish Aggregating Devices act as ecological traps for YFT in the western Indian Ocean, with the following summary provided by the authors:

*“Human-induced habitat modifications can severely impact the biology and behavior of wild species. Drifting Fish Aggregating Devices (DFADs), used by industrial purse seine tropical tuna fisheries, significantly increased the number of floating objects found in the open ocean, to which tropical tuna associate. This habitat change raised concerns over the risk of modifying the behavior and altering the biology of tuna and other associated species (the so-called ecological trap hypothesis). Relying on a time-series from 1987 to 2019 of more than 25,000 lengthweight samples collected in the western Indian Ocean, we reject the hypothesis that the body condition (Le Cren’s relative condition factor  $K_n$ ) of yellowfin tuna (*Thunnus albacares*) decreased concurrently with the increased number of DFADs. This result suggests the absence of negative long-term impacts of DFADs on the condition of tuna. As other factors may have counteracted possible negative effects of DFADs, we recommend a long-term monitoring of habitat, biological and behavioral parameters of tunas to detect any critical change.”*

58. The WGFAD **NOTED** that the concept of an ecological trap has been considered by the SC for many years and **WELCOMED** the opportunity to engage in discussions on this topic.
59. The WGFAD **NOTED** that there was substantial disagreement on the findings of this paper with several participants expressing their concern regarding the data used in the study, the methodology applied, the focus species, and the number of approximations. Regarding data, concern was expressed that the data from canneries do not have accurate associated location or date information. Additionally, it was noted that the dataset used in the analysis consisted of very few samples of small sized yellowfin tuna that mostly associate with FADs and that small fish were missing or very few from the initial years of the data period. Regarding the methodology, only the condition of the fish was assessed, and this was considered to be unreliably estimated as it was based on the difference from the “theoretical weight” estimated from the length-weight relationship. This did not take into account natural fluctuations or changes in weight caused by other factors. Concern was also expressed that the species was limited to YFT which is around 25-30% of the catch on DFADs and therefore may not be the best indicator species for evaluating the ecological trap hypothesis. Lastly regarding the approximations, year was used as a proxy for FAD numbers but some participants felt that FAD density is a more meaningful metric.
60. The authors responded to these concerns by explaining that some of the explanations for the data use were not detailed in the presentation but are included in the supplementary materials of the published paper. The location and date information were estimated from data available on well location and trip end and start date and using a bootstrap exercise to assess the result’s sensitivity to the position and date of capture for each sample. The authors further noted that the study could be performed on other tuna species. Regarding the approximations question, they looked for a correlation between FAD number and condition when data was available (2013-2019) but did not find any significant effects. The authors stressed that they were not disproving the ecological trap theory, but rather did not find evidence for supporting it from the current study.
61. Additional more technical questions were asked of the authors. The WGFAD **NOTED** a request by the authors to submit any additional questions to them in writing so that they could respond to the concerns raised by participants.
62. The WGFAD **NOTED** paper IOTC-2023-WGFAD04-10 which provided a review of strategies for reducing the negative environmental impacts of dFADs, with the following summary provided by the authors:

*“Drifting fish aggregating devices (dFADs) are human-made floating objects widely used by tropical tuna purse seine (PS) fisheries to increase catch of target species. However, dFAD use has several negative impacts, including increased potential for overfishing, higher juvenile tuna catch, higher bycatch compared to other PS fishing modes, ghost-fishing, and generation of marine litter. Based on these impacts, some stakeholders, especially environmental Non-Governmental Organizations and other competing fishing industries, suggest that dFADs should be completely banned. We list the pros and cons of dFAD fishing; address how to improve current management; and suggest solutions for the sustainability of dFAD fishing in the long term. A dFAD ban would lead to major changes in the availability and sourcing of tuna for human consumption and decrease the licensing revenue received by many developing states. Most importantly, we argue that tools exist today to manage for, reduce or eliminate most of the negative impacts of dFADs (e.g., bans on discards, limits on active dFADs, biodegradable non-entangling constructions, time-area deployment closures, recovery programs, and full data transparency, among others). Management decisions based on sound scientific reasoning are*



---

*needed to address the legitimate concerns surrounding dFAD use and ensure the sustainability of both pelagic and coastal ecosystems and tropical tuna PS fisheries.”*

63. The WGFAD **THANKED** the author for this interesting paper **NOTED** that it contained items that would be very useful for guiding the work of the WGFAD in response to the requests from the Commission in Resolutions 23/02 and 23/03.
64. The WGFAD **NOTED** that the paper did not consider the possibility of a full closure (such as done in the Pacific) but this could be simulated. The authors stated however that this may be difficult to conceptualise as effort redistribution based on a spatial closure can be accommodated, but effort redistribution over a temporal scale is difficult to understand. The WGFAD **AGREED** that the reaction of the fleets to a closure (either spatial or temporal) will need to be carefully considered and addressed.
65. The WGFAD **NOTED** the suggestion that a temporal closure could take place over two separate time blocks with the vessels being able to select which time block to observe. This would ensure continuity in fish supply to processors and markets.
66. The WGFAD **ACKNOWLEDGED** the complexity of evaluating closures in the Indian Ocean due to the wide range of fleet and gear types. In addition, any technological creep would require additional revision of any proposed measures in the future.

## **7. ADOPTION OF THE REPORT OF THE 4<sup>TH</sup> SESSION OF THE WORKING GROUP ON FADS**

67. The report of the 4<sup>th</sup> Session of the Working Group on FADs (IOTC–2023–WGFAD04–R) was **ADOPTED** by correspondence.

## APPENDIX I

### LIST OF PARTICIPANTS

**Co-Chairperson**  
Dr Gorka **Merino**  
AZTI  
[gmerino@azti.es](mailto:gmerino@azti.es)

**Co-Chairperson**  
Mr. Avelino **Munwane**  
Ministry of Sea, Inland  
Waters and Fisheries  
[avelinomunwane@gmail.com](mailto:avelinomunwane@gmail.com)  
[m](#)

**Other Participants**  
Mr. Mohamoud **Abdullahi**  
Ministry of Fisheries And  
Blue Economy Somalia  
[mr.badrudin@gmail.com](mailto:mr.badrudin@gmail.com)

Dr. Shiham **Adam**  
IPNLF  
[shiham.adam@ipnlf.org](mailto:shiham.adam@ipnlf.org)

Mr. Mohamed **Adawe**  
Ministry of Fisheries and  
Blue Economy Somalia  
[fish.license@mfmr.gov.so](mailto:fish.license@mfmr.gov.so)

Mr. Mohamed **Ahusan**  
Maldives Marine Research  
Institute  
[mohamed.ahusan@mmri.gov.mv](mailto:mohamed.ahusan@mmri.gov.mv)

Mr. Nattawut **Aiemubolwan**  
Department of Fisheries,  
Thailand  
[nattawut.mnk62@gmail.com](mailto:nattawut.mnk62@gmail.com)  
[m](#)

Dr. Nekane **Alzorriz**  
ANABAC  
[nekane@anabac.org](mailto:nekane@anabac.org)

Ms. Cindy **Assan**  
SFA  
[cassan@sfa.sc](mailto:cassan@sfa.sc)

Dr. Jose **Baez**  
Instituto Español de  
Oceanografía (CSIC)  
[josecarlos.baez@ieo.csic.es](mailto:josecarlos.baez@ieo.csic.es)

Mr. Roy **Bealey**  
IPNLF  
[roy.bealey@ipnlf.org](mailto:roy.bealey@ipnlf.org)

Dr. Nathalie **Bodin**  
Oceanika  
[scientist@oceanika.org](mailto:scientist@oceanika.org)

Ms. Priyal **Bunwaree**  
Blue Marine Foundation  
[priyal@bluemarinefoundation.com](mailto:priyal@bluemarinefoundation.com)

Dr. Manuela **Capello**  
IRD  
[manuela.capello@ird.fr](mailto:manuela.capello@ird.fr)

Dr. Joseba **Castresana**  
**Larrauri**  
AZTI  
[jcastresana@azti.es](mailto:jcastresana@azti.es)

Dr. Ansuman **Das**  
Fishery survey of India  
[ansuman@fsi.gov.in](mailto:ansuman@fsi.gov.in)

Ms. Yasmina **Diaz**  
Satlink  
[yds@satlink.es](mailto:yds@satlink.es)

Mr. Amaël **Dupaix**  
IRD  
[amael.dupaix@ens-lyon.fr](mailto:amael.dupaix@ens-lyon.fr)

Dr. Antoine **Duparc**  
IRD – MARBEC  
[antoine.duparc@ird.fr](mailto:antoine.duparc@ird.fr)

Ms. Emilia **Dyer**  
IPNLF  
[emilia.dyer@ipnlf.org](mailto:emilia.dyer@ipnlf.org)

Dr. Abdussamad **E.M.**  
CMFRI  
[emasamadg@gmail.com](mailto:emasamadg@gmail.com)

Dr. Daniel **Gaertner**  
IRD  
[daniel.gaertner@ird.fr](mailto:daniel.gaertner@ird.fr)

Ms. Kathryn **Gavira**  
Satlink

[kgo@satlink.es](mailto:kgo@satlink.es)

Dr. Maitane **Grande**  
AZTI  
[mgrande@azti.es](mailto:mgrande@azti.es)

Dr. Bianca **Haas**  
Australian National Centre  
for Ocean Resources and  
Security  
[bhaas@uow.edu.au](mailto:bhaas@uow.edu.au)

Mr. Ignatius **Hargiyatno**  
IRD  
[ignatius.hargiyatno@ird.fr](mailto:ignatius.hargiyatno@ird.fr)

Mrs. Hety **Hartaty**  
National Research and  
Innovation Agency  
[hhartaty@gmail.com](mailto:hhartaty@gmail.com)

Mr. Miguel **Herrera**  
OPAGAC  
[miguel.herrera@opagac.org](mailto:miguel.herrera@opagac.org)

Mr. Abdirahim **Ibrahim**  
Dalhousie University  
[sgunrahim@yahoo.com](mailto:sgunrahim@yahoo.com)

Dr. Taha **Izmilen**  
IRD  
[taha.imzilen@ird.fr](mailto:taha.imzilen@ird.fr)

Dr. Ahmed Riyaz **Jauharee**  
Maldives Marine Research  
Institute  
[riyaz.jauharee@mmri.gov.mv](mailto:riyaz.jauharee@mmri.gov.mv)

Mr. Stanislovas **Jonusas**  
European Commission  
[stanislovas.jonusas@ec.europa.eu](mailto:stanislovas.jonusas@ec.europa.eu)

Dr. David **Kaplan**  
IRD  
[david.kaplan@ird.fr](mailto:david.kaplan@ird.fr)

Dr. Farhad **Kaymaram**  
Iranian Fisheries Science  
Research Institute

[farhadkaymaram@gmail.com](mailto:farhadkaymaram@gmail.com)

Ms. Jess **Keedy**  
UK Department for the  
Environment, Food and  
Rural Affairs  
[jess.keedy@defra.gov.uk](mailto:jess.keedy@defra.gov.uk)

Mr. Muhammad Moazzam  
**Khan**  
WWF-Pakistan  
[mmoazzamkhan@gmail.com](mailto:mmoazzamkhan@gmail.com)

Ms. Beatrice **Kinyua**  
Sustainable Fisheries and  
Communities Trust  
[beatrice.kinyua@sfact.org](mailto:beatrice.kinyua@sfact.org)

Dr. Toshihide **Kitakado**  
Tokyo University of Marine  
Science and Technology  
[kitakado@kaiyodai.ac.jp](mailto:kitakado@kaiyodai.ac.jp)

Dr. Mohammed **Koya**  
CMFRI-India  
[koya313@gmail.com](mailto:koya313@gmail.com)

Ms. Chonticha **Kumyoo**  
Department of Fisheries,  
Thailand  
[chonticha.dof@gmail.com](mailto:chonticha.dof@gmail.com)

Dr. Yanan **Li**  
Shanghai Ocean University  
[liyananxiada@yeah.net](mailto:liyananxiada@yeah.net)

Dr. Maria Teresa **Losada Ros**  
Satlink  
[tlr@satlink.es](mailto:tlr@satlink.es)

Mr. Vincent **Lucas**  
SFA  
[vlucas@sfa.sc](mailto:vlucas@sfa.sc)

Mrs. Juliette **Lucas**  
SFA  
[jlucas@sfa.sc](mailto:jlucas@sfa.sc)

Ms. Joanne **Lucas**  
SFA  
[j.alucas@sfa.sc](mailto:j.alucas@sfa.sc)

Dr. Francis **Marsac**  
IRD

[francis.marsac@ird.fr](mailto:francis.marsac@ird.fr)

Dr. Naoto **Matsubara**  
Fisheries Resources Institute,  
Japan Fisheries Research and  
Education Agency  
[matsubara\\_naoto84@fra.go.jp](mailto:matsubara_naoto84@fra.go.jp)

Dr. Takayuki **Matsumoto**  
Fisheries Resources Institute  
[matumot@affrc.go.jp](mailto:matumot@affrc.go.jp)

Dr. Alexandra **Maufroy**  
ORTHONGEL  
[amaufroy@orthongel.fr](mailto:amaufroy@orthongel.fr)

Dr. Julio **Morón**  
OPAGAC  
[julio.moron@opagac.org](mailto:julio.moron@opagac.org)

Dr. Hilario **Murua**  
ISSF  
[hmurua@iss-foundation.org](mailto:hmurua@iss-foundation.org)

Dr. Gladys **Okemwa**  
KMFRI  
[gladysokemwa@gmail.com](mailto:gladysokemwa@gmail.com)

Mr. Marc **Owen**  
UK Department for the  
Environment, Food and  
Rural Affairs  
[marc.owen@defra.gov.uk](mailto:marc.owen@defra.gov.uk)

Ms. Dulce **Panguana**  
FAO – SWIOFC  
[Dulce.Panguana@fao.org](mailto:Dulce.Panguana@fao.org)

Mr. John **Pearce**  
MRAG Ltd  
[j.pearce@mrage.co.uk](mailto:j.pearce@mrage.co.uk)

Mr. Dinesh **Peiris**  
Department of Fisheries and  
Aquatic Resources  
[dineshdfar@gmail.com](mailto:dineshdfar@gmail.com)

Ms. Orawan **Prasertsook**  
Department of Fisheries,  
Thailand  
[fukowindy.sp@gmail.com](mailto:fukowindy.sp@gmail.com)

Mr. Martin **Purves**  
IPNLF

[martin.purves@ipnlf.org](mailto:martin.purves@ipnlf.org)

Mrs. Lourdes **Ramos**  
Instituto Español de  
Oceanografía (CSIC)  
[mlourdes.ramos@ieo.csic.es](mailto:mlourdes.ramos@ieo.csic.es)

Ms Jess **Rattle**  
Blue Marine Foundation  
[Jess@bluemarinefoundation.com](mailto:Jess@bluemarinefoundation.com)

Mr. Stuart **Reeves**  
Cefas  
[stuart.reeves@cefass.gov.uk](mailto:stuart.reeves@cefass.gov.uk)

Dr. Surya **S**  
CMFRI  
[revandasurya@gmail.com](mailto:revandasurya@gmail.com)

Dr. Josu **Santiago**  
AZTI  
[jsantiago@azti.es](mailto:jsantiago@azti.es)

Mr. Umair **Shahid**  
WWF  
[ushahid@wwf.org.pk](mailto:ushahid@wwf.org.pk)

Mr. Mohamed **Shimal**  
Maldives Marine Research  
Institute  
[mohamed.shimal@mmri.gov.mv](mailto:mohamed.shimal@mmri.gov.mv)

Dr. Hussain **Sinan**  
Ministry of Fisheries, Marine  
Resources and Agriculture  
[hsinan@gmail.com](mailto:hsinan@gmail.com)

Pr. Liming **Song**  
Shanghai Ocean University  
[limsong@shou.edu.cn](mailto:limsong@shou.edu.cn)

Mr. Weerapol  
**Thitipongtrakul**  
Department of Fisheries,  
Thailand  
[weerapol.t@gmail.com](mailto:weerapol.t@gmail.com)

Mr. Eric **Thuranira**  
Kenya Fisheries Service  
[thuraniraeric9@gmail.com](mailto:thuraniraeric9@gmail.com)

Dr Alex **Tidd**  
IRD

[alex.tidd@ird.fr](mailto:alex.tidd@ird.fr)

Dr. Mariana **Tolotti**  
IRD  
[mariana.travassos@ird.fr](mailto:mariana.travassos@ird.fr)

Dr. Marco **Valletta**  
European Union  
[marco.valletta@ec.europa.eu](mailto:marco.valletta@ec.europa.eu)

Dr. David **Wilson**  
DAFF  
[davetroywilson@gmail.com](mailto:davetroywilson@gmail.com)

Ms. Naghmana **Zafar**  
WWF  
[nzbhatti@wwf.org.pk](mailto:nzbhatti@wwf.org.pk)

Dr. Iker **Zudaire**

AZTI  
[izudaire@azti.es](mailto:izudaire@azti.es)

#### **IOTC Secretariat**

Dr Christopher **O'Brien**  
[chris.obrien@fao.org](mailto:chris.obrien@fao.org)

Dr Paul **de Bruyn**  
[paul.debruyn@fao.org](mailto:paul.debruyn@fao.org)

Mr Fabio **Fiorellato**  
[fabio.fiorellato@fao.org](mailto:fabio.fiorellato@fao.org)

Ms Lauren **Nelson**  
[lauren.nelson@fao.org](mailto:lauren.nelson@fao.org)

Dr Emmanuel **Chassot**  
[Emmanuel.Chassot@fao.org](mailto:Emmanuel.Chassot@fao.org)

Mr Dan **Fu**  
[Dan.fu@fao.org](mailto:Dan.fu@fao.org)

Ms Cynthia **Fernandez-Diaz**  
[Cynthia.FernandezDiaz@fao.org](mailto:Cynthia.FernandezDiaz@fao.org)

Ms Lucia **Pierre**  
[lucia.pierre@fao.org](mailto:lucia.pierre@fao.org)

**APPENDIX II**  
**AGENDA FOR THE 4TH AD-HOC WORKING GROUP ON FADS MEETING**

**Date:** 29 - 30 May 2023

**Location:** Zoom

**Venue:** Virtual

**Time:** 12:00 – 16:00 (Seychelles time)

**Co-Chair:** Dr. Gorka Merino (European Union); **Co-Chair:** Mr. Avelino Munwane

- 1. OPENING OF THE MEETING** (Co-Chairs)
- 2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Co-Chairs)
- 3. THE IOTC PROCESS: OUTCOMES, UPDATES, AND PROGRESS** (Secretariat)
  - 3.1. Outcomes of the 25<sup>th</sup> Session of the Scientific Committee
  - 3.2. Outcomes of the 6<sup>th</sup> Special Session of the Commission and the 27<sup>th</sup> Session of the Commission and previous decisions of the Commission in relation to FADs
  - 3.3. Resolution 23/09 *On A Fish Aggregating Devices (FADs) Working Group*
- 4. REVIEW OF THE DATA AVAILABLE AT THE SECRETARIAT ON FADS** (IOTC Secretariat)
- 5. COMMISSION REQUESTS TO THE SC UNDER RESOLUTIONS 23/02, 23/03 and 23/04** (All)
  - 5.1. Resolution 23/02 *On Management of Drifting Fish Aggregating Devices (DFADs) in the IOTC Area of Competence*
  - 5.2. Resolution 23/03 *On Establishing a Voluntary Fishing Closure in the Indian Ocean for the Conservation of Tropical Tuna*
  - 5.3. Resolution 23/04 *On Establishing Catch Limits for Bigeye Tuna in the Area of IOTC Competence*
  - 5.4. Plan of work for the WGFAD leading up to the next session in October (All)
- 6. REVIEW OF ANY NEW INFORMATION AVAILABLE ON FADS**
- 7. WRAP UP, SUMMARY OF DISCUSSIONS AND RECOMMENDATIONS** (Co-Chairs)
- 8. ADOPTION OF THE REPORT OF THE 4<sup>th</sup> SESSION OF THE WORKING GROUP ON FADS** (Co-Chairs)

**APPENDIX III**  
**LIST OF DOCUMENTS**

| Document                  | Title  |
|---------------------------|--|
| IOTC-2023-WGFAD04-01a     | Draft: Agenda of the 4 <sup>th</sup> Working Group on FADs Meeting   |
| IOTC-2023-WGFAD04-01b     | Draft: Annotated agenda of the 4 <sup>th</sup> Working Group on FADs Meeting   |
| IOTC-2023-WGFAD04-02      | Draft: List of documents of the 4th Ad Hoc Working Group on FADs Meeting   |
| IOTC-2023-WGFAD04-03      | Outcomes of the 25th Session of the Scientific Committee (IOTC Secretariat)  |
| IOTC-2023-WGFAD04-04      | Outcomes of the 6 <sup>th</sup> Special Session and 27 <sup>th</sup> Session of the Commission (IOTC Secretariat)  |
| IOTC-2023-WGFAD04-05      | Review of the statistical data on FADs (IOTC Secretariat)  |
| IOTC-2023-WGFAD04-06      | Update on biodegradable dFADs: current status and prospects – Zudaire I, Moreno G, Murua J, Murua H, Tolotti M, Roman M, Hall M, Lopez J, Grande M, Merino G, Escalle L, Hamer P, Basurko O, Capello M, Dagorn L, Ramos ML, Abascal F, Báez JC, Pascual-Alayón P, Déniz S, Santiago J. |
| IOTC-2023-WGFAD04-07      | Energy efficiency of the purse seine fishery: FAD vs free swimming schools strategy – Basurko O, Castresana J, Grande M, Santiago J.   |
| IOTC-2023-WGFAD04-08      | Data from abandoned, lost or discarded drifting fish aggregating devices recovered at sea and ashore in the IOTC area - Shiham Adam M, Bealey R, Purves M  |
| IOTC-2023-WGFAD04-09      | No evidence from long-term analysis of yellowfin tuna condition that Drifting Fish Aggregating Devices act as ecological traps – Dupaix A, Dagorn L, Duparc A, Guillou A, Deneubourg J-L, Capello M.   |
| IOTC-2023-WGFAD04-10      | Review of strategies for reducing the negative environmental impacts of dFADs. (Kaplan D et al.)   |
| <b>Information papers</b> |  |
| IOTC-2023-WGFAD04-INF01   | Developing a science-based framework for the management of drifting Fish Aggregating Devices (Capello M, Merino G, Tolotti M, Murua H, Dagorn L)   |
| IOTC-2023-WGFAD04-INF02   | Preserving Coral Reefs: OCEANIKA's actions to safeguard Seychelles coastal ecosystems through the retrieval of abandoned, lost, or discarded dFADs (Oceanika)  |
| IOTC-2023-WGFAD04-INF03   | Forecasted consequences of simulated FAD moratoria in the Atlantic and Indian Oceans on catches and bycatches (Escalle L, Gaertner D, Chavance P, Delgado de Molina A, Ariz J, Merigot B)  |

## APPENDIX IV

### INTERSESSIONAL WORKPLAN FOR THE WGFAD (2023)

#### **Issue 1: Alternative DFAD management options** (*Addressing requests of Resolutions 23/02 and 23/04*)

Develop a Schedule to evaluate alternative measures – this will be included as a point on the agenda in October to look at approaches to:

1. Reducing mortality of juveniles of BET/YFT and facilitate recovery.
2. Mitigating by-catch
3. Mitigating habitat impact (FAD loss, beaching, etc.).

#### **Issue 2: On closures (area, period modalities, full closure, dFADs closure, exploring other gears etc.)** (*Addressing requests of Resolutions 23/02 and 23/03*)

This was assigned the highest priority and was adopted for the next meeting in October. Approaches to be taken included:

1. Review similar evaluations conducted in other RFMOs. Considering why RFMOs have put moratoria in place. Analyses of representativeness of purse seine on total catch compared with the Indian Ocean situation
2. Conduct a data inventory (Secretariat). Check data quality for those data required for all analyses and determine whether the data required to provide advice to the Commission are available. If these data are not available, provide recommendations for improving data so that analyses can be conducted
3. Conduct statistical analyses to evaluate the effect of spatial/temporal closures on juvenile catch at a fine scale resolution (1x1 grid and monthly basis)
  - a. Using the stock assessment outputs to evaluate the recovery of the stock if fishing mortality of yellowfin and bigeye tuna juveniles is reduced (e.g., closure of DFADS or other gears). Activities to undertake include: Fishery impact analysis
  - b. Using projections to evaluate how recovery would be accelerated taking into consideration the following points:
    - Response of fleets to closures or different closure modalities
    - TAC may be achieved by replacing the DFAD catches with catches from free schools. Therefore, DFAD closure may lead to an increased catch of adults (e.g., from free schools) causing fleets to reach TAC faster
    - Skipjack tuna free school catches are very low (and even lower for bigeye tuna).
    - There is a lot of variation in catches and species composition among FAD sets, the model needs to account for uncertainty
    - The need to evaluate the impact on reference points (Res 23/04)
4. There is a need to consider the impact of different scenarios on the purse seine operations (qualitative analysis):
  - What will be the impact on activity, global catches of other species
  - Possible socio-economic impacts (Res 23/02 and 23/03)
  - Possible impacts of fuel consumption.

#### **Issue 3: On alternative FAD management measures**

1. Review similar evaluations in other RFMOs. Review FAD management options being implemented in other RFMOs. Examine limits on FAD sets for DFAD and AFAD separately as well as any recovery options.
2. Conduct a statistical analysis on spatial/temporal impacts of measures on juvenile catch. This should be done at a fine scale resolution (1x1 grid and monthly basis).
3. Study the data available and what additional analyses could be carried out.
4. Using the stock assessment outputs to evaluate recovery of the stock if juveniles are reduced (bigeye and yellowfin)
5. Provide advice on other measures.
  - Consider any unwanted consequences of measures.

**APPENDIX V****CONSOLIDATED RECOMMENDATIONS OF THE 4TH SESSION OF THE WORKING GROUP ON FADS**

WGFAD04.01 (Para 26) The WGFAD **NOTED** that when looking into the effectiveness of measures within Resolutions which CPCs have objected to such as those contained within Resolution 23/02, the consequences of not having full implementation of measures should be considered in relation to future catch trends. However, the WGFAD **NOTED** that this is not specifically requested by the Commission and so **RECOMMENDED** that the SC request clarification from the Commission on this.

WGFAD04.02 (Para 55) The WGFAD acknowledged the paper with information on FADs recoveries and, considering the various initiatives discussed by participants on FAD recovery across the Indian Ocean, the WGFADs **RECOMMENDED** the development and adoption of data form standards for collecting and reporting the information of the recovery of abandoned, lost, and discarded fishing gear (ALDFG) to the IOTC Secretariat. In this regard, the WGFADs **SUGGESTED** that FAD (and other gear) recovery experiences from Seychelles, and any other country, are presented to the next WGFADs in October 2023.