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UPDATE AND WORKPLAN ON FAD RESEARCH

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Executive Summary

Drifting Fish Aggregating Devices (dFADs) are used in large numbers in the Western and Central Pacific Ocean (WCPO). They have become an important part of the region's tropical tuna fishery. Managers, industry, NGOs and other stakeholders have become increasingly mindful of the need to improve management of dFAD use, and in particular mitigate their environmental impacts. The WCPFC is working towards improving the reporting, management and environmental sustainability of dFAD use in the Western and Central Pacific Ocean. This paper summarises the progress of the different dFAD-oriented research projects led by SPC and presents a workplan and Terms of Reference for future activities (Appendix 1 and 2) in order to support monitoring of current dFAD-related CMMs and the development of potential future CMMs to manage and mitigate the environmental impacts of dFAD use. This summary is provided in view of WCPFC priorities highlighted in the FAD Management Options IWG 2024–2026 work plan that includes: satellite buoy data transmission requirements; FAD recovery programs/strategies; FAD logbook; biodegradable FADs; dFAD deployment.

The dFAD-related research in the WCPO region being led by SPC includes:

- analyses of satellite buoy data, including trajectory and echosounder data
- scoping of feasibility of dFAD recovery programs and assessing the impact of dFAD loss and abandonment, including:
    - regional stranded dFAD data collection program and support for recovery of stranded dFADs;
    - re-using satellite and echosounder buoys to support local projects;
    - identification of hotspot(s) of dFAD stranding events, loss and abandonment;
    - analysis of feasibility and cost-effectiveness of dFAD recovery options in the WCPO;
    - a review study on the international and regional legal frameworks of relevance to dFADs;
    - monitoring of dFADs drifting outside the main purse seine fishing grounds.
- analyses of FAD data collected using the FAD logbook and comparisons with observer data
- non-entangling and biodegradable dFADs, including:
    - partnering with industry on trials of the performance of non-entangling and biodegradable dFADs, capacity building and training in biodegradable and non-entangling dFAD design aspects, materials and construction;
    - monitoring dFAD designs and materials used in dFAD's construction by the industry;
- assessments of dFAD use per vessel, including deployments and active numbers of dFADs

We invite WCPFC-SC22 to:

- Note the current broad range of dFAD research implemented or planned by SPC, that has direct value and linkage to the FAD Management Options Intersessional Working Group (IWG) work plan for 2024–2026 and the Scientific Committee.
- Provide advice on the current and future focus of dFAD research and on the priorities for the Scientific Committee; including the list of proposed SSP papers for SC23; the proposed activities for 2027–2028 (Appendix 1) and the Terms of Reference for a WCPFC project (Appendix 2).

1. Introduction

Drifting Fish Aggregating Devices (dFADs) are an important part of the purse seine fishery in the Western and Central Pacific Ocean (WCPO) and tropical tuna fisheries worldwide (Pons et al., 2023; Williams and Ruaia, 2023). In the WCPO, it has been estimated that 30,000 to 40,000 buoys attached to dFADs are deployed annually (Escalle et al., 2021b). In view of the potential impacts of this level of dFAD use (Pons et al., 2023), the Western and Central Pacific Fisheries Commission (WCPFC) has adopted several Conservation and Management Measures (CMM), mostly encapsulated in CMM-2023-01/2025-02 ('*The Tropical Tuna Measure'*), including annual FAD closures, during which all dFAD-related activities (e.g., fishing, deployment, servicing) are prohibited; a limit of 350 dFADs per vessel monitored at any one time with activated instrumented buoys (activation on-board only); banning the use of netting in dFAD construction; promoting the use of biodegradable material in the construction of dFADs; and promoting dFAD recovery. In order to support monitoring of the impacts of current CMMs and the development of potential future CMMs to reduce the environmental impacts of dFAD use, several research projects linked to dFADs are currently ongoing or have been developed and led by the Pacific Community (SPC), the WCPFC's Scientific Services Provider (SSP).

The outline of the WCPO dFAD research presented in this paper has been developed to reflect the FAD Management Options Intersessional Working Group (IWG) work plan for 2024–2026 and provides feedback to the WCPFC Scientific Committee (SC) on the research led by the SSP on priority topics identified by previous SC meetings.

The tasks of the FAD Management Options IWG for 2024–2026 include:

- Satellite Buoy Data Transmission Requirements: Consider requirements for the transmission of satellite buoy data from drifting FADs in 2024 to promote effective and sustainable FAD management in the WCPO.
- FAD Recovery Programs/Strategies: consider ways to implement FAD recovery programs/strategies, including economic aspects and standards required for programs to be effective
- FAD logbook development: consider relevant information/materials to develop the WCPFC FAD logbook for vessel operators.
- Biodegradable FADs: consider ways for the implementation of the stepwise introduction of bio-degradable.
- dFAD deployment levels, in particular to WCPFC23 on the effectiveness of the limit on the number of dFADs deployed as set in paragraph [21] of the CMM 2023-01.

The current document provides a summary on the progress of the different research projects led by SPC and presents a workplan for future activities (Appendix 1) developed to support work of the WCPFC and FAD Management Options IWG in the coming years. Actual work would be funding-dependent; which could be through a potential WCPFC project, with Terms of References included in Appendix 2.

2. dFAD research in the WCPO

2.1 Analyses of satellite buoy data

- **Trajectory data**

Analyses of dFAD trajectory data have been performed and presented to WCPFC-SC on a regular basis since 2017 (e.g., Escalle et al., 2017, 2023). This has allowed investigation of dFAD deployment patterns, dFAD density and inter-FAD distances, dFAD stranding events, dFAD loss and abandonment, echosounder use, and estimates of active dFADs and dFAD deployments per vessels. This could be reassessed and presented to SC23 if requested by WCPFC.

Data were mostly from the PNA FAD tracking data (data from 2016 until now), and included the fields listed below. Since January 2024, the PNA fourth Implementing Arrangement (PNA 4IA) prohibits deactivation of dFADs buoys in the WCPFC Convention Area between 20°N and 20°S, which greatly enhance the amount of data available.

- Buoy ID
- Fishing Company or other FAD Buoy Owner
- Vessel Name
- Date and time
- Latitude and longitude

Recently, dFAD trajectory data have also been submitted directly to the WCPFC-SSP, following the adoption by the International Seafood Sustainability Foundation (ISSF) Proactive Vessel Register Conservation Measures. This measure states that proactive vessels should report dFAD position data to the relevant Regional Fisheries Management Organization (RFMO) science bodies with a maximum time lag of 90 days, from 1 January 2023 (Management measure 3.7 Transactions with Vessels or Companies with Vessel-Based FAD Management Policies). Data have been received monthly at SPC since January 2023 in csv files. It includes the following fields:

- Buoy ID
- Fishing Company or other FAD Buoy Owner
- Vessel IMO Number
- Vessel Name
- Buoy model and brand
- Date and time
- Latitude and longitude
- Biomass estimation by layers (since January 2024, see next section)

In addition, the following are also transmitted, when available:

- Water temperature
- Buoy speed
- Buoy direction

Analyses of a small subset of the data has been performed (Escalle et al., 2023a). Similar investigations to those using the PNA FAD tracking data can be performed but now with a larger dataset.

- **Echosounder data**

A preliminary study analyzed a subset of echosounder data, comprising over 4.7 million acoustic transmissions from buoys (Satlink, Zunibal and Kato) deployed on dFADs in the WCPO in 2016–2018

(Escalle et al., 2021b). Data were obtain through direct collaboration with some fishing companies that provided a subset data to SPC. The study indicated that acoustic biomass estimates from dFADs could potentially assist in the development of an independent biomass index for skipjack tuna in the WCPO. A tuna biomass index has been derived from echosounder buoys in the Eastern Pacific Ocean, and was used in the IATTC benchmark stock assessments of skipjack tuna and explored for bigeye and yellowfin tuna assessments in 2024 (Uranga et al., 2024). Longer-term, with the inclusion of historical data, the availability of echosounder data from buoys attached to dFADs in the WCPO could prove valuable as independent biomass indices in stock assessments.

At present, received echosounder data is limited data sent on a voluntary basis, following the ISSF Proactive Vessel Register Management measure 3.7. Since January 2024, in addition to position data, echosounder data should also be submitted to SPC with a maximum time lag of 90 days. Investigation of echosounder data as a source for abundance indices would require greater coverage across the WCPO. We suggest this could be discussed in relation to the 'Tuna Assessment Research Plan' which notes the need for focused project work to improve tropical tuna abundance indices for stock assessment, and especially for skipjack tuna.

Table 1. Research topics and projects based on analyses of satellite buoy data.

Topic	Objective	Latest report	Next submission of results to SC
Analyses of trajectory data	Identification of: - deployment patterns, - dFAD density, - inter-FAD distances, - stranding events, - dFAD loss and abandonment - use of echosounder, - estimates of active dFADs and dFAD deployments per vessels and at the scale of the WCPO.	SC 19 (Escalle et al., 2023a)	SC23 In particular to update the estimates of active dFADs and dFAD deployments to support re-development of CMM 2025-02, if requested by WCPFC.
Analyses of echosounder data	- independent tuna biomass indices that could be considered in stock assessments	SC 17 (Escalle et al., 2021b)	Considered as part of a tuna abundance indices project under the Tuna Assessment Research Plan

2.2 FAD recovery programs and impact of FAD loss and abandonment

- **<u>Regional stranded FAD data collection programme and support for recovery of stranded FADs</u>**

Stranded FAD data collection programmes are in place in Pacific Island Countries and Territories (PICTs) to collect data on lost or abandoned FADs (industrial drifting and anchored FADs) reaching coastal waters and/or becoming stranded, as well as the potential impacts of these events on coastal environments (Mourot et al., 2025). Data are collated into a regional database at SPC. A total of 5,895 stranding events have been reported in the regional database across 26 countries and territories between 2006—2026, with dedicated programmes now in place in 16 PICTs, including American Samoa; Australia; Cook Islands; Federated States of Micronesia; French Polynesia; Guam; Hawai'i; Marshall Islands; New Caledonia; Palau; Palmyra; Solomon Islands; Tonga; Tuvalu; Samoa; and Wallis

and Futuna. The number or records of stranded FADs vary greatly between country programmes depending on the longevity of the programme, the location of each country and the resources and effort available for stranded FAD detection and reporting. More detailed information can be found in the paper WCPFC-SC21-EB-WP-05 (Mourot et al., 2025). The development of a data collection app has been discussed and could be developed with appropriate funding.

Table 2. Summary of data collected by stranded FAD data collection programs in the Pacific Ocean presented as the number of events recorded since the beginning of each programme.

PICT	Start of the program	Events recorded
French Polynesia	2019	2286
Solomon Islands	2024	725
Australia	2004	596
Cook Islands	2020	461
Tuvalu	2022	379
Wallis and Futuna	2020	275
Kingdom of Tonga	2023	219
Federated States Micronesia	2021	211
Hawai'i	2014	177
New Caledonia	2022	132
Republic of the Marshall Islands	2021	103
Palmyra Atoll	2009	87
Clipperton	Opportunistically	52
Samoa	2024	48
American Samoa	2024	41
Pitcairn Islands	Opportunistically	23
Vanuatu	Opportunistically	20
Guam	2024	15
Palau	2023	15
Wake Island (US)	Opportunistically	13
Republic of Palau	2024	12
Fiji	Opportunistically	7
Papua New Guinea	Opportunistically	6
Niue	Opportunistically	2
New Zealand	Opportunistically	2
Alaska (US)	Opportunistically	1
Japan	Opportunistically	1
Northern Mariana Islands (US)	Opportunistically	1
Total		**5895**

- **<u>Re-using satellite and echosounder buoys to support local projects</u>**

SPC and some of its member countries have joined initiatives to reduce the material pollution related to the stranding events of dFADs and buoys. Since July 2023, SPC is part of the Satlink project 'ReCon', a global circular economy initiative that works with a network of partners and a large part of the fishing industry with the aim of reusing shore-stranded functional buoys found by local PICT communities. Similarly, SPC joined Marine Instruments' Blue Recovery project and Zunibal's Searcle in 2025. One common objective shared by these projects is to mitigate the potential environmental impact and marine pollution caused by buoys that are stranded on shores. Buoys found in good condition have strong potential to be reused in local projects and benefit Pacific communities. The buoy can be re-

used for its GPS function to track marine debris or the position of an anchored community FAD; its flashing light can mark a channel or a fishing spot; and its echosounder can be used to estimate the quantity of fish aggregated under a community anchored FAD. Work with PICTs and buoy manufacturer will continue to expand, depending on funding and opportunities. In particular, a guide on how to re-use buoys and their components would be highly relevant to the Pacific context, funding dependant.

- **Hotspots of dFAD stranding events, loss and abandonment**

Patterns of dFAD loss, abandonment and dFAD stranding events are regularly compiled and studied using available dFAD tracking data (e.g., Escalle et al., 2023). With the recent availability of additional and more complete dFAD tracking data through the PNA 4IA (see section 2.1), such patterns and quantification of dFAD loss, abandonment and stranding events will be re-assessed. This will be compared to data available from in-situ stranded FAD data collection. Updated results will be presented at SC23.

Simulations can also be used to investigate patterns of dFAD use, loss and stranding events (Escalle et al., 2019, 2024; Scutt Phillips et al., 2019). For instance, Lagrangian passive drift simulation experiment have been used to examine corridors of loss of operational dFADs throughout equatorial fishing zones, between 10°N and 10°S (WCPFC-SC21-EB-IP-05) (Scutt Phillips et al., 2025). Such an approach has also been used to investigate potential reduction in dFADs lost from the fishing ground under different dFAD lifetime scenarios, reflecting the industry's transition to biodegradable dFADs (Scutt Phillips et al., 2025). Additional work using simulations data could be considered to complement real tracking data.

- **Analysis of feasibility and cost-effectiveness of dFAD recovery options in the WCPO**

SPC is leading a project, funded by the World Bank, that seeks to assess the feasibility and cost-effectiveness of a range of different dFAD recovery options to reduce the environmental and economic costs of lost, stranded and abandoned dFADs. The integrated assessment included assessing industry willingness to partake in the different recovery scenarios, and economic modelling.
Recovery options considered included:

1. Modifying deployment and retrieval patterns to reduce the likelihood of loss and stranding;
2. Increased purse-seine responsibility for retrieval prior to abandonment, loss or stranding;
3. Chartering or purchasing dedicated "cleaning" vessels to retrieve dFADs in identified hotspots at the edge of the purse-seine fishing grounds;
4. Recovery by existing vessels operating outside the purse-seine fishing grounds (such as longliners); and
5. Shore-based recovery programmes designed to intercept dFADs before stranding occur.

Preliminary results is available in WCPFC-SC22-EB-WP-05 (Escalle et al., 2026), however additional work would be needed to refine the analysis.

- **Legal study**

A review study on the international and regional legal frameworks relevant to dFADs, in particular the issue of loss and stranding events has been undertaken. The objective was to review the provisions of applicable international and regional legislations, as well as those of national legislation of certain

coastal states worldwide, in order to provide PICTs' decision-makers with reliable and up-to-date information on the topic. The study can be provided to individual SPC members upon request.

- **Monitoring of dFADs drifting outside fishing grounds and support for the development of dFAD recovery programmes**

SPC has also started monitoring dFADs drifting outside the typical purse seine fishing grounds and that would normally be deactivated by fishing companies. The PNA 4IA prohibits deactivation of dFADs buoys in the WCPFC Convention Area between 20°N and 20°S (except if a FAD buoy has drifted onto a reef or beach and is stationary and may be deactivated after one month).

While SPC therefore receives tracking data within the 20°S–20°N area through the PNA data, monitoring of the fate of dFADs outside of this area, has started since May 2025 through collaboration with fishing companies, Satlink, Marine Instruments and Zunibal. Since May 1st 2025, a total of 417 buoys (269 Satlink and 148 Marine Instruments) from partner fishing companies have been monitored by SPC (Table 1), with 324 still active on June 1st 2026. The position of the first SPC monitoring position are indicated in Figure 1. The project is currently ongoing and aims at monitoring buoys until their ultimate fate: recovery, stranding or signal loss at-sea indicating sinking.

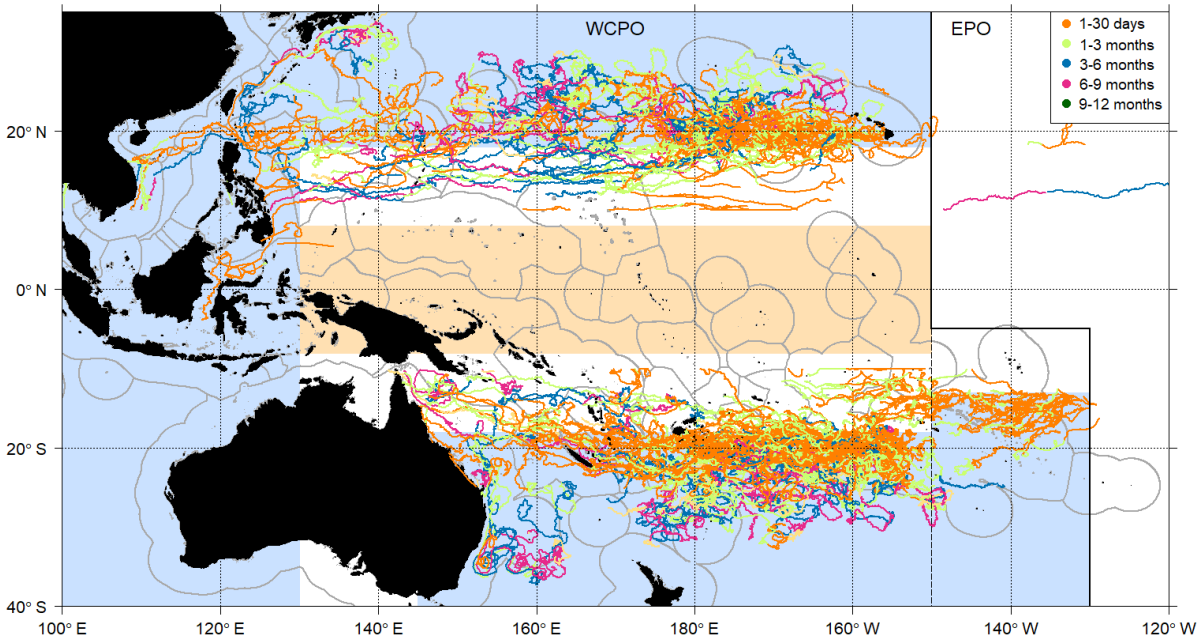

Figure 1. Drift trajectories of buoys monitored since start of the project since May 1st 2025.

A total of 80 buoys stranded since the beginning of the project, corresponding to 29.7% of the buoys monitored so far. The rate is significantly higher than the 11% of stranded events detected purely within the fishing grounds (Escalle et al., 2023a), highlighting the importance of such projects to continue monitoring buoys until their final position. There were also 20 signal losses at-sea (7.4% of total number of buoys monitored), probably buoys that sank (possibly with the dFAD).

As part of the project, SPC is also supporting the development of dFAD recovery programmes. This is occurring in Hawaii, French Polynesia, Australia and Aitutaki in the Cook Islands, thanks to the collaboration with local partners in each country and territory (The Nature Conservancy, Direction des Ressources Marines, Tangaroa Blue Foundation and Aitutaki FAD watch, respectively), with a total of 23 buoys (8.6% of total) recovered so far.

In addition, 21 buoys (7.8% of total) were recovered by partners while already stranded (8 buoys), or close to shore by fishers or communities opportunistically (13 buoys) without prior knowledge of positions. The pilot recovery activities are proving successful and expanding in the 4 countries/territories included. SPC is also investigating the possibility of starting similar initiatives in areas with many stranding events detected (e.g., Fiji, Tonga).

Table 3. Research topics and projects linked to dFAD recovery programs and impacts of FAD loss and abandonment.

Topic	Objective	Latest report	Next submission of results to SC
Regional stranded dFAD data collection programme	- quantify the number of dFAD stranding events or dFADs drifting nearshore; - assess marine pollution and environmental impacts - evaluate materials and designs of dFADs found stranded; as well as how communities may repurpose or recycle dFADs and satellite buoys - consider ways to mitigate the impacts of dFADs - highlight origin areas and owner fleets	SC 21 (Mourot et al., 2025, 2023)	Upon request
Re-using buoys to support artisanal fishers	- support artisanal fishers - develop a circular economy that reduces waste from industrial fishers		TBD
Hotspots of dFAD stranding events, loss and abandonment	- identify hotspots of dFAD loss, abandonment and stranding events - provide scientific advice to guide the sustainable management of the FAD dependent tuna fishery	SC 19 (Escalle et al., 2023a)	TBD
Economic analysis of dFAD recovery options	- assess and compare the feasibility and cost-effectiveness of dFAD recovery options to reduce the environmental and economic costs associated with lost and abandoned dFADs	SC 22 (Lauriane Escalle et al., 2026)	SC 23
Legal framework	- review the provisions of international law and national legislation of coastal states, in relation to dFADs drifting in EEZ and/or the stranding on their coasts		
Monitoring of dFAD drifting outside the fishing grounds	- assess drift, connectivity and potential stranding events of dFAD normally deactivated by fishers outside the fishing grounds	SC 21 (Escalle et al., 2025)	SC 23 (tentative)

	- Support for development of dFAD recovery programmes, within or outside fishing grounds		

2.3 FAD logbook

- **Analyses of FAD data collected using FAD logbook and comparison with observer data**

Since 2010, dFAD related data have been collected by observers, however it has been considered that some information could be reported more precisely directly by captains. The PNA developed a new FAD logbook, which is currently under consideration by the FAD-IMO WG to be extended to the whole WCPFC. A comparison of data collected through the observers and the FAD logbook could highlights potential data gaps or redundancy.

Analyses of dFAD data collected using the PNA's newly developed FAD logbook (PNA and Tokelau, 2024; Pons et al., 2023) are planned, with the aim to review materials and designs of dFAD use, activities performed on dFADs and identification of dFADs encountered. A comparison will be made with data collected by observers.

Table 4. Analyses of dFAD data collected using the FAD logbook in comparison with observer data.

Topic	Objective	Latest report	Next submission of results to SC
Analyses of FAD data collected using the FAD logbook and comparison with observer data	- review materials and designs of FADs used in WCPO - assess FAD use and ability to monitor FADs using unique ID numbers - compare quantity and quality of data collected using FAD logbook with observer data		TBD

2.4 Non-Entangling and Biodegradable FADs

- **Non-Entangling and biodegradable FADs**

SPC is leading WCPFC Project 110, and its expanded Project 110a, to conduct trials of non-entangling and biodegradable dFADs in the WCPO and is also collaborating closely with the International Seafood Sustainability Foundation (ISSF) on this topic, including through the WCPFC projects and through ISSF's US NOAA Bycatch Reduction Engineering Program (BREP) project. The objectives of the projects are to provide essential information to the WCPFC and tuna fishing industry on the designs, types of materials, performance, implementation challenges and cost-effectiveness of non-entangling and biodegradable dFADs in the WCPO context. As part of Projects 110/110a, staff of industry partners are receiving training in biodegradable dFAD design considerations and construction, and materials supply options are being explored. More details on and results of these projects can be found in WCPFC-SC22-EB-WP-04 (Escalle et al., 2026).

While the industry continues to test biodegradable materials and designs adapted to their fishing practices, SPC could continue to support their transition, through advice, training and learning workshops, as well as scientific analyses of the performance of dFADs constructed and deployed by fishing companies.

- **Monitoring dFAD designs and materials used in dFAD's construction**

WCPFC has adopted measures to limit entanglement of marine species (prohibition of the use of netting since 2024) and marine pollution (encouraging the use of biodegradable materials) (CMM 2025-02). The last assessment of materials and designs used in dFAD construction used data from 2011–2023 (Escalle et al., 2023b). A review of dFAD designs and materials used since the adoption of the non-entangling dFAD requirement in January 2024 using observer data and the newly developed PNA FAD logbook would therefore be needed. This can be performed by the SSP if requested by WCPFC.

Table 5. Research topics and projects linked to non-entangling and biodegradable dFADs.

Topic	Objective	Latest report	Next submission of results to SC
Non-Entangling and biodegradable FADs	- provide essential information to WCPFC and the industry on the designs, types of materials, performance, implementation challenges and cost-effectiveness of non-entangling and biodegradable dFADs - support industry training and uptake of more ecological dFAD designs	SC 22 (Escalle et al., 2026)	SC 23
Monitoring dFAD designs and materials used in dFAD's construction	- review materials and designs of FADs used in WCPO - compare quantity and quality of data collected using FAD logbook to observer data	(Escalle et al., 2023c, 2023b)	TBD

2.5 dFAD deployments

- **Assessment of dFAD use per vessel, including deployments and active number of dFADs**

Monitoring the number of dFADs deployed annually, and their spatio-temporal prevalence is important for assessing their influence on the tuna fisheries and other environmental and ecological risks. Estimates of the number of deployments and active dFADs per vessel and at the scale of the WCPO has been performed previously (Escalle et al., 2021a). These estimates should be re-evaluated, if requested by WCPFC, to assess potential changes in dFAD use and provide advice to WCPFC on the effectiveness of the limit on the number of active dFADs that can be monitored at any given time, as set out in paragraph 21 of the CMM 2023-01. This might be particularly important with the recent reduction in the FAD closure periods, which have encouraged increased dFAD deployments.

Table 6. Research topics and projects linked to dFAD use per vessel, including deployment and active number of dFADs.

Topic	Objective	Latest report	Next submission of results to SC
Assessment of dFAD use per vessel, including deployment and active number of dFADs	- assess potential changes in dFAD use - provide advice to WCPFC on the effectiveness of the limit on the number of active dFADs that can be monitored at any given time	Escalle et al. (2021a)	SC 23, upon request

5. Conclusion and recommendations

The current paper summarises current and planned dFAD related research led by SPC, including proposed timelines of future SC papers, that would be finilised based on recommendations from SC 22. This summary was developed in view of the WCPFC priorities highlighted in the FAD Management Options IWG 2024–2026 work plan that includes: satellite buoy data transmission requirements; FAD recovery programs/strategies; FAD logbook; biodegradable FADs; and dFAD deployment. Given the importance of dFADs to the WCPO purse seine fishery and the growing number of research topics, SPC is seeking feedback from SC 22 and WCPFC 23 on the ongoing research projects and future work plan presented in this paper, including any gaps or priority areas. Appendix 1 lists activities for 2027–2028, depending on funding available; and Appendix 2 proposes the Terms of Reference for a WCPFC project to mitigate the adverse effects of drifting and anchored FAD use on marine and coastal environments

The SSP proposes the following minimum list of papers to develop for SC23 and seeks feedback from SC22 on this list:

- Spatial and temporal description of drifting FAD use in the WCPO derived from analyses of the FAD tracking programmes and observer data, including:
    - Hotspots of dFAD stranding events, loss and abandonment
    - Assessment of dFAD use per vessel, including deployment and active number of dFADs, to support re-development of CMM 2025-02
- Assessment of the impacts of drifting Fish Aggregating Devices on marine environment in the WCPO: recommendations for mitigation strategies, including:
    - Updated economic analyses of dFAD recovery options
    - Monitoring of dFAD drifting outside the fishing grounds
- Final report for Project 110/110a: Non-entangling and Biodegradable FAD Trial in the Western and Central Pacific Ocean

We invite WCPFC-SC22 to:

- Note the current broad range of dFAD research implemented or planned by SPC, that has direct value and linkage to the FAD Management Options Intersessional Working Group (IWG) work plan for 2024–2026 and the Scientific Committee.
- Provide advice on the current and future focus of dFAD research and on the priorities for the Scientific Committee; including the list of proposed SSP papers for SC23; the proposed activities for 2027–2028 (Appendix 1) and the Terms of Reference for a WCPFC project (Appendix 2).

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7. Declaration of generative AI and AI-assisted technologies in the SC paper preparation process

No AI technologies were used in the preparation of this paper.

Appendix 1. List of proposed activities for the 2027-2028 SPC FAD research and monitoring workplan.

Work priorities identified by SPC for the next years are provided below. Research areas and activities listed are based on the workplan of the FAD-MO IWG and requests made at SC21 and will depend on appropriate funding sources being identified.

1. Support and monitor the industry to transition to biodegradable FADs
    - **Definition of biodegradable materials, including on the standards of biodegradable materials in the marine environment (SC21 request)**
        - Review of definitions and international standards, advice to SC and TCC on how to define, categorise and monitor biodegradable materials use in dFADs (desktop work)
    - Support the industry to transition to Biodegradable dFADs
        - Updated analyses of material used in bioFADs (desktop work)
        - Evaluate the current monitor framework and its ability to adequately monitor biodegradable materials and designs, in view of the staged transition to biodegradable FADs proposed by the FAD IMO-WG.
        - Provide guidance and desktop analyses to scientifically assess performance of bioFADs that would be entirely constructed and deployed by the industry. The SSP would not be involved in any aspects of procurement, construction, deployment, but would need to know which dFADs are bioFADs to allow a basin scale analyses of the different designs deployed (desktop work and a regional workshop).
    - **Reduce the environmental impacts of aFAD loss: consider materials that could be used in the construction of anchored FADs (SC21 request)**
        - Literature review and expert discussions; collaboration with PNG, Solomon Islands, ID and PH to conduct some testing of materials (desktop work and discussion / workshop with PNG, Solomon Islands, ID and PH).
        - Provide guidance and desktop analyses, to scientifically assess performance of biodegradable materials on aFADs that would be constructed and deployed by the industry (desktop work; procurement and at-sea work not carried out by SPC).
    - Investigate ways to better monitor and mitigate anchored FAD loss
        - discussion / workshop with PNG, SB, ID and PH
        - Deploy satellite buoys or other position tracking devices fixed on to aFADs rafts to monitor loss (procurement, monitoring, desktop analyses), drift and stranding.

2. Monitor the dFAD fishery to guide management
    - **Re-assessment of dFAD use per vessel (FAD-MO IWG request)**
        - Assessment of number of deployments and active number of dFADs, to provide guidance related to the 350 active buoy limit in the tropical tuna CMM review scheduled for 2027
    - Re-analyses of satellite buoy data
        - identification of deployment patterns, dFAD density, inter-FAD distances, stranding events, rate of dFAD loss and abandonment

3. Reduce dFAD loss, abandonment and stranding and mitigate their impacts on coastal habitats
    - **Better understand the impacts of stranded FADs on different habitats, including using FAD tracking data (SC21 request)**
        - Support the continued monitoring of dFAD stranding through in situ data collection (training, coordination, data processing, desktop analyses)
        - Source funds and administer grants for countries to continue the stranded FAD data collection and pilot recovery programs
        - Analyses of FAD tracking data to assess/monitor impact hotspots (desktop analyses)
    - **Assessment of options to increase dFAD recovery** (SC21 request)
        - Further refine the feasibility and economic analyses of dFAD recovery programmes (desktop analyses)
        - Support for recovery programmes (desktop analyses; training; consultation/workshop)
    - Monitor buoys outside fishing grounds and support developing recovery programs
        - Provision of satellite communication fees
        - Analyses of buoys fate outside fishing grounds (remote monitoring, and desktop analyses)
        - Support for recovery programmes (remote monitoring, and desktop analyses)

Appendix 2. Terms of Reference for a project to mitigate the adverse effects of drifting and anchored FAD use on marine and coastal environments.

Project XX	**Terms of Reference for a project to mitigate the adverse environmental effects of drifting and anchored FAD**
Rationale	This project aims to provide guidance to WCPFC and its members on mitigation options to reduce the environmental effects of drifting and anchored FAD use. This will include continuing to support the industry to transition to non-entangling and biodegradable FADs; quantify and evaluate the impacts of dFAD loss, abandonment and stranding; and assess option to develop dFAD recoveries. The project will build on the findings from the WCPFC projects 110/110a. These projects demonstrated that materials supply and construction of biodegradable dFADs is feasible in the Pacific region and that the performance of non-entangling and biodegradable dFADs in terms of drift speed, tuna aggregation and catch rates are similar to conventional dFADs. Considerable industry engagement has been carried out during these previous projects, including education on the concepts and design considerations for biodegradable dFADS, and hands on training in their construction. However, additional support and guidance is needed to facilitate transition to biodegradable dFADs at the scale of the WCPO purse fishing industry. This is not only in relation the biodegradable dFADs but also capacity building of the industry to follow an implementation process and meet requirements of Conservation and Management Measures that will control the materials, usage and reporting on biodegradable dFADs. Monitoring of dFADs and their fate has advanced in the last few years, however additional work is still needed to better quantify and assess dFAD fates and the related environmental impacts, and perhaps more importantly, to focus in and further evaluate potential mitigation options that have been identified from recent work. Finally, aFADs are used by some fleets in the WCPO. While the need for materials to last as long as possible is required in the case of aFADs, their impacts in case of detachment can still be high, and possibly higher at an individual level for certain types such as the large metal or fiberglass payao styles. The use of biodegradable materials or alternative designs in some components could be considered to reduce these impacts. SC21 has requested that: • additional work on the definition of biodegradable materials be conducted, including on the standards of biodegradable materials in the marine environment. And that a TOR for a project to be considered by SC22. • similar work should be considered for materials used in the construction of anchored FADs and that the SSP develop a TOR for a project to be considered at SC22. • SC21 recommended that additional work should be conducted to better understand the impacts of stranded FADs on different habitats, including using FAD tracking data, and recognized the importance of the availability of historical data. The current TOR, separated into 3 different parts, would be for a 2 to 3 years project.
Part 1.a	**Support and monitor the industry to transition to biodegradable dFADs**
Objectives	Part 1.a has the objectives of:

	1. Reviewing definitions and international standards linked to biodegradable materials; 2. Evaluating the current monitoring framework and its ability to adequately monitor biodegradable materials and designs; including assessment of the current materials and designs used in the construction of dFADs; 3. Continue supporting the industry to transition to the use of biodegradable dFADs, including capacity building in implementation processes and requirements imposed by the WCPFC.
Assumptions	SPC has the personnel available to undertake this work and or suitable consultants are available to support SPC to conduct the work. Travel in the region remains open to run workshop, if necessary. The industry continues to work with biodegradable materials, identify suppliers, shipment routes, companies to build non-entangling and biodegradable dFADs, and test designs and materials adapted to their fishing practices. Industry engages in workshops and training activities and advice on regional supply options for non-entangling and biodegradable FADs.
Scope	Support and monitor the industry to transition to biodegradable dFADs - review of definitions and international standards, advice to SC and TCC on how to define, categorise and monitor biodegradable materials use in dFADs. - updated analyses of material used in bioFADs - enhance the monitoring framework to assess the transition - provide guidance and desktop analyses to scientifically assess performance of bioFADs that would be entirely constructed and deployed by the industry. - industry capacity building workshops and materials for supporting transition and understanding/meeting WCPFC timelines and requirements.
Budget	Salary: (SPC scientific and technical) 87,000 Euro Travel and communications: 15,000 Euro Project management: 18,000 Euro **Total: 120,000 Euro**
Part 1.b	**Reduce the environmental impacts of aFAD loss**
Objectives	Part 1.b has the general objective to: 4. Reduce the environmental impacts of aFAD loss
Assumptions	SPC has the personnel available to undertake this work and or suitable consultants are available to support SPC to conduct the work. Travel in the region remains open to run workshop, if necessary. Industry engages in training activities.
Scope	Reduce the environmental impacts of aFAD loss - Consider and assess materials that could be used in the construction of anchored FADs. This would first include literature review and expert discussions; collaboration with PNG, Solomon Islands, ID and PH to conduct some testing or materials. Second, it would include guidance and desktop analyses, to scientifically assess performance of biodegradable materials on aFADs that would be constructed and deployed by the industry (desktop work; procurement and at-sea work not carried out by SPC), with position tracking devices attached.
Budget	Salary: (SPC scientific and technical) 59,000 Euro Travel (training workshops, communications): 26,000 Euro

	Project management: 15,000 Euro **Total: 100,000 Euro**
Part 2	**Monitor the dFAD fishery to guide management**
Objectives	Part 2 has the general objective to: 5. Re-assessment of dFAD use per vessel: deployment and active FAD numbers 6. Develop a set of FAD fishery related indicators
Assumptions	SPC has the personnel available to undertake this work and or suitable consultants are available to support SPC to conduct the work.
Scope	Desktop analyses of satellite buoy data, and other fishery data, to guide the management of the WCPO dFAD fishery. This includes the assessment of number of deployments and active number of dFADs, to provide guidance related to the 350 active buoy limit in the tropical tuna CMM review scheduled for 2027. And also the development of a set of dFAD fishery related indicators. This could include indicators such as annual dFAD deployments, catches and set numbers; numbers of active buoys; numbers of strandings and lost dFADs; entanglements of SSI; and any other relevant indicators.
Budget	Salary: (SPC scientific and technical) 75,000 Euro **Total: 75,000 Euro**
Part 3	**Reduce dFAD loss, abandonment and stranding and mitigate their impacts on coastal habitats**
Objectives	Part 3 has the general objectives of: 7. Better understand the impacts of stranded FADs on different habitats 8. Further assess options to increase dFAD recovery
Assumptions	SPC has the personnel available to undertake this work and or suitable consultants are available to support SPC to conduct the work. Collaboration with Pacific Island countries and territories continues. Appropriate data are available. Industry partners are engaged and participate to the project.
Scope	Better understand the impacts of stranded FADs on different habitats, including using FAD tracking data. - Support the continued monitoring of dFAD stranding through in situ data collection (training, coordination, data processing, desktop analyses) Source funds and administer grants for countries to continue the stranded FAD data collection and pilot recovery programs - Analyses of FAD tracking data to assess and monitor hotspots of stranding to provide target area for field studies of habitat impacts (desktop analyses). Assessment of options to increase dFAD recovery - Further refine the feasibility and economic analyses of dFAD recovery programmes (desktop analyses) - Support for recovery programmes (desktop analyses; training; consultation/workshop) Monitor buoys attached to dFAD and aFADs outside fishing grounds and support developing recovery programs

	- Investigate ways to better monitor and mitigate anchored FAD loss. Discussion and workshop with appropriate fleets would be conducted, and assessment of current loss patterns and monitoring tools. - Satellite buoys or other tracking devices would be attached to aFADs to monitor loss (resource dependent). - Satellite communication fees - Analyses of buoys fate outside fishing grounds (remote monitoring, and desktop analyses)
Budget	Salary: (SPC scientific and technical) 100,000 Euro Grant for countries: 60,000 Operational (buoys to monitor aFADs; satellite communication fees): 40,000 Euro Travel (training workshops, communications): 15,000 Euro Project management: 34,000 Euro **Total: 276,000 Euro**