



SCIENTIFIC COMMITTEE
SEVENTEENTH REGULAR SESSION

Online meeting
11-19 August 2021

Report of Project 110: Non-entangling and biodegradable FAD trial in the Western and Central Pacific Ocean

WCPFC-SC17-2021/EB-IP-03

24 July 2021

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Executive Summary

WCPFC Project 110 will conduct trials of non-entangling and biodegradable drifting Fish Aggregation Devices (dFADs) in the Western and Central Pacific Ocean (WCPO). It will provide essential information to the tuna fishing industry on the designs, types of materials, performance and cost-effectiveness of non-entangling and biodegradable dFADs in the WCPO context, and support industry to increase uptake of more ecologically sustainable dFAD designs. The aims of the project are the following:

1. Design/refine cost-feasible, non-entangling and biodegradable dFADs; informed by previous trials in the WCPO and other oceans, fostering industry and national fishery agency input, and utilizing readily available (locally or shipped) suitable construction materials.
2. Undertake at-sea experiments to compare the performance of non-entangling and biodegradable dFADs to traditional dFADs.
3. Provide robust scientific advice to industry and national fisheries managers on the performance of non-entangling and biodegradable dFAD designs.
4. Increase regional support, capacity building and partnerships on dFAD research with various stakeholders in the WCPO.

The project was initially planned to start in March 2021. However, the design of the non-entangling and biodegradable dFADs and the trials at-sea could not start in 2021 due to the COVID-19 pandemic, as none of the fishing companies contacted could commit to starting such activities this year, but some have showed interest in joining the project at a more suitable time.

The project will include four stages: i) information and planning workshops, identifying dFAD construction locations, detailing design of at-sea trials, and initiating capacity building in design and construction; ii) constructing the experimental dFADs; iii) conducting at-sea trials and broader industry communications program; and iv) data analysis, reporting, final workshop and industry adoption plan. Some activities within stage 1 have already started or will start in coming months. These include the literature review and online consultations with other researchers on dFAD designs to develop the potential designs, materials and summarise previous work. Some additional research on available materials (origin, type, price, logistics) and potential dFAD construction locations will also be performed. Some work on the communication and engagement strategy, including with the purse seine sector, communities, managers and fisheries departments, will start in 2021, which will include the development of dedicated forms for data collection by skippers and observers.

We invite WCPFC-SC17 to:

- Note the delays in the activities planned due to the COVID-19 pandemic.
- Note the updated timing of activities, including those planned over the first year of the project.
- Note that first results from this project will be available by SC19.
- Note a no-cost project extension of at least one year can be expected to be requested from the donors and the WCPFC.

1. Introduction

Recent estimates indicate that the number of drifting Fish Aggregation Device (dFAD) deployments in the Western and Central Pacific Ocean (WCPO) has varied between 23,000 and 40,000 per year over the last decade (Escalle et al., 2021a, 2020). Traditional dFAD designs can lead to entanglement and unnecessary mortality of Species of Special Interest (SSIs; i.e. sharks, turtles). Of increasing concern is the rate of subsequent abandonment and beaching of deployed dFADs, recently estimated at 41% and 7%, of tracked dFADs, respectively (Escalle et al., 2019, 2021b). The resulting marine pollution, ghost fishing and ecosystem impacts on coastal environments are of concern to the communities of the region, fishery stakeholders and impact the social licence of the purse seine tuna industry in the WCPO. To mitigate these undesirable impacts of dFAD use there is a need to transition to dFADs constructed of materials that are both biodegradable and prevent entanglement of SSI. For fishing industry to accept and make this transition, collaboration with fishing industry on research and development is required to design and test dFADs made of biodegradable and non-entangling materials and to demonstrate their performance relative to traditional designs.

2. Project description

In recognition of the need to reduce the environmental and ecological impacts of dFADs in the WCPO, CMM 2018-01 (Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the western and central Pacific Ocean), includes requirements that:

- all dFADs in the WCPO should comply with low-entanglement design specifications (as described in CMM 2018-01) from January 2020, and;
- the use of biodegradable materials to construct dFADs is encouraged.

Recent review of observer data shows limited use of non-entangling and/or biodegradable dFAD designs in the WCPO (Phillip and Escalle, 2020) so far. However, 2020 and 2021 data are limited, and it is therefore not yet possible to identify the recent response to the requirements of CMM 2018-01. Importantly, greater support to national fisheries agencies and information to guide construction and use of 'effective' non-entangling and biodegradable dFADs will be essential to encourage and drive wider industry uptake. This will necessarily involve working closely with industry.

While trials of non-entangling and biodegradable dFADs adapted to the WCPO (Moreno et al., 2020) have been initiated by ISSF (International Seafood Sustainability Foundation), in collaboration with industry, government and SPC, much additional work and collaborative action is required if non-entangling/biodegradable dFADs are to become the 'norm' in the WCPO. This project will build on the recent trials in the WCPO and elsewhere (Moreno et al., 2020b). It will provide the additional data required to provide robust information to industry on the designs, types of materials, performance and cost-effectiveness of non-entangling and biodegradable dFADs in the WCPO. The project has the following objectives:

1. Design/refine cost-feasible, non-entangling and biodegradable dFADs; informed by previous trials in the WCPO and other oceans, fostering industry and national fishery agency input, and utilizing readily available (locally or shipped) suitable construction materials.
2. Undertake at-sea experiments to compare the performance of non-entangling and biodegradable dFADs to traditional dFADs.

3. Provide robust scientific advice to industry and national fisheries managers on the performance of non-entangling and biodegradable dFAD designs.
4. Increase regional support, capacity building and partnerships on dFAD research with various stakeholders in the WCPO.

3. Methodology

Stage 1: Information and planning workshop, identify dFAD construction locations and initiate capacity building in design and construction.

Initially, we will compile relevant information from previous ISSF and other studies on non-entangling/biodegradable dFADs worldwide (Moreno et al., 2020b) and identify willing industry partners. Following this, in collaboration with ISSF, industry partners, national fisheries agencies, Regional Observer Programme (ROP) representatives and local dFAD construction experts, we will hold a planning and information sharing workshop. The workshop will identify plausible dFAD materials and designs to trial and inform the design, data collection protocols and logistics of the at-sea trials. Identifying locations for the construction on land of non-entangling/biodegradable dFADs for the project, and ongoing supply to industry, will also be an important part of this initial workshop. Based on the information from the planning workshop a detailed design for the at-sea trials will be developed by the lead SPC scientist in collaboration with ISSF project collaborator and presented back to the initial workshop attendees/industry partners/ROP representative for comment/endorsement. The detailed project design will include all aspects of the at-sea trials and clearly outline the data collection protocols and other support required from industry, national fisheries agencies and observers. dFAD construction will be ongoing from stage 1 once the prototype dFADs are designed and endorsed by industry partners.

Stage 2: Construction of non-entangling and biodegradable dFADs

Based on the recommendations of locations for dFAD construction activities, capacity building activities in design and construction of biodegradable and non-entangling dFADs will be initiated as part of the construction of the prototype dFAD designs, and eventually all dFADs for the project.

Stage 3: Conduct at sea trials and broader industry communications program

The project will aim to deploy a minimum of 150 'experimental' non-entangling/biodegradable dFADs that will be compared with 150 'conventional' (currently used) dFADs. We will aim to increase this number subject to support from industry partners and attraction of other funds. We envisage that the performance of the experimental and conventional dFADs will be monitored over 8–10 months. The timing of trials is dependent on the COVID situation in port(s) where participating fleets dock and are the bases for the construction and distribution of the dFADs. Trials are hoped to begin in the second half of 2022. If logistically feasible, at-sea experimental dFAD trials will follow normal deployment practices. The trials will be co-ordinated by the lead scientist from the SPC with support from ISSF. Observer involvement and coverage will be important, and they will be supported by SPC/ISSF in monitoring and data collection. The monitoring program will be developed in collaboration with the observers and industry partners/skippers to ensure it is feasible given their other work activities. Monitoring of the dFADs will include information on dFAD condition, catch history, acoustic data and drift trajectories (following approaches previously employed in ISSF projects). Comparative analyses of the performance of the two dFAD types will include; aggregative power and drift behaviour, catch rates per species, costs and handling requirements, effective lifespan and condition at different times-

at-sea. Analyses of data from echo-sounder buoys deployed on the dFADs will build on knowledge gained through EU funded Project 88 (FAD acoustics). Acoustic buoys will be provided by manufactures used by the participating fleets to ensure data is comparable with their standard dFADs deployed in the region.

These trials will be performed in close partnership with industry (skippers) and the observer programme to ensure marking, deployment, identification and monitoring/data recording of dFADs occurs in a consistent and coordinated way. Two levels of industry participation are anticipated: (1) the partner fleets that deploy the dFADs and are actively engaged in the research depending on their fishing activities, and; (2) all other fleets that find and/or fish the experimental dFADs. Information from (2) will be important to the success of the research.

Stage 4: Data analysis, reporting, final workshop and industry adoption plan

Data from the at-sea trials will be summarised (and analysed to the extent possible) as it becomes available and reported back to industry partners at 6 monthly intervals, including a mid-project review workshop, and to the WCPFCs dFAD Management Options Intersessional Working Group (FAD-IWG) and papers to the WCPFC Scientific Committee (SC). The final analyses and reporting of results will be delivered to the SC and a final workshop with industry partners, national fisheries agencies, NGOs and ROP representatives. Assuming positive results of the trial, the final workshop would include a session on ‘industry adoption’ with an objective of developing an adoption plan. SPC is also developing a dFADs communication strategy and we will build this project into that broader strategy.

Table 1. Updated timing of activities.

	2021				2022				2023				2024																
Activity	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
Stage 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
Stage 2												X	X	X	X	X													
Stage 3														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stage 4					X												X			X	X	X	X	X	X	X	X	X	X

4. Updates on activities for the first year of the project

WCPFC project 110 was initially planned to start in 2021, with the non-entangling and biodegradable dFAD trials starting in October 2021, after the FAD closure period. Several fishing companies were contacted late 2020 and early 2021 and all indicated interest in joining the project. However, none of them were ready to start the project, including workshops with fishers to design the non-entangling and biodegradable dFAD and the at-sea trials in 2021 due to the COVID-19 pandemic. The project has therefore not progressed as expected during the first year, both in terms of work conducted and expenditure. We expect the project will require an extension at some point, likely at no additional cost to complete the required activities under the original funded workplan.

A first meeting between SPC and ISSF collaborators has reviewed the timing of the project and discussed activities that could start during the first year of the project. Hence, stage 1 of the project has been extended with some activities occurring in 2021. The literature review has started to list the potential designs, and materials that have already been used worldwide as well as summarising previous initiatives in terms of their efficiencies, effectiveness, cost and the lessons learnt (Lopez et al., 2016; Moreno et al., 2020a, 2020b; Zudaire, 2017). Other activities, including consultation with

dFAD construction experts, will also start in the upcoming months including some additional research on available materials (origin, type, price, logistics) and potential dFAD construction locations. Potential partner fishing companies will be contacted again with the hope that we can obtain commitment assuming certain conditions prevail in the second half of 2022, as they will be key to jointly decide on materials and construction sites, depending on fishing practices, base ports and areas where other materials are purchased.

Work on the communication and engagement strategy, including with the purse seine sector, communities, managers and fisheries departments, NGOs etc. will also begin. In particular, defining ways to communicate and inform the ROP and all fishing companies will be important to gather reporting data from sources other than the partner fishing companies. This will also involve developing dedicated forms for data collection by skippers and observers, which will also require collaboration with the relevant partners over the next few months.

Overall, the project has been delayed due the lack of ability for project staff to travel and engage directly in-person with fishing companies, and the inability of companies to provide firm commitments to participate in trials during the COVID-19 pandemic. Nonetheless certain activities related to planning, developing some design options and background research and consultation will become a focus for the remainder of 2021. If we can achieve commitments from fishing companies, we will consider placing orders for buoys and other materials to ensure they can be shipped to construction locations to be ready for assembly next year. The additional time this year will also allow for the communication and engagement strategy to be planned.

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Acknowledgments

WCPFC project 110 is funded by the European Union, the United States and the International Seafood Sustainability Foundation. We thank Sam McKechnie for valuable comments on an earlier version of the paper.

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