Assessment of options to mitigate dFAD loss and abandonments and their impacts

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Summary

While there is growing information related to drifting Fish Aggregating Devices (dFADs) and their use in tuna purse sine fisheries, information related to dFAD loss and abandonment, as well as potential environmental impacts remains limited. The current paper summarises work plan and preliminary results of a project aiming at gathering additional information on dFAD loss, abandonment and stranding, and as well as exploring mitigation options. In particular, project tasks include i) monitoring of dFADs outside fishing grounds; ii) review of the regulatory framework of dFADs in the Pacific, with a focus on loss and abandonment; and iii) economic and feasibility analyses of options to decrease dFAD loss and abandonment, including their retrieval. This last tasks includes a stakeholder consultation, with a first general survey available here:

https://docs.google.com/forms/d/e/1FAIpQLScMhpj158Dku-

<u>UmAly3CsZtvSgogOiO8nBrwwrZXZKEZbH0Og/viewform</u>; and a regional workshop planned from February 9th to 12th 2026 in French Polynesia.

Resumen

Si bien existe una creciente cantidad de información sobre los Dispositivos de Concentración de Peces a la deriva (dFADs, por sus siglas en inglés) y su uso en la pesca de cerco de túnidos, la información relacionada con la pérdida y el abandono de dFADs, así como sobre sus posibles impactos ambientales, sigue siendo limitada. El presente documento resume el plan de trabajo y los resultados preliminares de un proyecto cuyo objetivo es recopilar información adicional sobre la pérdida, abandono y varamiento de dFADs, así como explorar posibles medidas de mitigación. En particular, las tareas del proyecto incluyen: i) el seguimiento de dFADs fuera de las zonas de pesca; ii) la revisión del marco regulatorio aplicable a los dFADs en el Pacífico, con un enfoque específico en la pérdida y el abandono; y iii) el análisis económico y de viabilidad de las opciones para reducir la pérdida y el abandono de dFADs, incluyendo su recuperación. Esta última tarea contempla una consulta con los diferentes actores en la pesca del atún, que incluye una primera encuesta general disponible en el siguiente enlace:<u>https://docs.google.com/forms/d/e/1FAIpQLSeD4eYx6Q2LNeaSa3IAhPNpVldOrmou3EZmoG1</u> XQ4y-8ZaVtQ/viewform?usp=dialog, y un taller regional previsto del 9 al 12 de febrero de 2026 en la Polinesia Francesa.

1. Background

There is growing information related to drifting Fish Aggregating Devices (dFADs) based on satellite buoy data, observer and logsheet data (Escalle et al., 2021; Lopez et al., 2024). It is estimated that industrial purse seine vessels deploy 46,000 to 65,000 dFADs annually in the Western and Central Pacific Ocean (WCPO) (Escalle et al., 2021; Lopez et al., 2024) and that dFADs could be a major source of abandoned, lost, or otherwise discarded fishing gear (ALDFG) in the PICTs (Escalle et al., 2023; Mourot et al., 2023). However, the data to study the rate and spatial distribution of dFAD loss and abandonment, as well as potential environmental impacts, remain limited. In particular, abandoned and lost dFADs can cause significant environmental damage when they become stranded in coastal areas, polluting coastlines and damaging fragile habitats like coral reefs while also endangering marine fauna such as turtles and sharks (Balderson and Martin, 2015; Mourot et al., 2023). The stranding of dFADs in coastal areas also contributes to an increased public perception that tuna fisheries are polluting the ocean, which will erode the social license of the tuna fisheries that provide vital economic benefits to PICTs. Therefore, quantifying stranding events of dFADs and their impact on fragile ocean habitats (Mourot et al., 2025), as well as reviewing and assessing options for mitigating their impact, will help to inform improved management and mitigation of dFADs environmental risks in the Pacific Ocean.

The Pacific Community (SPC), with funding from the World Bank, is implementing a project entitled "Assessment of the impacts of drifting Fish Aggregating Devices on marine environment in Pacific Island Countries: recommendations for mitigation strategies" from 2024 to 2026. The project aims to i) enhance data collection programs to investigate the number of dFAD stranding events and type of impacts (Mourot et al., 2025); ii) gather additional information on dFAD fates, iii) explore the legal aspects of dFAD loss and abandonment; iv) explore potential options for mitigating dFAD loss and abandonment, including their retrieval; and v) provide recommendations that can inform regional dialogue toward an action plan for the prevention, mitigation and management of abandoned and lost dFADs in PICTs. The longer-term outcome of the project is to inform decision making for policymakers at the national and regional level on policies and investment needs to minimize and remediate impacts of marine debris from dFADs on PICTs.

The following sections provide an overview of activities carried out as part of the project, and preliminary results, where available, regarding the objectives mentioned above.

2. Project tasks

Task 1: Monitoring of dFADs outside fishing grounds

In order to gain additional information regarding to dFAD fates, this sub-task aims to monitor dFADs outside fishing grounds, by maintaining active buoys that would normally be deactivated by fishers. Areas of common signal loss have been defined between SPC and partner fishing companies (see green area in **Figure 1**). If any buoy is planned to be deactivated by fishers and still drifting (excluding stranded buoys) within these areas, the buoy would be maintained active and monitored by SPC only. A total of 350 Satlink buoys attached to dFADs will be monitored as part of the project, for a minimum of 12 months, or until communication is lost. It should be noted that the budget for the monitoring the 350 buoys for 12 months is around 50,000 euros, with position only (approximately \$12 per buoy per month). The cost related to accessing the echosounder data for these buoys is covered by the participating fishing companies.

The project is in collaboration with Satlink, which is the main buoy provider in the Pacific Ocean. Monitoring started in May 1st 2025, so there are no results on this task yet.

The main objective of this task is to gain knowledge on the fate of dFADs outside fishing grounds, including their drifting duration, fate, and potential return to fishing grounds. Such information will be important to guide the development of management measures for the sustainable use of dFADs, in particular assessing options, feasibility and priority areas for recovery programs. Data from the project will also allow validation of trends detected in simulation studies (Scutt Phillips et al., 2025). Additionally, this task will include data from echosounder buoys used to track FADs, providing information related to fish presence and absence around dFADs and their dynamics outside main fishing grounds. The data will serve as a proof of concept for future efforts aimed at developing abundance indices to support stock assessments. Furthermore, the collected data could contribute to physical oceanographic models focused on ocean current dynamics.



Figure 1. Areas of frequent FAD communication loss in the WCPO (green and main purse seine fishing grounds (orange).

Task 2: Legal aspects of dFAD loss and abandonment

This task aims to analyse the regulatory framework of dFADs in Pacific tuna fisheries to improve fisheries sustainability. The preliminary legal findings on the international and regional framework for dFADs are reported below. The final report will refine these findings and further analyse national legislation that is relevant to dFAD use in the Pacific region and beyond.

Although dFADs have increased tuna fishing efficiency and revenue, especially for skipjack, their extensive use now poses environmental and legal concerns. Up to 65,000 dFADs are deployed annually in the Pacific Ocean, with thousands stranding on coral reefs or beaches, damaging ecosystems and imposing cleanup costs on Pacific Island communities (Mourot et al., 2025; Royer et al., 2023). Most dFADs are constructed with plastics and contribute to marine debris and microplastics. Current regulations by tuna Regional Fisheries Management Organization (tRFMOs) in the Pacific Ocean prohibit the use of netting in the construction of dFAD structures. This conservation measure significantly reduces if not entirely eliminates, the risk of entanglement of marine fauna in the dFAD structure. In the Western and Eastern Pacific, this regulation entered into force in January 2024 and 2025, respectively. Therefore, newly deployed FADs are not expected to cause entanglement issues. However, FADs deployed prior to these dates—particularly those constructed with netting—may still

be adrift and pose a risk of entangling marine species. Additionally, FADs can represent navigation hazards.

The United Nations Convention on the Law of the Sea (UNCLOS) and the 1995 UN Fish Stocks Agreement require States to cooperate in managing straddling and highly migratory species and to minimise fishing-related pollution and waste. Within this framework, several tRFMOs have adopted dFAD management measures for tuna stock sustainability. However, only recently have tRFMOs begun addressing coastal damage and marine pollution caused by dFADs more directly.

In the Pacific, the Inter-American Tropical Tuna Commission (IATTC) regulates dFAD use through a series of resolutions that set rules for their design, deployment, tracking and impact mitigation. They have a unique identification code (the identification code of the tracking buoy used by fishers). A progressive phase-out of non-biodegradable FADs is required between 2026 and 2030. Plastic floats will remain permitted until 2030, after which the Commission will review the requirement for fully biodegradable FADs to be implemented in 2031 (IATTC, <u>C- 23-04</u>). The Western and Central Pacific Fisheries Commission (WCPFC) has also adopted several conservation and management measures relevant to dFADs, including seasonal FAD closure periods and mandatory use of non-entangling designs - effective 2024 - to reduce entanglement of sensitive species. Additionally, the Parties to the Nauru Agreement (PNA) have implemented region-specific rules for purse-seine fishing and dFAD use under their Vessel Day Scheme. Their Fourth Implementing Arrangement mandates dFAD tracking, keeping buoys active (20°S to 20°N) and buoy registration to increase accountability and enable retrieval.

Under UNCLOS Part XII, States have specific obligations to protect and preserve the marine environment and to prevent, reduce and control pollution of the marine environment. Legal scholars argue that, except in case of *force majeure*, the intentional abandonment of dFADs may trigger application of specific treaties on marine pollution, such as Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL) or the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) and its 1996 Protocol.

These treaties reinforce that dFAD-related pollution is subject to international rules, not operating in a legal vacuum, despite the need for specific guidance on certain aspects of dFAD use, such as the status of dFADs that have drifted outside their authorised fishing grounds, or whether deactivating the satellite buoy effectively constitutes illegal dumping or waste discharge under international law. New treaties, such as the Agreement under UNCLOS on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ), and future ones, such as the planned Plastics Pollution Treaty, may bring further clarity as to State obligations.

RFMOs have both the authority and responsibility to act. Strengthening dFAD rules will better align fisheries governance with international environmental law, reduce transboundary harm and build resilience in vulnerable coastal ecosystems. To strengthen legal accountability and environmental protection for sustainable dFAD use, the draft report suggests regulatory and programmatic actions for RFMOs' consideration. Proposed recommendations include: (i) clarifying legal ownership of dFADs and all their parts; (ii) regulating dFAD ownership transfer; (iii) establishing responsibilities for retrieval and damage compensation; (iv) establishing time-bound targets to increase retrieval rates; (v) introducing fees or funds to cover cleanup and recovery costs; (vi) establishing robust compliance mechanisms, (vii) banning or controlling satellite buoy deactivation; (viii) enhancing FAD registry systems; and (ix) removing regulatory disincentives for retrieval (e.g., such as discussing retrieval-only during dFAD closure period; whether retrieval accounts as a fishing day in the PNA VDS; which vessel are authorised to retrieve dFADs; keeping buoy active and implication with active buoy limits, etc.).

Task 3. Economic and feasibility analyses of options to decrease dFAD loss and abandonment, including retrieval

This task includes an economic and feasibility analysis of options to decrease dFAD loss and abandonment, including increased recovery by purse seiners and other dFAD retrieval options. The main objective is to identify the most cost-effective mitigation option(s) that could be implemented to reduce the environmental and economic damage associated with lost and abandoned dFADs. Different scenarios likely exist depending on where the dFAD is loss or strands and the possibilities for its retrieval; therefore, mitigation options should be tailored to each context to ensure both feasibility and cost-effectiveness. This will include the assessment of financial costs that would be incurred by industries and other participants, the identification of administrative requirements and the exploration of potential unintended consequences for each identified option. The options considered to decrease dFAD loss and abandonment and increase dFAD recovery in the Pacific Ocean are the following:

- Modification of the deployment areas to limit dFAD loss from fishing grounds.
- A greater emphasis on retrieval by purse seine vessels before dFAD loss and abandonment (including collaboration between fishing companies).
- Dedicated / chartered vessel(s) for at-sea collection of lost or abandoned dFADs at the edge of fishing grounds.
- At-sea collection from non-purse seine vessels (e.g., longliners) already present at-sea (in areas outside the purse seine fishing grounds).
- 'FAD watch' systems that enables community collection of dFADs prior to stranding events in sensitive areas.

In order to gather the adequate data and views on these options, SPC, with the support of consultants from MarFishEco and ISSF, have started to gather the cost data and other logistical components that should be considered through a large stakeholder consultation at the national and regional level (e.g., country fisheries agencies, local communities, country environmental management agencies, fishing companies, RFMOs, FFA, SPREP, PNA, NGOs).

The workplan for the consultation includes surveys and interviews for the following stakeholder groups:

- A general survey, sent to all relevant stakeholders, and open from *May 15th to June 15th* If you have not already filled out the survey, you can do it using the following link: [English]

https://docs.google.com/forms/d/e/1FAIpQLScMhpj158Dku-UmAly3CsZtvSgogOiO8nBrwwrZXZKEZbH0Og/viewform

[Spanish]

https://docs.google.com/forms/d/e/1FAIpQLSeD4eYx6Q2LNeaSa3IAhPNpVldOrmou3EZmoG1XQ4y-8ZaVtQ/viewform?usp=dialog

 Dedicated surveys, in-person or remote interviews are also to be implemented, to gather more specific details, in particular to: purse seine fishing company managers; purse seine skippers; longline fishing company managers; longline skippers; other relevant experts; local partners and communities that are part of retrieval programmes or considering to join one; and artisanal fishers.

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The study will also use fishery data available at SPC, such as FAD trajectory data, *in-situ* stranding data, logsheet, observer and VMS data.

Finally, a regional workshop is planned with key stakeholders and representatives from countries involved in the data collection. The workshop "International workshop on mitigation of dFAD loss and abandonment in the Pacific: Insights from fishing industry to communities" planned in French Polynesia from February 9th to 12th 2026, will present results from the scientific analyses of stranded dFADs and opportunities for peer-to-peer exchange and learning. It will include findings on dFAD drift beyond fishing areas, a legal review of the international and regional regulatory frameworks governing dFADs, and the economic and feasibility analyses of mitigation options, drawing on results from stakeholder consultations. The workshop will also offer a platform for feedback and discussion on mitigation strategies and the associated environmental and socio-economic impacts of dFAD loss and abandonment, particularly in coastal areas.

Conclusion and recommendations

The current paper summarises the activities to be implemented by SPC under the project "Assessment of the Impacts of Drifting Fish Aggregating Devices on Marine Environment in Pacific Island Countries: Recommendations for Mitigation Strategies" funded by the World Bank. Key outcomes of the project will include the development of recommendations for mitigation and management of dFADs and their associated impacts in the Pacific Ocean. A final report will be prepared and presented to the Meeting of the IATTC Ad Hoc Working Group in 2026. While analyses, reviews and stakeholder consultations are still ongoing, the authors invite the 9th Meeting of the IATTC Ad Hoc Working Group on FADs to:

- Note the preliminary findings of the legal study on the international and regional framework of dFADs loss and abandonment.
- Provide feedback on the project and planned activities presented in the paper.
- Encourage Members and cooperating non-Members (CPCs) to filled out the stakeholder surveys and share the link with their national industries and other interested parties.

[English]

https://docs.google.com/forms/d/e/1FAIpQLScMhpj158Dku-UmAly3CsZtvSgogOiO8nBrwwrZXZKEZbH0Og/viewform [Spanish] https://docs.google.com/forms/d/e/1FAIpQLSeD4eYx6Q2LNeaSa3IAhPNpVldOrmou3EZmoG1XQ4y-8ZaVtQ/viewform?usp=dialog

 Note the plan for the workshop entitled "International workshop on mitigation of dFAD loss and abandonment in the Pacific: Insights from fishing industry to communities" in French Polynesia from February 9th to 12th 2026.

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