AGREEMENT BETWEEN THE IATTC AND AZTI FOR THE EVALUATION OF MATERIALS IN THE TROPICAL MARINE ENVIRONMENT, FOR THE CONSTRUCTION OF BIODEGRADABLE FISH AGGREGATING DEVICES (FADs).

The Inter-American Tropical Tuna Commission (IATTC) and the Fundación AZTI-AZTI Fundazioa (individually referred to as a "Party" or collectively as the "Parties"), have agreed to develop and implement a project on "*Evaluation of materials in the tropical marine environment, for the construction of biodegradable Fish Aggregating Devices (FADs)*" ("the Project"), in the framework of the Memorandum of Understanding agreed by the Parties ("the MOU").

1. PURPOSE AND INTENT OF THIS AGREEMENT

Almost half of the global tropical tuna catch worldwide is currently fished by purse seiners (PS) using Fish Aggregating Devices (FADs). The European Union (EU) and its associated tropical tuna PS fleet account for approximately 10% of this total. FADs have developed together with available technology, playing an important role in enhancing fishing efficiency by reducing search time and improving successful catch rates. Alongside, FADs construction materials have also evolved, aimed at higher resistance and durability. The utilization of synthetic materials, mainly derived from petroleum, has become prevalent due to their exceptional resilience, but these synthetic materials can contribute to the increasing problem of marine litter, species entanglement (e.g. sensitive species like turtles and sharks), and potential disruption to ecosystems, which have prompted recognition as one of the anthropogenic pressure on ecosystems, and addressing these issues has become imperative for fisheries management in Europe and worldwide oceans, including the eastern Pacific Ocean (EPO). To mitigate the impacts of FADs in the ecosystems, tuna Regional Fisheries Management Organizations (t-RFMOs) have adopted measures requiring the use of non-entangling designs and materials for FAD construction, including biodegradable alternatives.

These considerations motivated a collaboration between the IATTC and AZTI to conduct a controlled experiment in the research facility of Achotines Bay, in the Republic of Panama, assessing the behaviour of biodegradable materials to be used in the construction of biodegradable FADs in tropical environments.

2. OBJECTIVE/s

A laboratory-controlled experiment will be conducted to assess the degradation behaviour of BioFAD surface components (i.e., rafts) made with biodegradable materials provided by AZTI.

Specifically, this experiment will have the following objectives:

- To help design small-scale trials and providing logistical support for the implementation of the experiments in controlled tropical environments.
- To conduct periodic evaluations and monitoring the physical characteristics of the biodegradable materials for a minimum duration of 12 months.

3. METHODOLOGY

A full description of the experimental design is provided as Annex 1. Data input and data transfer methodology to be used by the Parties will be done using data collection formats developed by the AZTI-IATTC team.

4. DURATION

This Agreement shall enter into force upon signature and shall remain in force until the Service has been properly delivered. This will be managed within a maximum period of 12 months from the date of signature of this Agreement. Upon expiration, this Agreement may be extended by written agreement of the Parties for six-monthly periods. Any extension of the duration of the project beyond the period of 12 months will need to consider budget revisions to reflect the additional efforts.

5. RESPONSIBILITIES (*OBLIGATIONS)* OF "THE PARTIES"

1. IATTC agree to:

    - Coordinate with AZTI´s staff on the setting up and fine-tuning of the experiment following the protocol defined in Annex 1.
    - Provide the appropriate facilities within the IATTC-Achotines Lab and the technical assistance (staff) for carrying out the experiment.

- Provide technical assistance (staff) to supervise and conduct the experiment once started using the guidelines described in Annex 1.
- Review and communicate the experiment outputs and concerns within an appropriate time frame to develop contingency plans.

2. AZTI agree to:
   - Provide the materials and follow the methodology and monitoring plans described in Annex 1 for carrying out the experiment.
   - Coordinate with the staff at IATTC to set up, install and fine-tune the experiment.
   - AZTI will cover the financial cost of the experiment as detailed in Annex 2.

3. Both Parties agree to:
   - Conduct the study following the methodology and plans described in Annex 1.
   - Communicate regularly with each other and provide timely information on matters relating to the activities.
   - Raise any issues of concern with the nominated points of contact.
   - Share experiment outputs prior to dissemination beyond the parties mentioned under this Agreement.
   - Co-author any scientific peer-reviewed publications, conference presentations, that may arise.

Additional responsibilities, or changes to these responsibilities, may be generated and agreed to by the Parties as part of the planning and analysis process.

6. CONFIDENTIALITY AND USE OF DATA (Intellectual Property Rights (IPR))

The development and implementation of the Project shall be governed by the following rules of confidentiality:

6.1. For the purpose of this agreement "Confidential Information" shall mean any and all information, which is supplied or disclosed, directly or indirectly, in writing or in any other means, by each Party to the other including, but not limited to any documents, drawings, sketches, designs, materials, samples, prototypes, data, know-how, and which at the time of its disclosure or supply is identified as confidential. Oral information shall be recorded in writing by the Party disclosing it within fifteen (15) days after disclosure, and the resulting document shall specifically state the date of disclosure and designate the information as confidential.

6.2. For the purpose of this agreement "the Recipient" shall mean the Party receiving the Confidential Information and "Disclosing Party" shall mean the Party disclosing the Confidential Information to the other Party

6.3. The Recipient shall:

i. undertake to keep the Confidential Information confidential and not to disclose it nor to permit the disclosure of it to any third party, except in accordance with clause 1.6. of this agreement, and not to make it available to the public or accessible in any way, except with the prior written consent of the Disclosing Party

ii. undertake to use the Confidential Information solely for the Purpose of this agreement and not to make any other use, whether commercial or non- commercial, without the prior written consent of the Disclosing Party.

6.4. The obligations specified in clause 1.3. above shall not apply in the following cases:

i. the Confidential Information was known to the Recipient prior to the time of its receipt pursuant to this agreement otherwise than as a result of the Recipient's breach of any legal obligation; or

ii. the Confidential Information is in the public domain at the time of disclosure by the Disclosing Party to the Recipient or thereafter enters the public domain without any breach of the terms of this agreement; or

iii. the Confidential Information becomes known to the Recipient through disclosure by sources, other than the Disclosing Party, having the legal right to disclose such Confidential Information; or

iv. the Recipient proves the Confidential Information has been developed independently by its employees, who had no access to any of the Confidential Information disclosed by the Disclosing Party to the Recipient.

6.5. The Recipient shall limit and control any copies and reproductions of the Confidential Information. The Recipient shall return all records or copies of the Confidential Information at the request of the Disclosing Party and at the latest on termination of this agreement. This shall not apply to Confidential Information or copies thereof which must be stored by the Recipient according to mandatory law, provided that such Confidentiality Information or copies thereof shall be subject to an indefinite confidentiality obligation.

6.6. The Recipient undertakes to disclose the Confidential Information only to its employees who:

i. reasonably need to receive the Confidential Information for the Purpose of the present agreement; and

ii. have been informed by the Recipient of the confidential nature of the Confidential Information and of the terms of the present agreement; and

iii. have been advised of and agree to be bound by equivalent obligations to those in the present agreement.

6.7. The Disclosing Party has exclusive ownership over the Confidential Information. The exchange of information does not involve a transfer or license of rights to the Confidential Information. All Confidential Information shall remain the exclusive property of each Party as well as all patent, copyright, trade secret, trademark and other intellectual property rights therein.

6.8 The Disclosing Party makes no warranties in respect to the condition, accuracy, fitness for any purpose, correction, completeness or performance of the Confidential Information.

7. FINANCIAL PROVISIONS

The financial contribution of AZTI to develop the objectives of this Project shall be twenty-five thousand, nine hundred and ninety-two dollars ($**25.992,00**) (taxes included; see Annex 2 for project budget distribution). Contributions will be distributed accordingly to the experiment stages for invoices payment: IATTC will forward its lab usage days and its respective invoices at the beginning (February 2024), in the middle (August 2024) and at the end of the experiment (January 2025). AZTI will cross-check and validate the invoice within 15 days. After successful validation, the invoice payments will be made within 7 days by bank transfer to the bank account stipulated by IATTC (**NOTE**: the bank account information will be provided on the invoices).

8. ENTRY INTO FORCE

This Agreement shall enter into force on date of signature of the last Party to sign.

Signed in representation of the Parties

Signature:	Signature:
15940877Z ROGELIO POZO (R: G48939508) Firmado digitalmente por 15940877Z ROGELIO POZO (R: G48939508) Fecha: 2024.02.05 16:32:20 +01'00' Rogelio Pozo Director General	Arnulfo L. Franco Director
AZTI	IATTC

Annex 1: Experimental work plan description and calendar

Evaluation of materials in the tropical marine environment, for the construction of biodegradable Fish Aggregating Devices (FADs).

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SUMMARY

Almost half of the global tropical tuna catch worldwide is currently fished by purse seiners (PS) using Fish Aggregating Devices (FADs). The European Union (EU) and its associated tropical tuna PS fleet account for approximately 10% of this total. FADs have developed together with available technology, playing an important role in enhancing fishing efficiency by reducing search time and improving successful catch rates. Alongside, FADs construction materials have also evolved, aimed at higher resistance and durability. The utilization of synthetic materials, mainly derived from petroleum, has become prevalent due to their exceptional resilience, but these synthetic materials can contribute to the increasing problem of marine litter, species entanglement (e.g. sensitive species like turtles and sharks), and potential disruption to ecosystems, which have prompted recognition as one of the anthropogenic pressure on ecosystems, and addressing these issues has become imperative for fisheries management in Europe and worldwide oceans, including the eastern Pacific Ocean (EPO). To mitigate the impacts of FADs in the ecosystems, tuna Regional Fisheries Management Organizations (t-RFMOs) have adopted measures requiring the use of non-entangling designs and materials for FAD construction, including biodegradable alternatives. These considerations motivated a collaboration between the IATTC and AZTI to carry an controlled experiment in the research facility of Achotines Bay, in the Republic of Panama, assessing the behaviour of biodegradable materials to be used in the construction of biodegradable FADs in tropical environments.

BACKGROUND

About half of the global tropical tuna catch worldwide is fished by purse seiners (PS) using Fish Aggregating Devices (FADs) these days. Notably, the European Union (EU) and its associated tropical tuna PS fleet account for approximately 10% of this total. FADs have developed together with available technology, playing an important role in enhancing fishing efficiency by reducing search time and improving successful catch rates (Dagorn et al., 2012; Lopez et al., 2014).

Concurrently, FADs construction materials have also evolved, aimed at higher resistance and augmenting their durability. The utilization of synthetic materials, mainly derived from petroleum, has become prevalent due to their exceptional resilience (Moreno et al 2017a). To further optimize FAD performance, modifications such as tail configuration adjustments and increased depth have been implemented to facilitate slower drifting and higher aggregation potential.

However, these synthetic materials can contribute to the increasing problem of marine litter (Dagorn et al., 2012) and potential disruption to ecosystems like coral reefs, mangroves or beaches (Maufroy et al., 2015). Approximately 80% of marine debris originates from inland sources but the fishing industry significantly contributes to this issue. For example, Abandoned, Lost, or otherwise Discarded Fishing Gears (ALDFGs) constitute an estimated 10-20% of marine litter and plastic, potentially rising to 27%-30% when considering plastic waste from fishing and shipping (Morales-Caselles et al., 2021).

Furthermore, the loss of fishing gear, including nets, traps, lines, and drifting FADs amounts to 5.7%, 8.6%, 29%, and 40%, respectively, on a global scale each year. The environmental implications of marine litter, particularly microplastics, have prompted recognition as one of the anthropogenic pressure on ecosystems and their services. Consequently, addressing these issues has become imperative for fisheries management in Europe and worldwide oceans (Bastardie et al., 2021).

In this context, the inappropriate use of potential entangling materials, such as nets with large mesh sizes (e.g., >7cm) and inadequately configured raft and underwater parts of FADs (e.g., open net panels), leads to most entanglement events involving sensitive species like turtles and sharks (Filmalter et al., 2013). To mitigate the effects of FADs in the ecosystems, tuna Regional Fisheries Management Organizations (t-RFMOs) have adopted measures requiring the use of non-entangling FADs and use of sustainable materials, including biodegradable alternatives, in their construction (see Table 1 for conservation and management measures in place).

In this context, both publicly funded projects and private sector initiatives have been actively exploring the feasibility of using natural materials in developing biodegradable FADs. The investigation into such environmentally friendly alternatives has been a collaborative effort between EU scientists and tropical tuna purse seiners since the early 2000s, as evidenced by studies conducted by Delgado de Molina et al. (2004, 2007;) and Franco et al., (2009, 2012). However, the initial at-sea tests involving biodegradable FADs were constrained in scale, producing inconclusive results and progress at a relatively slow pace.

Complementary trials of biodegradable FADs have also emerged from the private sector, with several EU PS companies incorporating into their commercial fishing operations. These trials encompassed the use of ropes and canvas crafted from materials like coconut fiber and high-resistance cotton. Furthermore, EU PS companies funded a study evaluate the optimal biodegradable twine materials and their structural configuration, such as twisted, braided, and bulked, for FAD appendages (Lopez et al., 2016, 2019). The study analyzed various plant-origin fibers, including cotton, sisal, hemp, and linen, considering factors such as potential biodegradation, resistance, reproducibility, and market availability (Lopez et al., 2016, 2019). Similarly, ISSF conducted experiments at the ANABAC fleet in the Maldives, spanning a year, to assess the performance of natural origin biodegradable twines. Results indicated that mixed cotton and sisal ropes exhibited the highest strength (Moreno et al. 2017a).

Despite limitations arising from the small-scale nature of these trials, related, for example, to a high FAD loss rate to other vessels and thus hindering the attainment of statistically significant results (Moreno et al., 2017b), these studies have laid the groundwork for more extensive experiments in the Indian, Atlantic and Pacific Oceans over the past five years (Moreno et al., 2023; Murua et al., 2023; Roman et al., 2023).

The small-scale trials conducted in controlled environments have played a crucial role in assessing the degradation of biodegradable materials in tropical environments over time. They have also been instrumental in identifying materials strong enough for use in constructing biodegradable FADs (Lopez et al., 2019; Moreno et al. 2017a; Román et al., 2020). These experiments offer a consistent means of evaluating the physical properties of materials, a task impossible in fishing areas and during daily fishing operations.

In the Achotines Laboratory in Panama, the IATTC carried out a controlled experiment of BIOFAD materials from 2016 to 2017. Three prototypes of bioFAD (NEDs) were constructed, each utilizing bamboo for the surface component. The underwater components varied across designs, incorporating palm leaves (prototype 1; Figure 1-A), bamboo halves arranged in a lattice fashion (prototype 2; Figure 1-B), and cotton canvas (prototype 3; Figure 1-C). Coconuts enclosed in 'henequen' bags were added to enhance buoyancy. The NEDs were anchored approximately 0.5 miles from the shoreline, spaced about 0.1 miles apart. Three additional replicas were installed in calmer sea conditions, using bamboo canes (prototype 4; Figure 1-D) and cotton canvas (prototype 5; Figure 1-E) for different submerged components. The observed maximum floating time for FADs was 65 days, indicating the need for alternative solutions. While bamboo and cotton canvas could be considered for real-condition experiments, exploring materials like balsa wood, canvas, and ropes made from abaca fibers is crucial for enhancing NED floatation and durability over extended periods, ideally reaching 6 to 12 months.

To achieve this objective, a second phase of the project was conducted under real fishing conditions (Román et al., 2023). A total of 780 biodegradable FADs (114 prototype 1; 395 prototype 2; 271 prototype 3; Figure 2 A-C) were deployed alongside their corresponding traditional FAD controls, resulting in 1,544 experimental FADs. Results indicated similar catch per set values between NEDs and traditional FAD controls (NEDs = 33.6 mt/set, traditional control FADs = 31.7 mt/set). Prototype 1 demonstrated good and very good condition after a minimum of two months at sea, while prototype 2 materials maintained good to fair condition for at least three months. Although the NED design of prototype 3 was the least durable, modifications made in collaboration with the fleet improved its durability, achieving good to excellent condition during longer soak times (at least two-three months).

Satellite buoys' data were also used to determine the lifespan (i.e., 'operational' life) of the experimental FADs, with traditional FADs having a lifespan of 854 days and NED prototypes 1,2, and 3 having maximum lifespans of 790, 379 and 686 days, respectively. Comparisons of drifting trajectories showed that pairs with similar drifting patterns had lower differences in speed, while pairs with divergent trajectories had greater separation distances. Tuna biomass aggregation analyses using echo-sounder information from satellite buoys indicated comparable results.

Also recently, a series of private and voluntary initiatives trialing biodegradable FADs have been implemented in the EPO by NGOs and fishing organizations. Some examples are the TUNACONS voluntary deployments of biodegradable FADs, and the jelly-FAD experiment led by ISSF and some OPAGAC vessels (Zudaire et al. 2023). In both cases, the IATTC has played an important collaborative role by coordinating data collection and supporting experimental designs and data analysis.

Although the results showed improvement in NED duration at sea, further development through small and large-scale at sea experiments in the EPO is essential. This approach aims to engage in continuous participatory approaches with fishers and other stakeholders to discover means of reducing material usage in bioFADs. The current list of suitable materials for biodegradable FAD construction remains limited, underscoring the need for ongoing small-scale experiments to broaden the range of potential materials for bioFAD construction. Urgently, alternatives for floats with biodegradable options in different ocean regions and bioFAD designs must be identified. Given the potential extensive damage to ecosystems from the high number of conventional FADs still in use, coupled with their rate of loss and abandonment and the long-lived materials used, there is pressing need to expand the list of biodegradable materials available for FADs. Indeed, the IATTC adopted a Resolution in 2023 requiring vessels to deploy fully non-entangling biodegradable FADs before 2030 (IATTC Res. C-23-04). Therefore, this project aims to conduct controlled experiments in tropical environments, evaluating during a 12 month period the behaviour of some of the biodegradable materials to be used in the construction of biodegradable FADs (note that the experiments could be extended if agreed by the Parties and the budget is revised to reflect the additional needs).

AIM

This project aims, specifically, i) to help design small-scale trials to provide logistical support for the implementation of the experiments in controlled tropical environments, and ii) to conduct periodic evaluations and monitoring the physical characteristics of the biodegradable materials to be used in the construction of biodegradable FADs for a duration of 12 months (as mentioned above, the duration of the experiment could be extended beyond the 12 month period with additional budget needs agreed between the parties).

MATERIAL AND METHODS

Task 1: **Analysis of trial specifications, experimental design and assemblage**.

Experimental design

IATTC scientists will work in close collaboration with AZTI scientists to design and conduct the experiment, as well as with the pertinent arrangements with the Panamanian authority in case deployment permits for testing materials at the Achotines Laboratory are required. A minimum of 8 BioFAD surface components (i.e., rafts), provided by AZTI and made with biodegradable materials, will be used in the experiment.

Information gathering

The primary objective of this task is to gather information from past small-scale trials and the specifications provided by AZTI to assess the range of biodegradable materials. This information will inform the design and assembly of the experiment.

Testing site

The IATTC Laboratory in Panama, with proven experience in small-scale trials for biodegradable materials, is an ideal location for developing and fine-tuning the experiment. The offshore tuna cage as part of its facilities will deploy The BioFAD surface components, which will be tethered and evenly distributed within the sea cage ring (see Figure 3).

Data collection for tested materials

This involves designing data collection forms to record sampling parameters such as date, time, material identification and associated characteristics, and the name of the data collector, among others. AZTI will provide the sampling forms after discussion and agreement with the IATTC.

The physical characteristics of the material to be tested and recorded are:

- Color
- Weight

- Percentage of flotation
- Presence and magnitude of tears and cracks
- Breaking strength
- Thickness
- Percentage covered by epibiotic colonization
- Overall condition (1, excellent; 2, very good; 3, good; 4, fair; 5, poor; 6, very poor).

Project milestones (M) and deliverables (D) associated to task 1

M1.1: The final experimental design is agreed, including data collection material, and biodegradable materials are installed (Month 1).

Task 2: Periodic evaluations and monitoring of biodegradable materials.

The IATTC-Achotines Laboratory staff will conduct routine evaluations of the deployed materials, assessing their physical characteristics.

Data collection sampling will occur every 6 weeks (8 samples to be assessed), over a 12-month period (the number of samples and duration of the project could be increased with a revised budget). Additionally, dedicated inspections during sampling will verify the experimental assembly's proper performance and security (e.g., mooring, attachment, and installation) to prevent material losses due to adverse ocean and weather conditions. However, this is anticipated to be unlikely, as experimental material will be secured inside the semi-protected offshore tuna cage.

Additional characteristics and materials may be monitored if easily incorporated and evaluated by IATTC-Achotines Laboratory staff in the field. All specific equipment required for the tests will be provided and shipped to the Achotines Laboratory by AZTI.

Project milestones (M) and deliverables (D) associated to task 2

M2.1: Collection of biodegradable materials physical characteristics over a 12-month period.

D. 2.1. Complete data collection sheet and audiovisual information of the evaluations.

CHRONOGRAM OF THE PROJECT

The project will have a duration of 12 months (1 year). Should a project extension be required (ideal for obtaining long-term responses to degradation of materials to meet fisheries needs), the service will be extended until the project's completion, after revising the budget accordingly. The outlined timetable (Table 2) is designed to accomplish the minimum objectives of this service, with associated milestones and deliverables specified for each task. However, the timetable and budget below (Annex 2) could be adapted to other project durations (e.g., 18 or 24 months, by extending task 2 – Periodic evaluations and monitoring of biodegradable materials).

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Figure 1. Prototypes used in the phase 1 of the EU-IATTC project in the Achotines Laboratory in Panama.

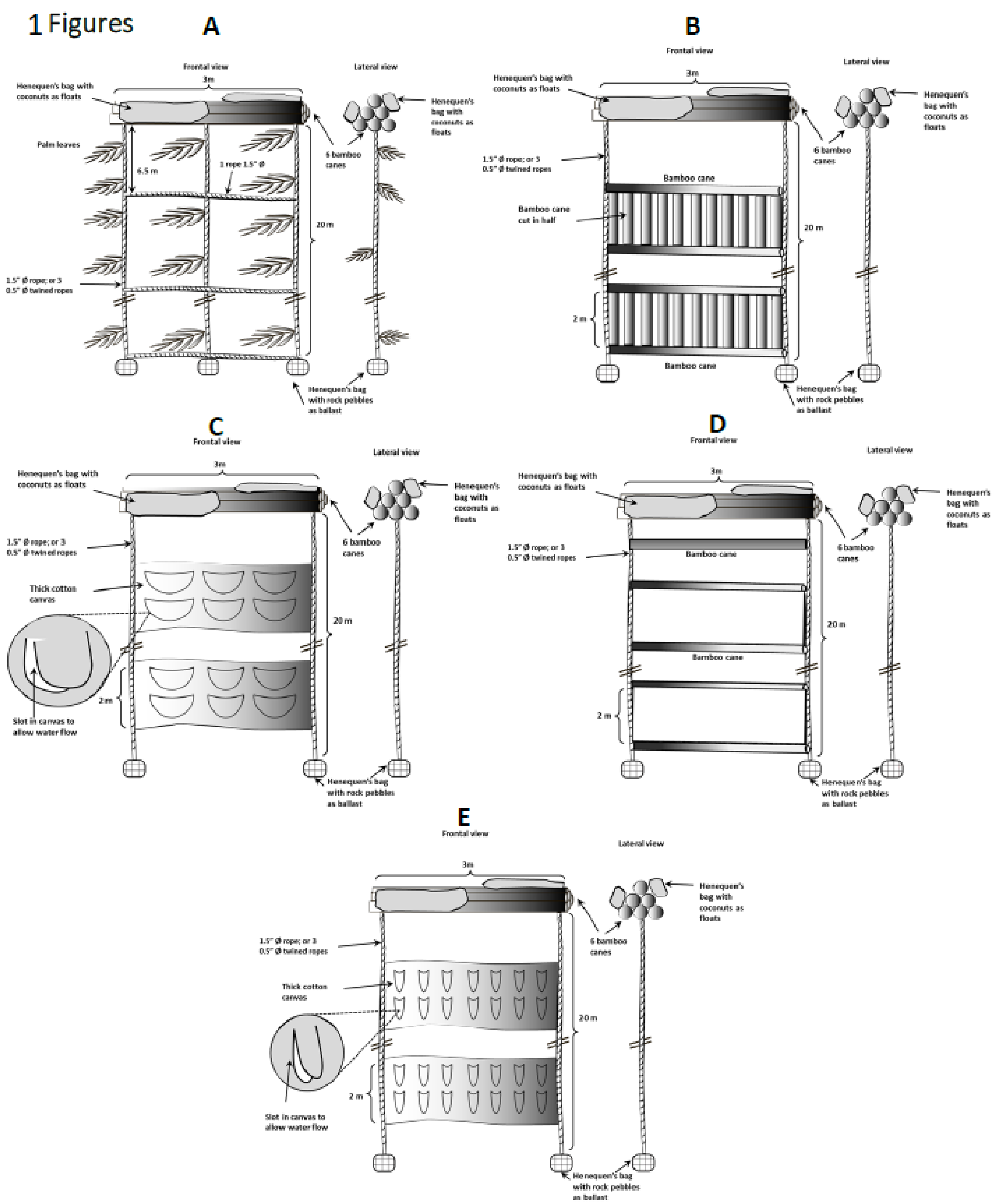

Figure 2. Prototypes used in the phase 2 of the EU-IATTC biodegradable FAD project.

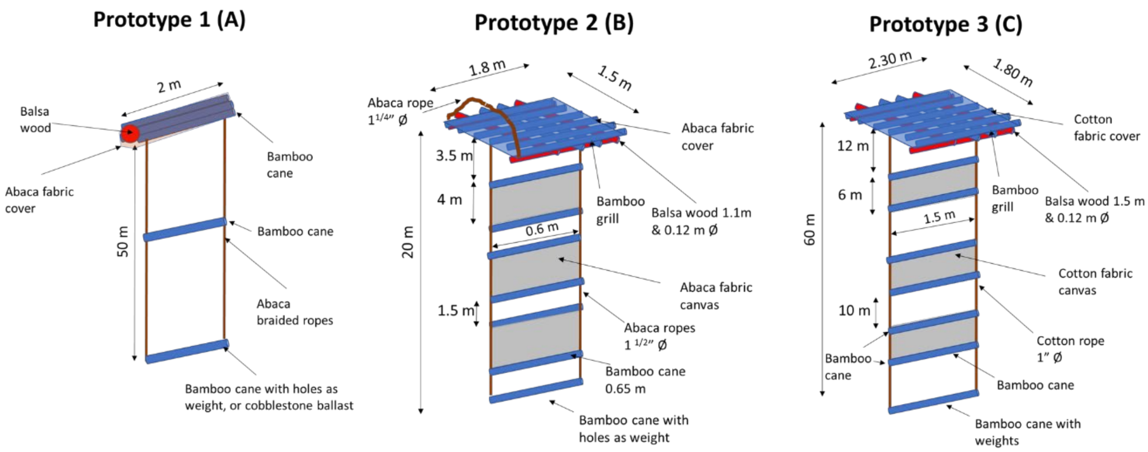

Figure 3. Offshore tuna cage in IATTC Laboratory of Achotines in Panama.

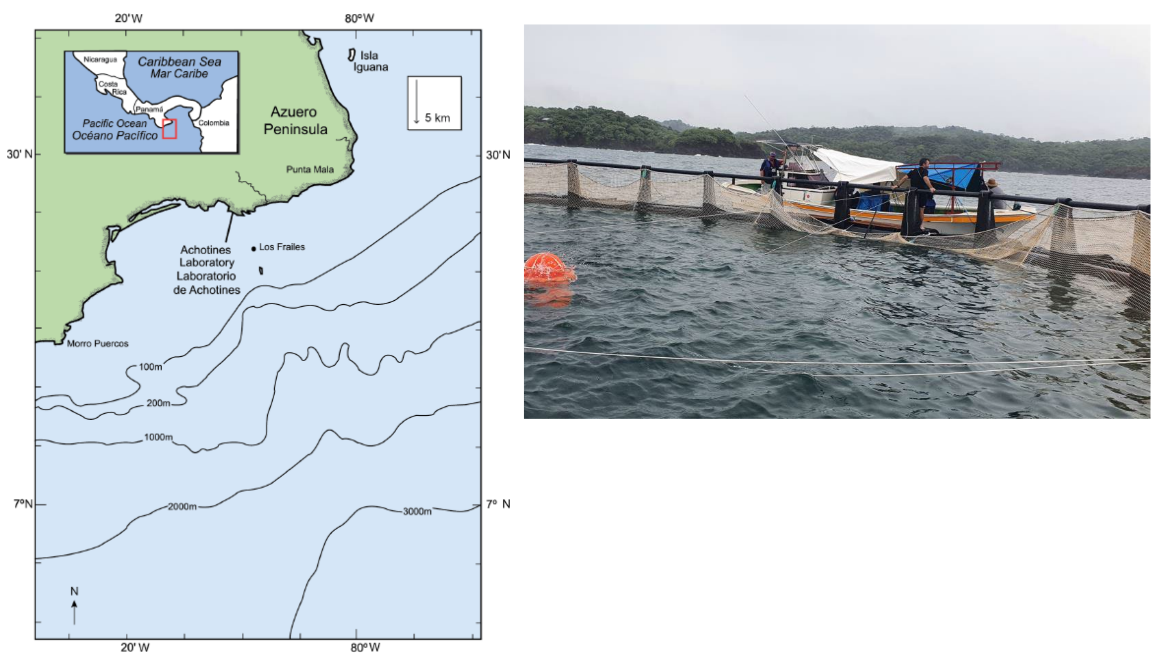

Table 1. Mitigation measures on the use of non-entangling and biodegradable materials

RFMO	Resolution(s)	Non-entangling material	Biodegradable FADs	FAD recovery requirements
IATTC	C-16-01 C-18-05 C-17-02 C-19-01 C-20-06 C-21-04 C-23-04 C-23-05	By 2019 the floating or raft part (flat or rolled structure) of the FAD might be covered. If it is covered with mesh net, it must have a stretched mesh size less than 7 cm and the mesh net must be well wrapped around the whole raft so that there is no loose netting hanging below the FAD when it is deployed. The design of the underwater or hanging part (tail) of the FAD should avoid the use of mesh net. If mesh net is used, it must be tied as tightly as practicable in the form of sausages or have a stretched mesh size less than 7 cm in a panel with weight at the end. By 2025, the design and construction of any FADs to be deployed or redeployed shall comply with the following specifications: a) the use of mesh net shall be prohibited for any part of a FAD; b) only non-entangling FAD materials and designs shall be used.	To reduce the amount of synthetic marine debris, the use of natural or biodegradable materials (such as hessian canvas, hemp ropes, etc.) for drifting FADs should be promoted. a) as of 1 January 2026, CPCs shall only allow vessels to deploy or redeploy drifting FADs of biodegradability categories I, II, III or IV (see Resolution C-23-04 for details on categories I-IV); b) as of 1 January 2029, CPCs shall only allow vessels to deploy or redeploy drifting FADs of categories I or II; c) At the annual meeting in 2030, the Commission shall decide whether to require by 2031 CPCs to only allow vessels to deploy or redeploy drifting FADs of Category I.	Recover within 15 days prior to the start of the closure period a number of FADs equal to the number of FADs set upon during that same period.
ICCAT	REC. 14-01 REC. 15-01 REC. 16-01 REC. 19-02 REC. 21-01 REC. 22-01	- The surface structure of the FAD should not be covered, or only covered with non-meshed material. - If a sub-surface component is used, it should not be made from netting but from non-meshed materials such as ropes or canvas sheets.	- To reduce the amount of synthetic marine debris, the use of natural or biodegradable materials (such as hessian canvas, hemp ropes, etc.) for drifting FADs should be promoted. - Endeavour that as of January 2021 all FADs deployed are non-entangling, and constructed from biodegradable materials, including non-plastics, except for materials used in the construction of FAD tracking buoys	
IOTC	Res. 15-08 Res. 17-08 Res. 18-08 Res. 19-02	From 2014 vessels should progressively use in FAD construction non-entangling designs and materials, which should be fully implemented by 2020:	To reduce the amount of synthetic marine debris, the use of natural or biodegradable materials in FAD construction should be promoted. CPCs shall encourage their flag vessels to use biodegradable FADs, except for materials used for the instrumented buoys, by their flag vessel from 1 January 2022.	From 1 January 2022, encourage their flag vessels to remove from the water, retain onboard and only dispose of in port, all traditional FADs encountered The Commission shall establish a DFAD tracking and recovery policy at its annual session in 2021, based on

		- The surface structure of the FAD shall not be covered, or only covered with non-meshed material. - If a sub-surface component is used, it shall not be made from netting but from non-meshed materials such as ropes or canvas sheets.		recommendations from the ad-hoc FAD working group
WCPFC	CMM-18-01 CMM-20-01 CMM-21-01	From 2020, CCMs shall ensure that the design and construction of any FAD to be deployed in, or that drifts into, the WCPFC Convention Area shall comply with the following specifications: • The floating or raft part (flat or rolled structure) of the FAD can be covered or not. To the extent possible the use of mesh net should be avoided. If the FAD is covered with mesh net, it must have a stretched mesh size less than 7 cm (2.5 inches) and the mesh net must be well wrapped around the whole raft so that there is no netting hanging below the FAD when it is deployed. • The design of the underwater or hanging part (tail) of the FAD should avoid the use of mesh net. If mesh net is used, it must have a stretched mesh size of less than 7 cm (2.5 inches) or tied tightly in bundles or "sausages" with enough weight at the end to keep the netting taut down in the water column. Alternatively, a single weighted panel (less than 7 cm (2.5 inches) stretched mesh size net or solid sheet such as canvas or nylon) can be used. From **January 2024** the use of mesh net shall be prohibited for any part of the FAD. If the raft is covered, only non-entangling materials and designs shall be used. The subsurface structure shall only be made using non-entangling materials.	To reduce the amount of synthetic marine debris, the use of natural or biodegradable materials for FADs should be promoted. The use of non-plastic and biodegradable materials in the construction of FADs is encouraged.	

Table 2. Chronogram of the service

TASKS														
		Months												
ID	Description	1	2	3	4	5	6	7	8	9	10	11	12	13
T 1	Analysis of the specifications of the trials, experimental design and assembled	■												
T 2	Periodic evaluations and monitoring of biodegradable materials		■	■	■	■	■	■	■	■	■	■	■	■
MILESTONES														
M.1.1	The experimental design and data collection methods are agreed, and materials installed	■												
M 1.2	The data on physical characteristics of biodegradable materials are collected for a minimum of a 12 month period													■
DELIVERABLES														
D 2.1	Complete data collection sheet and audiovisual information of the evaluations													■

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Annex 2. Project budget, designed for a service of a 12-month period (will need to be revised to reflect an eventual extension of the project accordingly).

Item Description	Unit Description	Unit Cost	N Units	Total
Design of the experiment (days of work for 1 person)	One day of labor	$ 400,00	4	$ 1.600,00
Clearing Equipment through Customs and Transport Internal shipping in Panama and Customs broker fees	Estimate	$ 700,00	1	$ 700,00
Installation of materials and equipment Two days of at land-based and at sea work	Vessel and two staff	$ 440,00	2	$ 880,00
Monthly Sampling 24 days of sampling (2 days a month for 12 months)	Vessel and two staff	$ 440,00	24	$10.560,00
Weekly inspections (1 trip/week for 3 weeks/month x 12 months)	Vessel and two staff	$ 220,00	36	$ 7.920,00
Total Projected IATTC Direct Support				$21.660,00
Overhead 20%				$ 4.332,00
Total				$25.992,00