

Progress Report of Project 110: Non-entangling and Biodegradable FAD Trial in the Western and Central Pacific Ocean

**NON - ENTANGLING
&
BIODEGRADABLE**

**FAD
Trials
in the
WCPO**



Lauriane Escalle,

Gala Moreno , Iker Zudaire , Jon
Uranga, Donald David, and Paul Hamer

WCPFC project 110: Non-entangling and biodegradable FAD trial in the WCPO

NOAA BREP project: Towards the Use of Biodegradable FADs in the Pacific Ocean



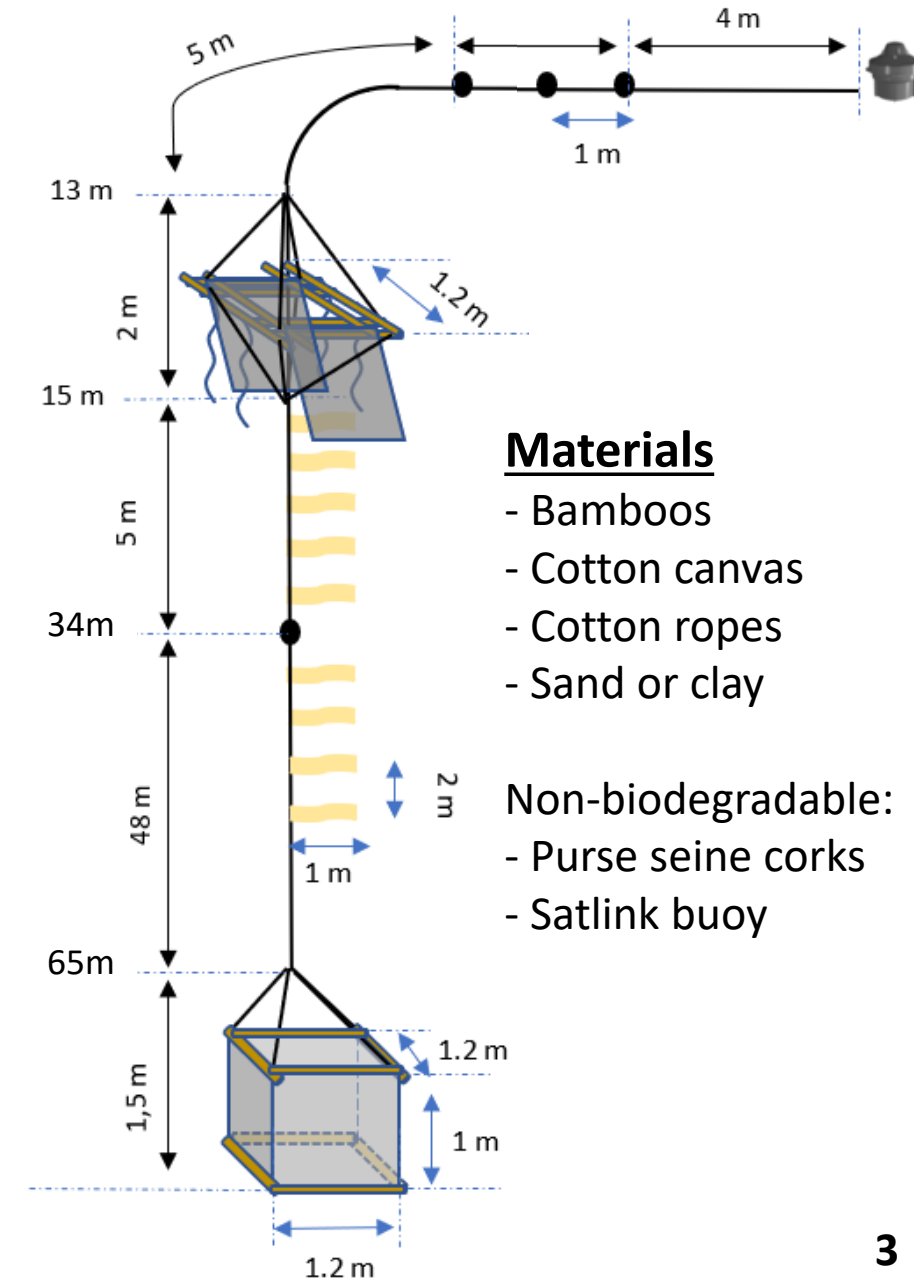
Objectives:

1. Explore design and cost-feasibility of non-entangling and bio-FADs.
2. Train dFAD manufacturers on the construction of bio-FADs.
3. Undertake at-sea experiments to compare the performance/functionality of non-entangling and biodegradable dFADs to conventional dFADs. Deploying them together in pairs.
4. Provide robust scientific advice to industry and national fisheries managers on the performance of non-entangling and biodegradable dFAD designs.
5. Dissemination of the bio-FADs, construction and use through workshops with fishers



The Jelly-FAD

- **Neutral buoyancy:** after 20-25 days, it drift neutrally in the water column just like a jelly-fish.
- **Reduces structural stress:** reduced component at the surface, helping increasing lifetime of biodegradable materials
- **Reduces the size of dFADs:** 3-D shape of the drogue ensures slow drift



430 jelly-FADs to be tested

Partners	Vessels	Flag	Construction	No. of BioFADs	
				WCPFC 110	BREP
Caroline Fisheries Corporation	6	FSM	Pohnpei	50	
FCF Co. Ltd	8	Taiwan	Pohnpei	50	
American Tunaboat Association		US			
- Cape Fisheries	6		Manta	30	108
- Others	10		Manta and Pago Pago	50	108
Silla	2	Korea	Pohnpei	34	
TOTAL	32			214	216

Method

Materials & tools



Cotton ropes

Itsaskorda (Spain)
Sea Master (Chinese Taipei)



Bamboos Local



Clay Local



Purse seine corks Local



Tools

Cotton canvas

Soluciones Anmarsaq (Ecuador)
Sea Master (Chinese Taipei)



Satellite echosounder buoy

Satlink SLX+ (Spain)

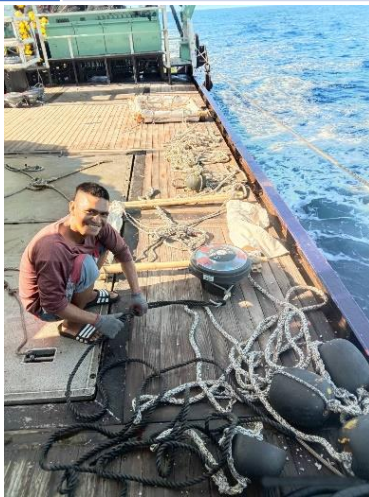


Construction

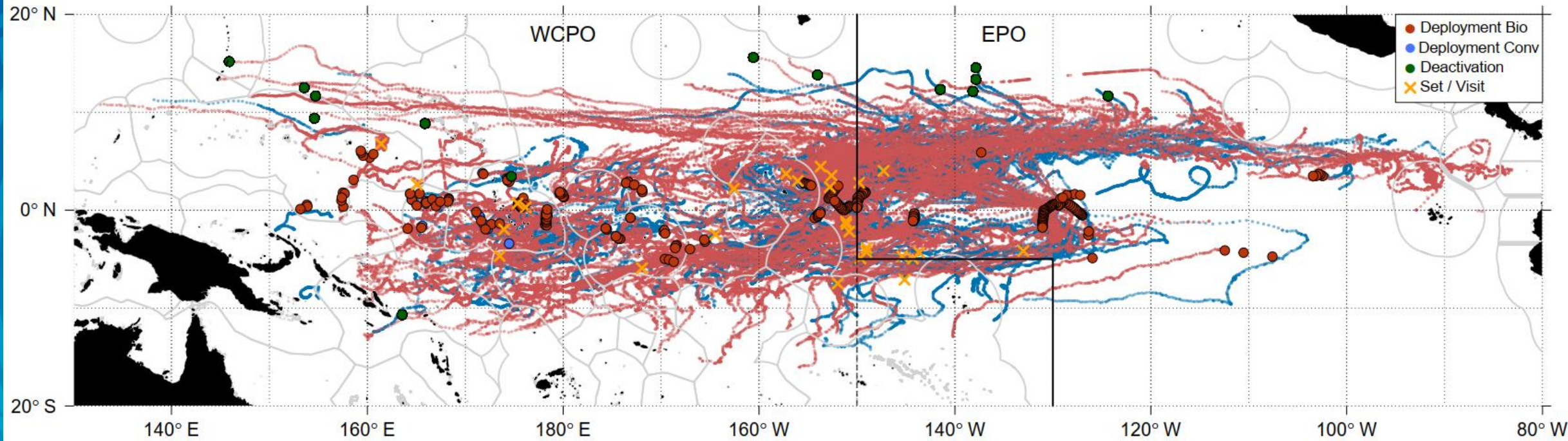


At-sea trials – preliminary results

	FM		KR		TW		US fleet	
	Jelly	Conv.	Jelly	Conv.	Jelly	Conv.	Jelly	Conv.
Convention Area	WCPFC		WCPFC		WCPFC		WCPFC & IATTC	
Nb FADs planned	50	50	34	34	50	50	296	296
Deployments	50	27	3	3	42	26	191	167
Deployment period	03/04/23 – 12/04/24		12/04/24		02/03/23 – 11/07/23		04/09/22 – 04/05/24	
Sets	1	0	0	0	4	0	15	50
Visit (without set)	3	0	0	0	0	0	1	0
Buoy deactivation	0	0	1	0	10	4	26	24
Stranding events	0	0	0	0	3	0	0	0

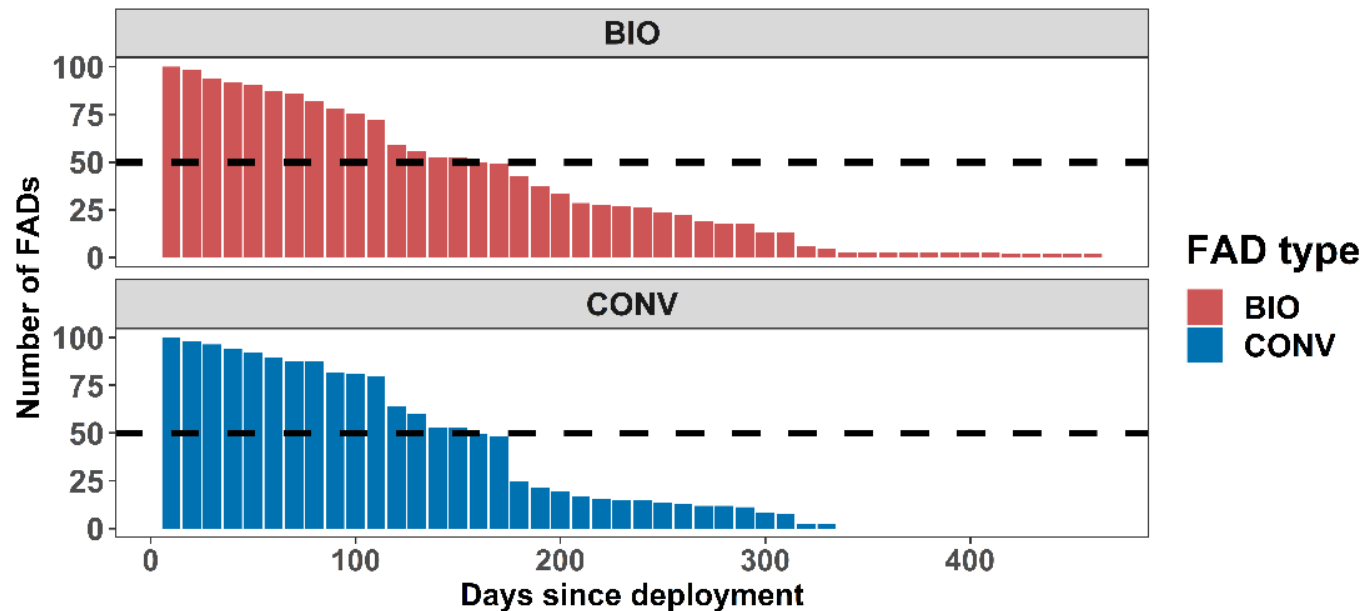


At-sea trials – preliminary results

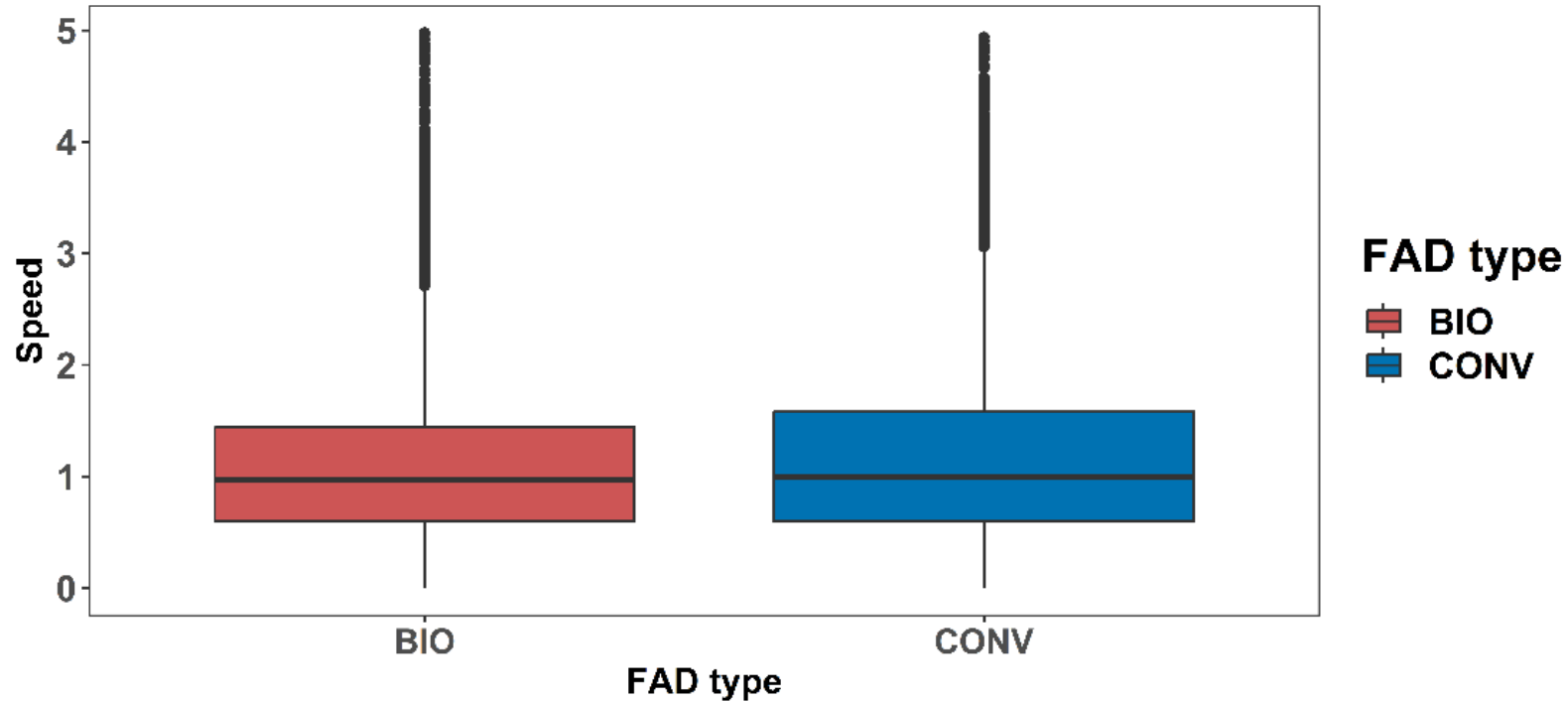


At-sea trials – preliminary results: duration at-sea

	Other fleets		US fleet	
	Jelly-FADs	Conventional	Jelly-FADs	Conventional
Deployments	83	44	132	114
Data available	74	42	129	112
Duration (days)				
Min	0	1	1	12
Mean	123	82	160	163
Max	284	248	457	321



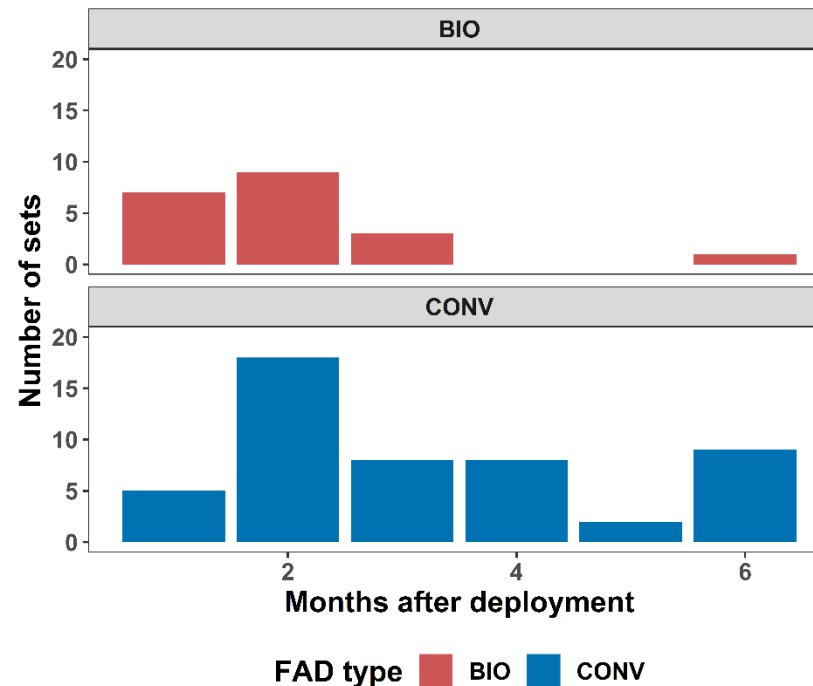
At-sea trials – preliminary results: speed



SPEED	Other fleets		US fleet	
	Jelly-FADs	Conventional	Jelly-FADs	Conventional
Min	0.0	0.0	0.0	0.0
Mean	0.9	0.9	1.1	1.2
Max	4.9	4.9	4.9	4.9

At-sea trials – preliminary results: catch

FAD type	Number of sets	Total tuna catches (mt)			
		Min	Mean	Median	Max
Jelly-FAD	20	0	53.6	35.0	185
Conventional	50	5	71.3	52.5	260
2023 WCPO FADs	11,005	0	46.3	30.0	481



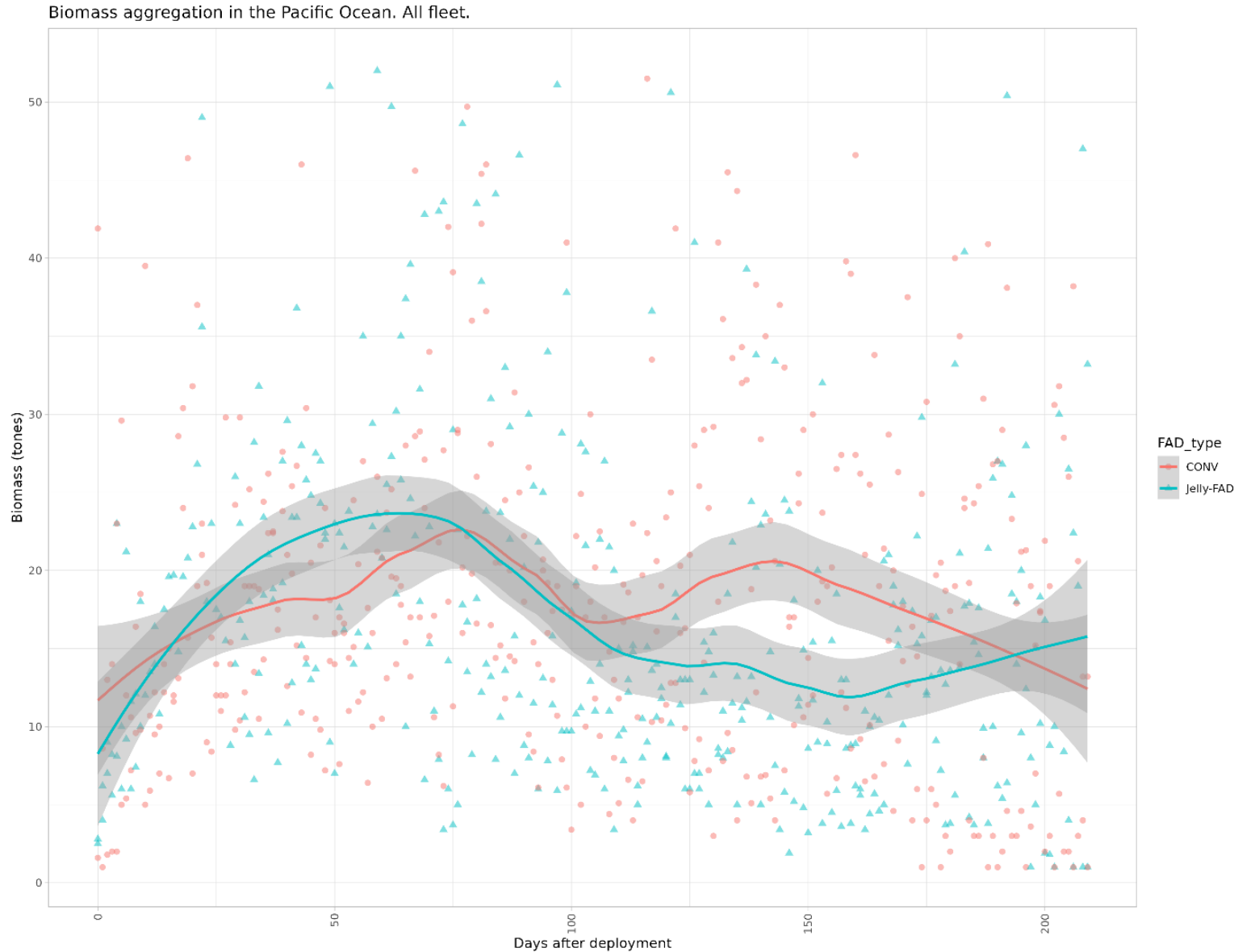
At-sea trials – preliminary results: catch on same pairs

Jelly-FADs

Conventional FADs

Pair	Deployment	Bio	Total catch (t)	Months after deployment	Conv	Total catch (t)	Months after deployment
Pair 1	12/02/2023	Set 1	35	1	Set 1	155	6
	12/02/2023	Set 2	35	2	Set 2	95	6
	12/02/2023	Set 3	55	2			
	12/02/2023	Set 4	43	2			
Pair 2	04/05/2024	Set 1	26	2	Set 1	55	2
Pair 3	04/05/2024	Set 1	161	2	Set 1	25	2
Pair 4	04/05/2024	Set 1	134	1	Set 1	35	2

At-sea trials – preliminary results: Aggregation patterns from echosounders



At-sea trials – preliminary results: condition



Additional work on trialing and supporting development of non-entangling and biodegradable FADs in the WCPO

- To enhance WCPFC project 110 with the deployment of additional non-entangling and biodegradable FADs to increase the robustness of the results and related management and industry advice.
 - Additional 150 jelly-FADs
- To increase the regional capacity to support industry uptake and use of non-entangling and biodegradable FADs in the WCPO.
 - Training workshops
 - Additional base ports
 - Exploring options for regional materials supply



Partners	Vessels	Flag	Construction	No. of BioFADs	No. Constructed
Fishing Industry Association PNG	12	PG	Lae (PNG)	60	35
Koo's	2	MH	Majuro	10	0
???				80	
TOTAL				150	35



- Note that 430 jelly-FADs have been constructed, including 216 as part of WCPFC Project 110, and that 286 jelly-FADs have been deployed (67%) under the WCPFC and BREP project collaboration.
- Note that the drift speed of conventional and jelly-FADs is similar and that jelly-FADs were monitored longer than the conventional dFADs, indicating that based on buoy data, they have comparable at sea durability to traditional dFADs. However more visits are needed after 6 months to validate this result.
- Note that aggregation patterns measured using biomass data from echosounder buoys attached to dFADs, were similar between the conventional and jelly-FADs, with a peak 2 months after deployment.
- Note that 20 fishing sets have been performed on jelly-FADs in this trial so far, representing 7% of the jelly-FADs deployed, with an average tuna catch of 53.6 t per set.
Conventional dFADs showed a higher average catch per set (71.3 t)
The median catch per set on the jelly-FADs for this trial were higher to that of the whole fleet in 2023 (i.e., 53.6 vs 30 t per set for jelly-FADs of the trials and conventional dFADs of the whole fleet, respectively).

- Note that this work is ongoing and complete results from the trial and analyses of all non-entangling and biodegradable dFADs from Project 110 and the follow-up project P19X4 are expected to be available by SC 22.
- Encourage fishing fleets to join these trials, to both increase the sample size and their involvement in the development of non-entangling and biodegradable dFADs.
- Note that industry involvement requires a commitment to deploy a certain number of non-entangling and biodegradable dFADs systematically along with conventional dFADs. Reports from any independent trials of non-entangling and biodegradable dFADs should be made available to the SC.
- Note that these trials and the associated industry engagement and training are essential to support transition to the use of more ecologically friendly dFADs in the Western and Central Pacific Ocean.



© ISSF

© ISSF

© ISSF

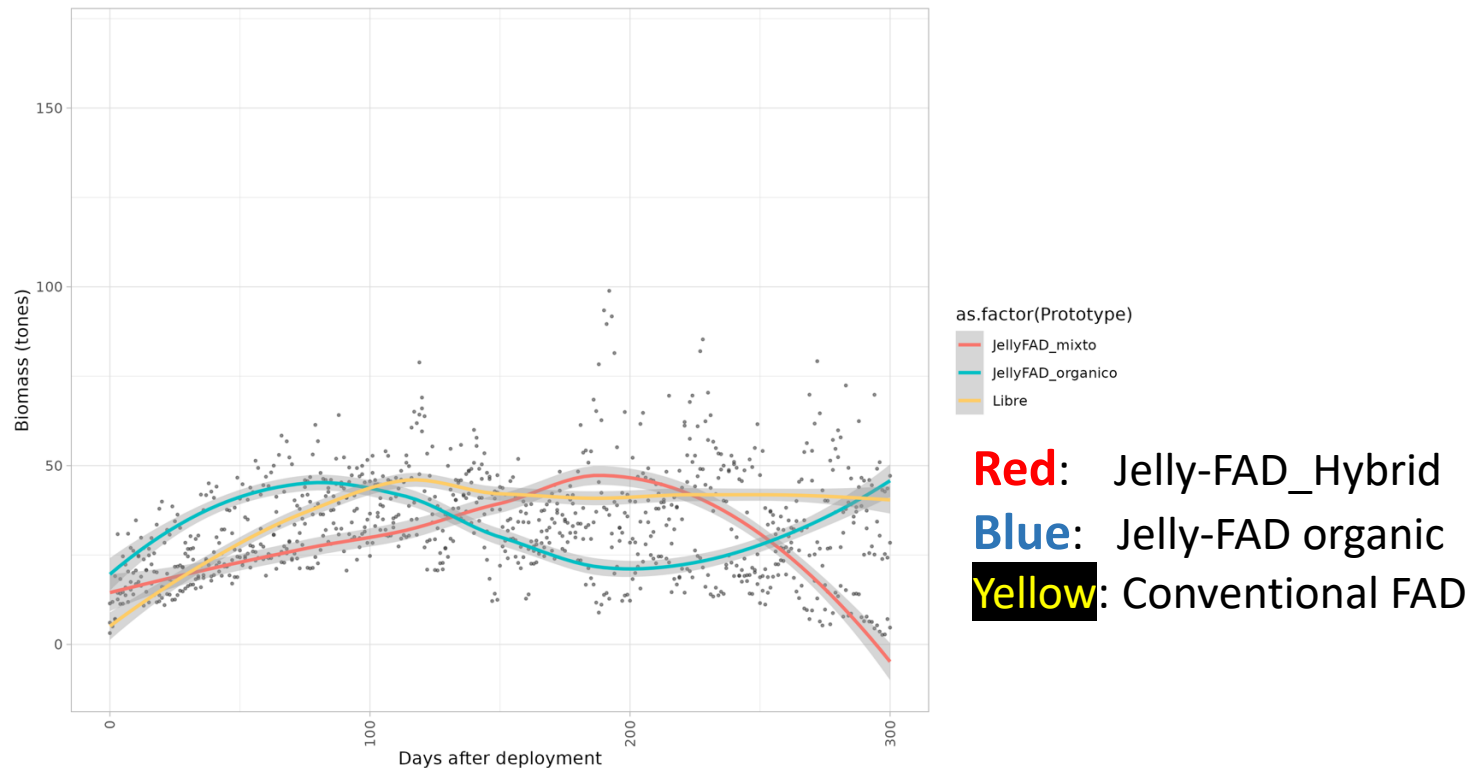
For additional information, contact laurianee@spc.int or gmoreno@iss-foundation.org

Acknowledgments

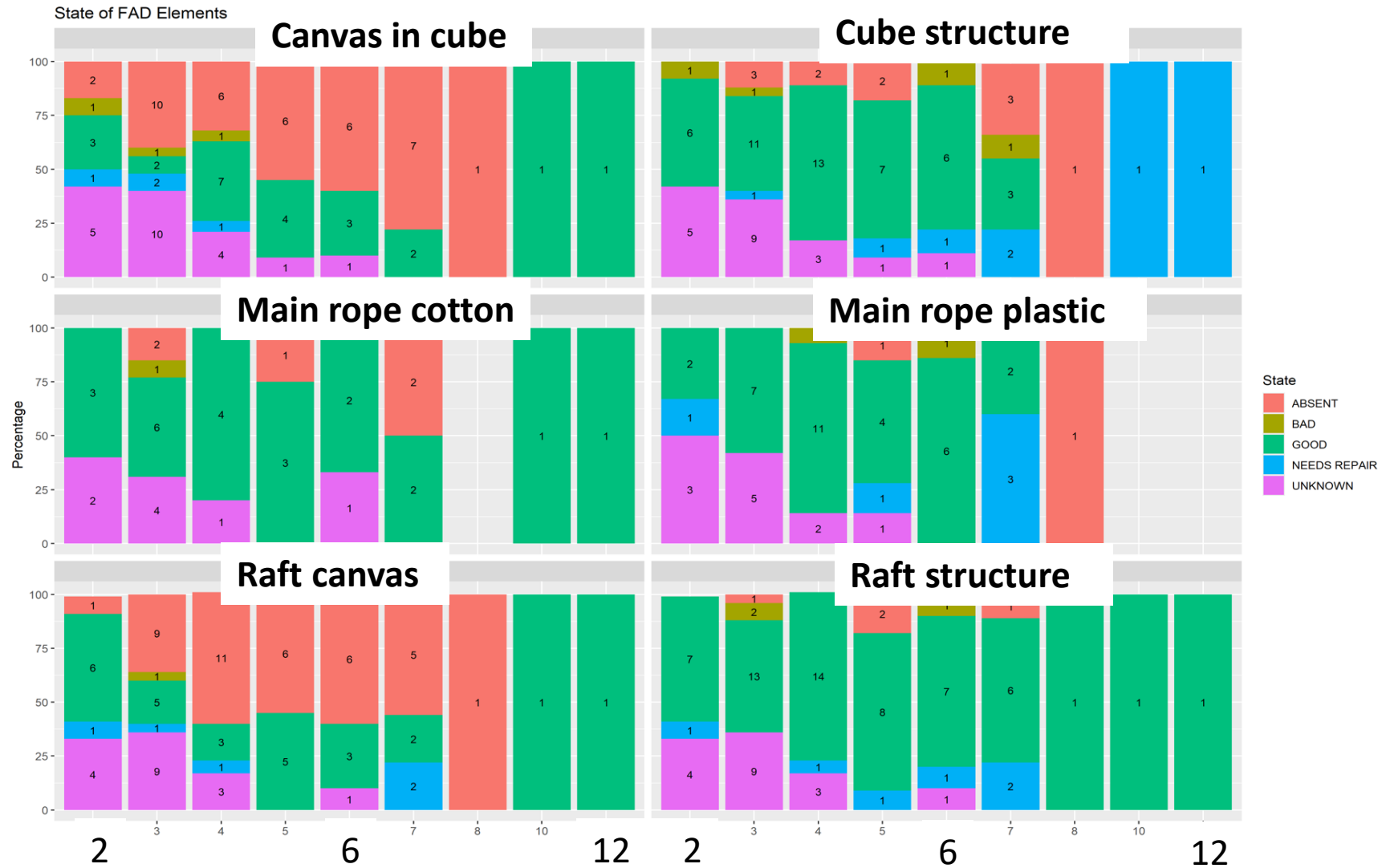


2,000 non-entangling and biodegradable FADs (Jelly-FADs) by UGAVI fleet

FAD Prototype	N	Soaking Time (days)			Catch (tons)		
		min	mean	max	min	mean	max
JellyFAD_organic (Cat II)	34	37	132	335	0	38,5	125
JellyFAD_hybrid (Cat IV)	36	33	113	238	0	40,2	120
JellyFAD_total	70	33	122	335	0	39,4	125
Conventional	46	28	106	267	0	35,9	265



2,000 non-entangling and biodegradable FADs (Jelly-FADs) by UGAVI fleet



2,000 non-entangling and biodegradable FADs Jelly-FADs by UGAVI fleet

- JellyFADs **aggregate tuna** as conventional FADs do or even more.
- 70 fishing sets: similar average tuna catch: 39.4 t on jelly-FADs ; 35.9 t on conventional FADs
- JellyFADs **drift** as slow as conventional FADs but with less weight and volume
- **Lifespan**: sets were made after 11 months at sea, and many occurred after 5 months with the FAD being in perfect condition and re-deployed at sea. **This meets fishers' needs for dFADs lifespan.**
- The **success** relies on the **number of Jelly-FADs deployed** which should be systematically tested supported by the shipowner and with the feedback from fishers at sea.

PROGRESS IN THE IMPLEMENTATION OF

EcoFADs

In the Eastern Pacific Ocean

**20 Regular Scientific Advisory Committee
Western and Central Pacific Regional Commission / August 2024**



Biodegradable FAD made from 100% ecological material. José Luis García, Juan Carlos Quiroz y Guillermo Morán



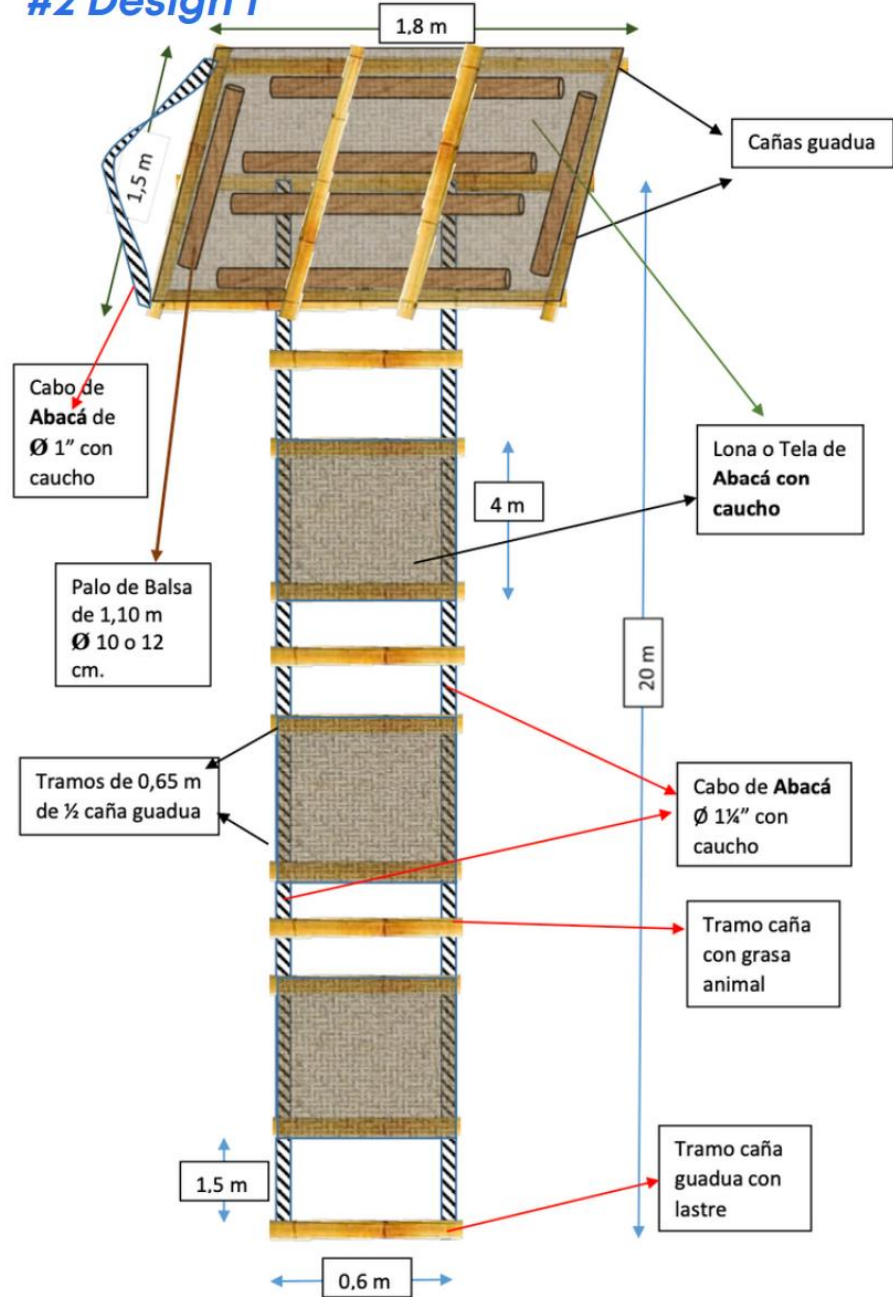
Guillermo Morán Velásquez / TUNACONS Director
Fisheries Engineer
g Moran@tunacons.org

PROTOTYPE DESIGNS

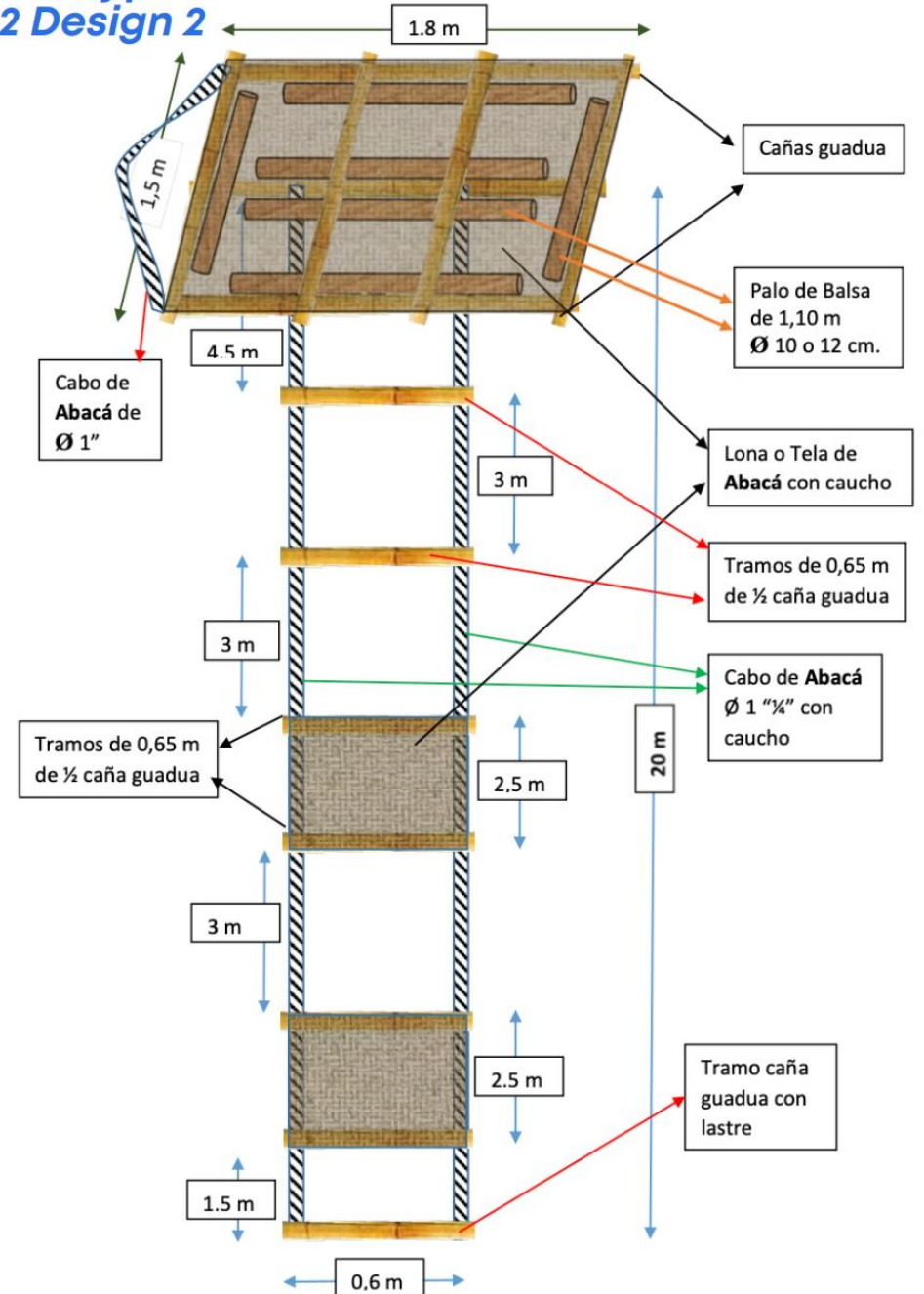
OF ECOFADS USED BY THE TUNACONS FLEET



Prototype #2 Design 1



Prototype #2 Design 2



Key findings



1. The capture efficiency with ECOFADs is similar to traditional FADs.

The average catch between 2021 and 2023 was 23.06 tons per set, while in FADs with traditional materials it was 23.19 tons.

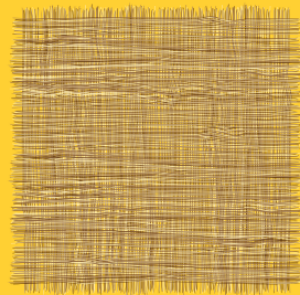
2. The duration of the fishing operation of ECOFADs is shorter in relation to traditional FADs.

Very Good and Good 90 days average, as Regular probably up to 120 days average.



- 3. There are key parts that still require mixing with synthetic material such as the Main Cape that links the floating part with the submerged part to improve the durability of the structure and resistance to manipulation when they need to be replanted.

1. 4. There is a need to develop handling guidelines for ECOFADs to reduce damage that causes accelerated deterioration of the structure.



5. With better protection of the abaca fabrics and ropes with organic rubber and by being able to replace worn fabrics on board, their lifespan can be improved to increase the use time of the ECOFAD.

6. The change towards the use of 100% ECOFADs will cause modifications in the fishing strategy that may affect productivity per fishing trip due to its shorter duration.



Recommendations

- To further research work on ECOFADs, which will enable standardizing the use of plant fibers, protective treatments with organic materials and improving their manufacture to increase the life of the prototype, especially in the case of rope and abaca fabric.
- Develop manuals or on-board handling guides for captains on handling Ecofads to help reduce damage to prototypes.
- Any potential future conservation measures on limitations on the number and sets of FADs must take into account the shift towards the use of ECOFADS due to the changes it will bring about in fishing strategy.





Working together for a healthy marine ecosystem



www.TUNACONS.org

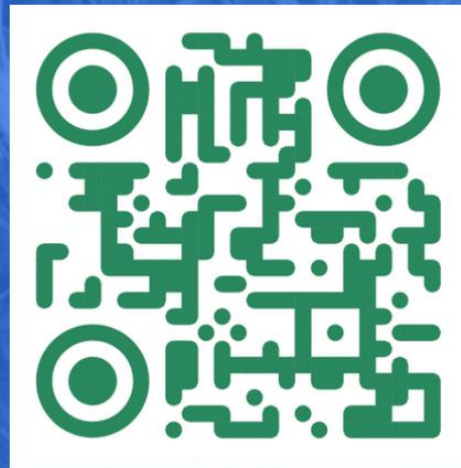
@**TUNACONS**org



@TUNACONS**uk**



@TUNACONS**deu**



Follow us!
Scan this code
with your
mobile camera

