IMPLEMENTATION PROGRESS ABOUT

EcoFADs

In the Eastern Pacific Ocean

FADs working group meeting.
June 2024 Tropical Tuna Commission

Biodegradable FADs made of 100% ecological materials by José Luis García, Juan Carlos Quiroz, and Guillermo Morán.

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CONTEXT - IATTC CATEGORIZATION

TUNACONS is striving to attain Category 1 in IATTC resolution C 23 04, based on the classification of FADs according to their biodegradability level.

All our FADs are assembly using natural plant-based materials that are fully biodegradable in all components.

Our objective is for all organic elements to decompose in the salty water, particularly the ropes that uphold the frames of the floating or submerged part, without polluting the marine ecosystem.

EcoFADs

Materials for assembly

ONG FOR THE TUNA CONS TUNA CONSERVATION

Materials	Measurements
Abaca ropes	1/8", 3/16", 1/4", 3/8", 1/2", 5/8", 1", and 1 1/4"
Abaca textile	1 yard of taffeta, 0.70 cm in width
Guadua or Bamboo	12 to 10 cm diameter x (1.5 or 1.8) m
Balsa wood	12 cm diameter x 1.10 m
Ballast	4 kilograms of coarse sand
Latex	10 kg

2021-2023 Period

ECOFADS PROGRESS

PROGRESS

Findings

Based on multiple TUNACONS experiments carried out since 2017 using plant-based fibers, **Abacá has been identified as the most durable and sustainably sourced fiber.** The optimal method to enhance the fiber's longevity was found to be the application of natural rubber.

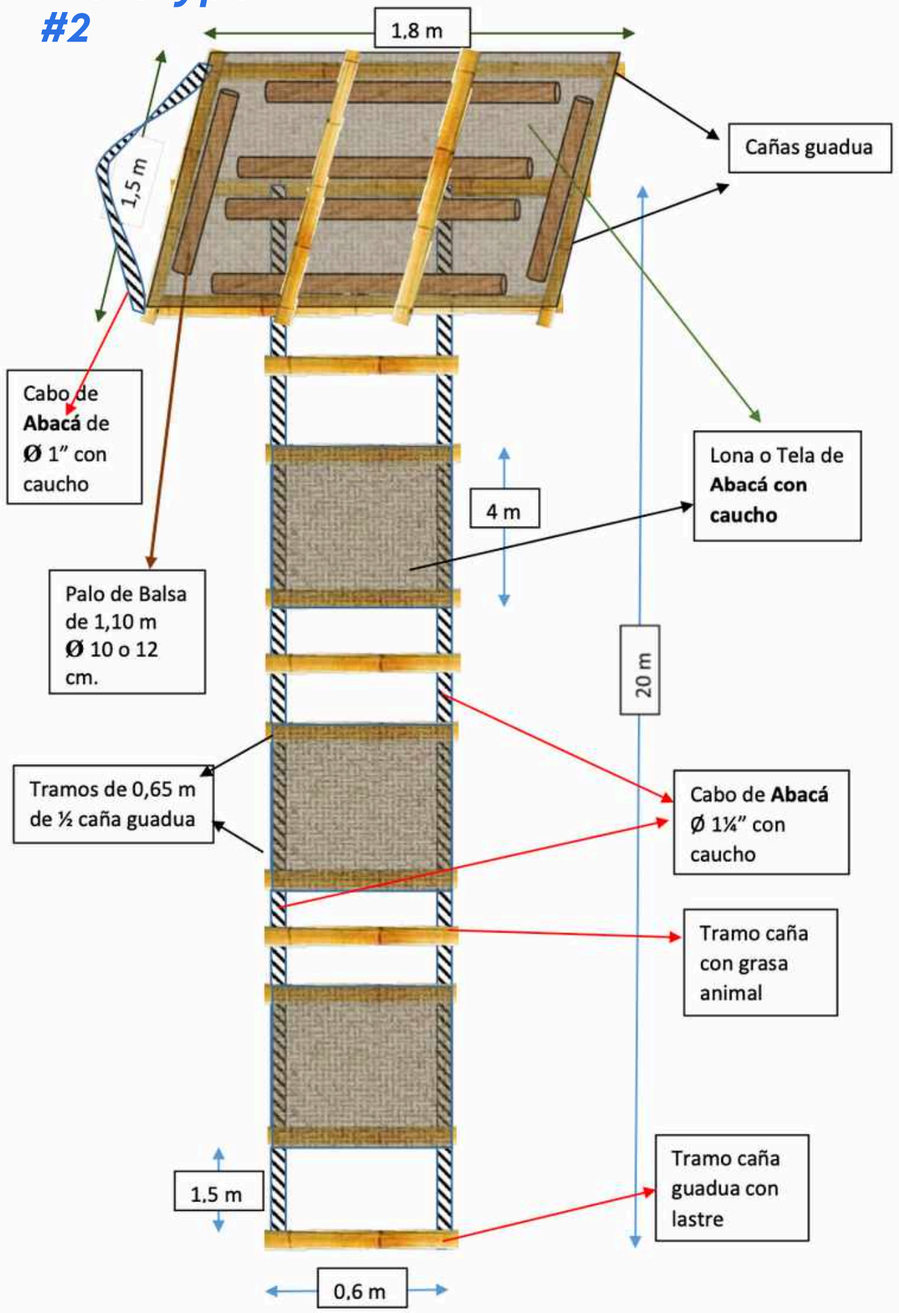
Between 2021 and 2023, **anchored FADs trials** were expanded to include **ocean FADs deployment**, enhancing experimental research on durability, resistance, and impermeability.

The EcoFADs were assembled following the specifications of prototype #2, used in the **pilot project** in collaboration with **IATTC**, albeit with some adjustments.

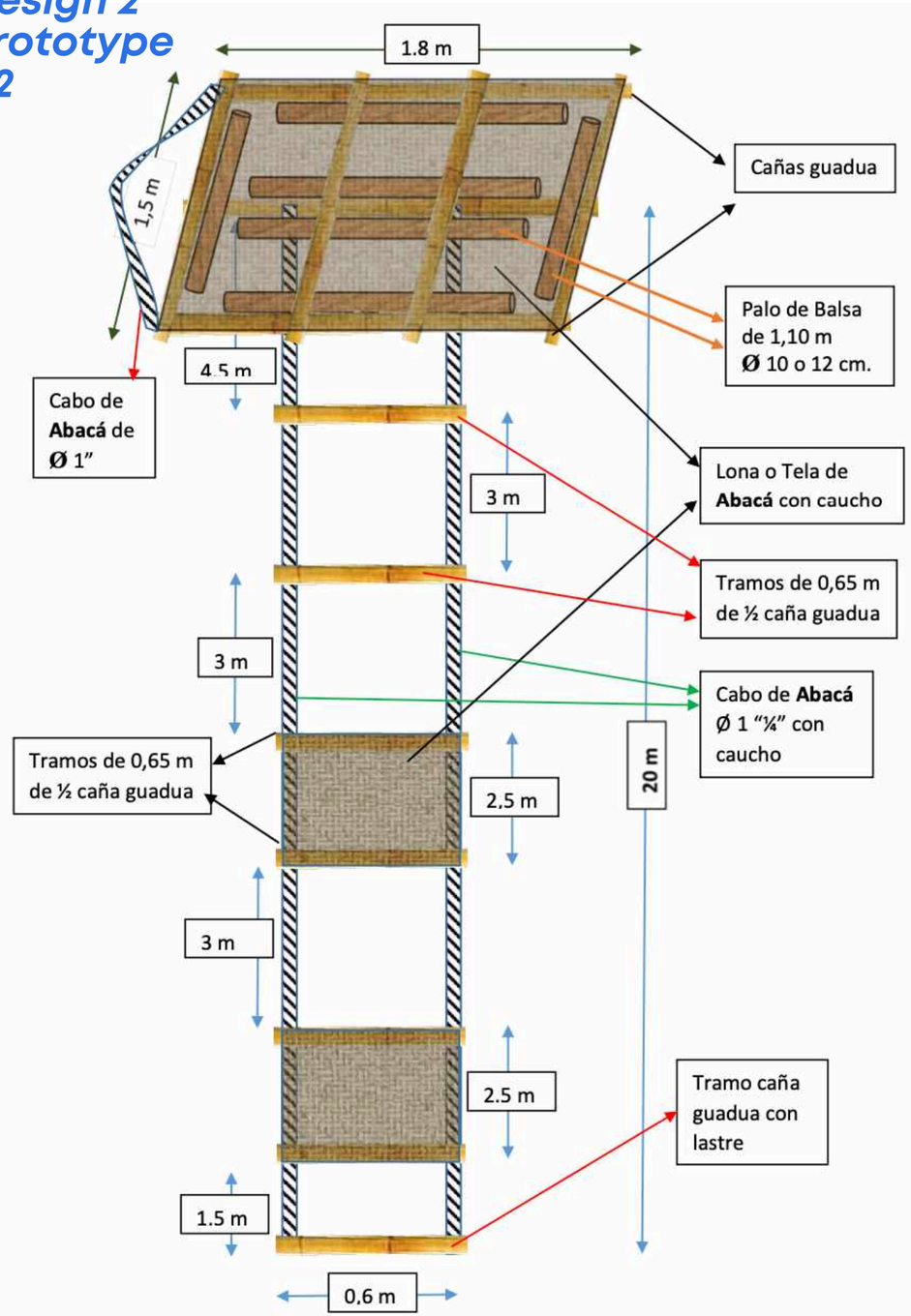
PROTOTYPE DESIGNS

THE ECOFADS UTILIZED BY THE TUNACONS FLEET.

Design1 Prototype #2

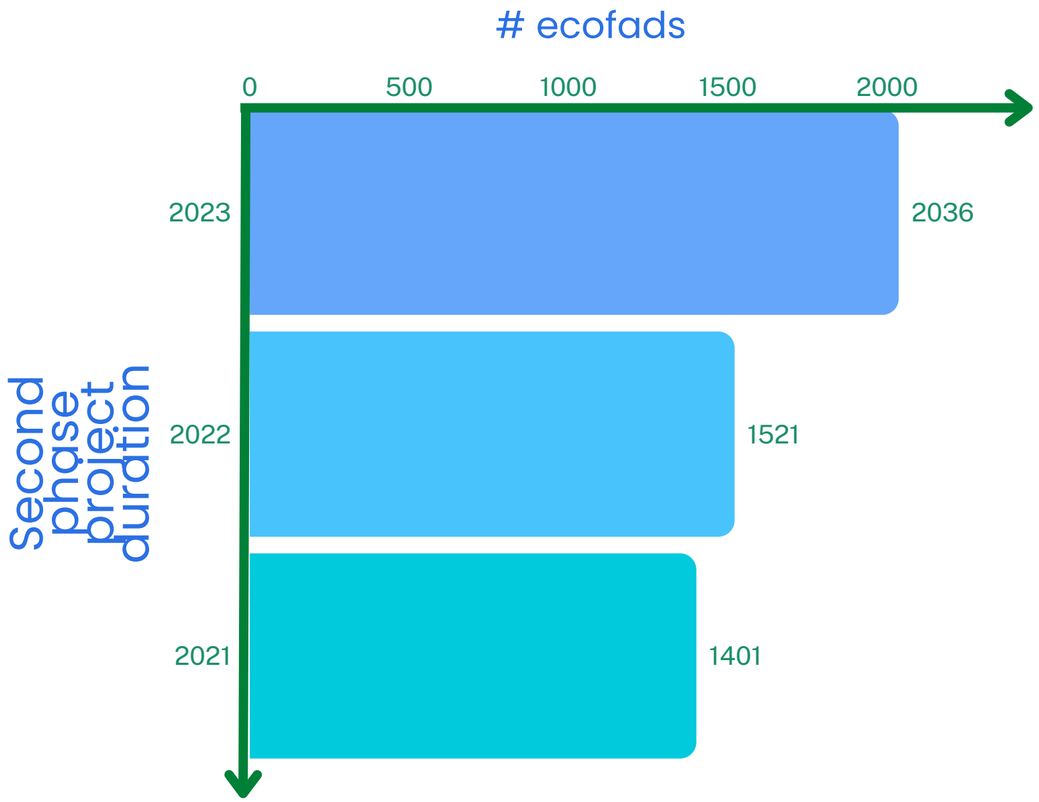


Design 2 Prototype #2



Progress 1 - Prototype improvement

TUNACONS played a key role in developing Prototype #2 and made substantial contributions to the deployment of these ECOFADs in fishing operations.



In 2023, TUNACONS FADs over 2,000 ECOFADs.

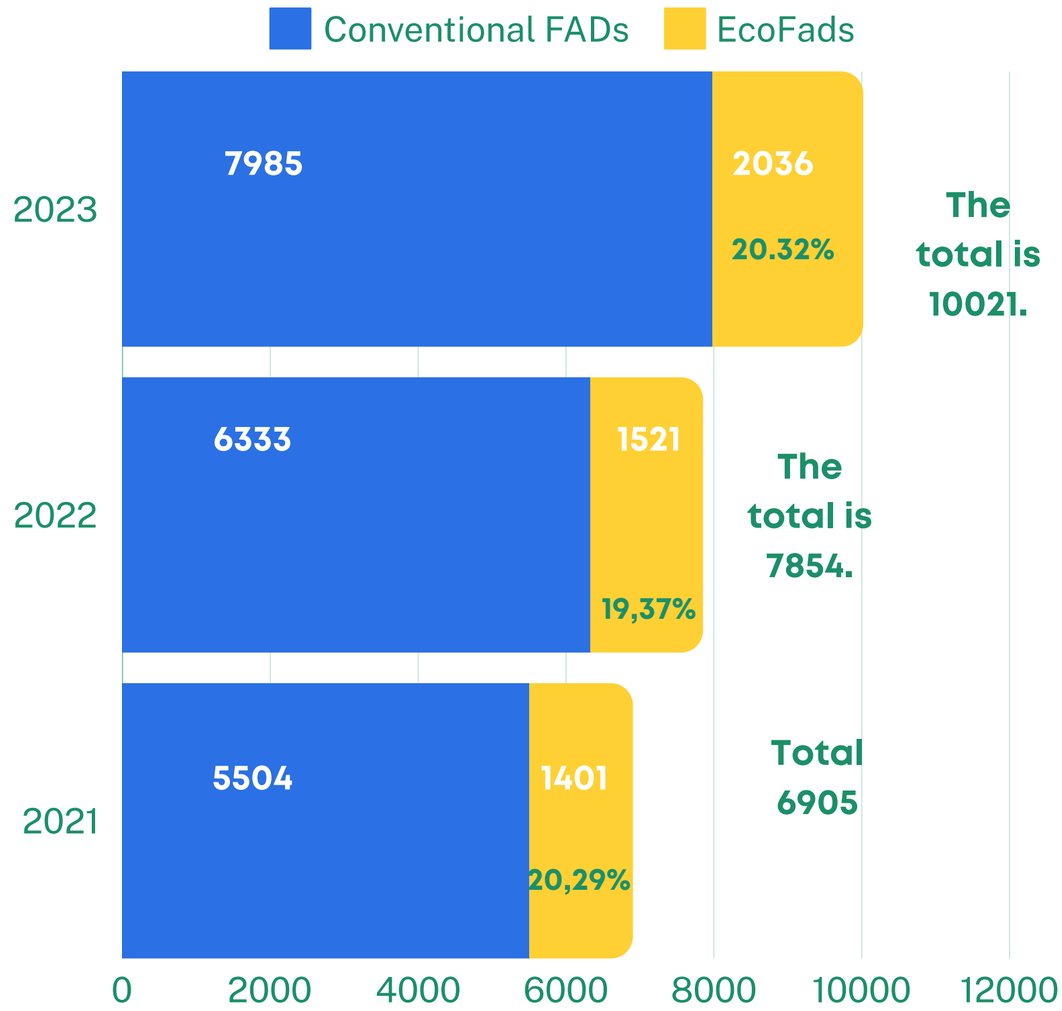
The challenge lies in ensuring that these EcoFADs achieve a **prolonged soaking time in the sea**, enabling them to be utilized for an average of **2 sets per FAD** in abundant areas and to re-deploy them when needed.

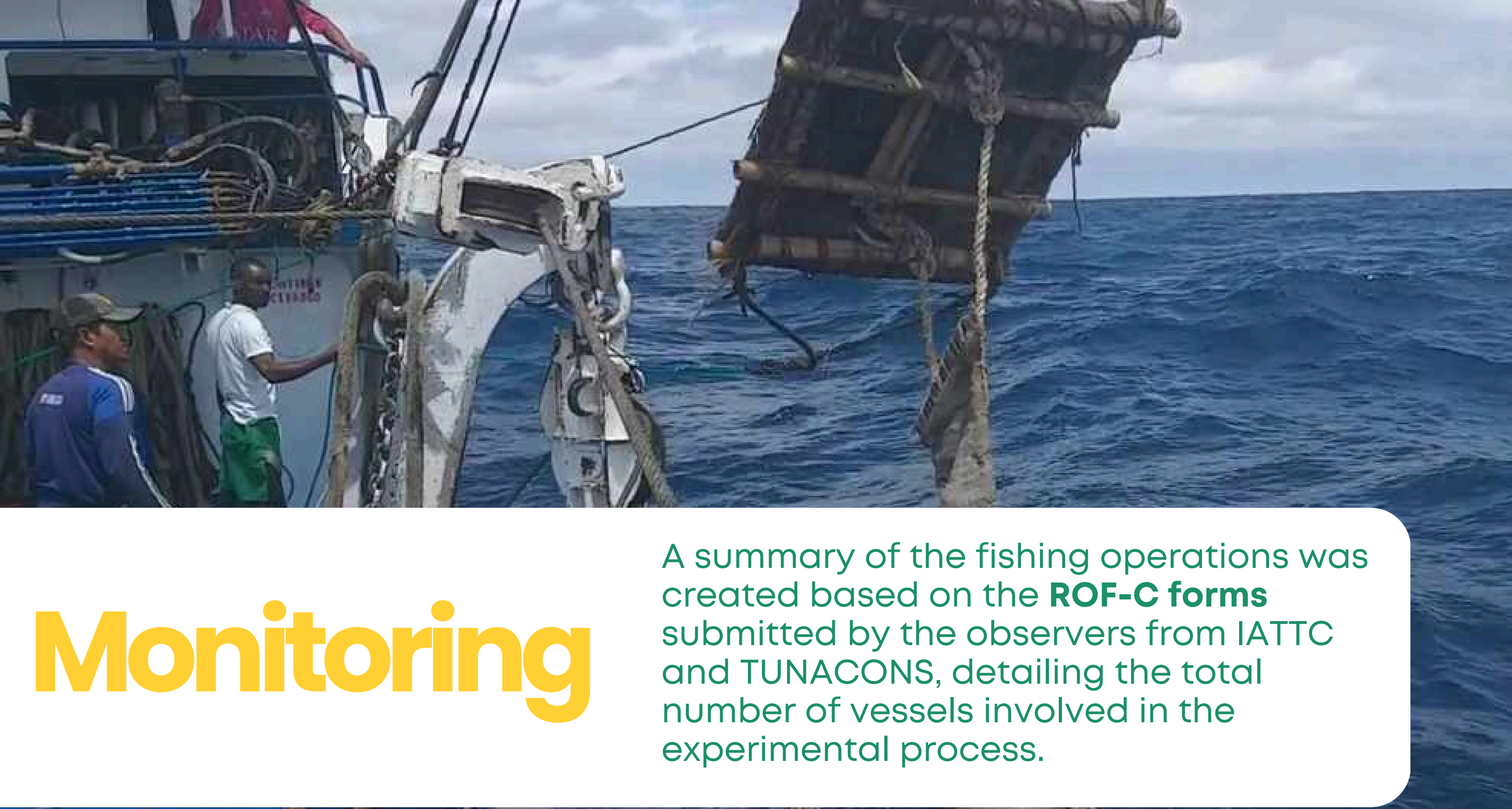
Progress 2 - Implementation of 20% of EcoFADs

4958

TOTAL FAD REPLACEMENTS BY ECOFADS IN THE TUNACONS MEMBER COMPANIES' FLEET.

Graph 1: Comparison of Traditional FADs and Eco-FADs FADs by Year





Monitoring

A summary of the fishing operations was created based on the **ROF-C forms** submitted by the observers from IATTC and TUNACONS, detailing the total number of vessels involved in the experimental process.

progressMENT 2 - Execution of 20% of EcoFADs

2023

Sowing
2036 EcoFADs

401
Sighting

273
Sets

2022

1521 ECOFADs
Sowing

520
Sighting

228
sets

2021

1401 ECOFADs
Sowing

222
Sighting

148
sets

The sighting rate (relative to FADss) averaged 23% between 2021 and 2023.

In 2023, 273 sets were conducted on EcoFADs, achieving a catch rate of **25.3 tons per EcoFAD.**

Results

Engagement with the fleet throughout the project period.

TUNACONS fleet	fishing trips	ECOFADS Sighting	ECOFADS bidding	catch within ECO FADS	Catch per sets	soaking time
2021	179	222	140	3730	**26,6**	**1 – 108**
2022	271	520	228	3953	**17,3**	**6 - 139**
2023	272	401	273	6907	**25,3**	**7 – 169**
Total	**722**	**1143**	641	14590	**23,1**	**1 – 169**

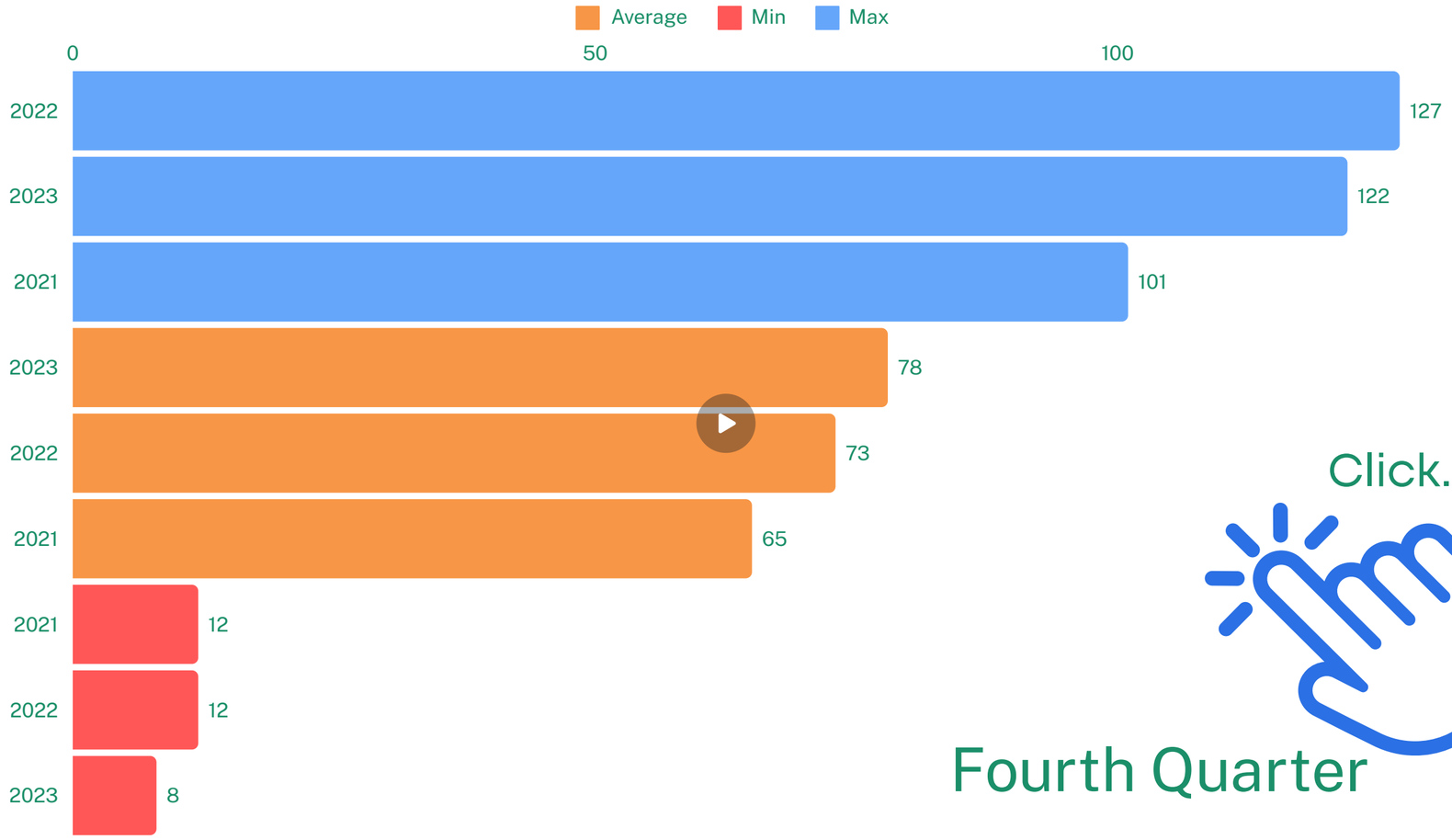
1,143 EcoFADs visited
722 fishing trips
23% of total deployed
Up to **169** soak days.
On average 46 days soak time

Nearly **15 thousand** tons in catches
In **641** sets / 23 tonnes on prom/set

Progress 3 - Soak Time

The temporal sequence of soaking days, as indicated by the quarterly **average**, **maximum**, and **minimum** for the period between 2021 and 2023, demonstrates a **gradual rise in the soaking duration** of the EcoFADs.

The soaking average has significantly increased in the results of the Large Scale Experiment
(FAD-07-02, prototype #2).



Click.

Fourth Quarter

Materials status: DETAILS

TUNACONS fleet	Material status		
	Floating fabric section	Submerged fabric part	Main tail rope - submerged section
2021	46% MB 25% B	43% of MB 14% of B	45%MB 26%B
	20%R 7%M	28%R 8%M	19% red, 3% magenta, 5% maroon
2022	46% MB 30% B	43%MB 29%B	53%MB 31%B
	12%R 4%M 7%MM	19%R 2%M 2%MM	13%R 1%M 1%MM
2023	47% MB 34% B	46%MB 32%B	54%MB 36%B
	11%R 3%M 5%MM	14%R 3%M 3%MM	5%R 3%M 1%MM
Total	**46% MB 30% B**	**44%MB 25%B**	**51%MB 31%B**
	14%R 5%M 5%MM	**Magenta, 3%**	**12%R 2%M 2%MM**

Fabric on the top:

- **46% excellent.**
- Approximately 30%.
- Standard 14%
- Poor 10%+-

Hangging part:

- **44% excellent,**
- Approximately 25%.
- Standard 20%
- Poor/Terrible 8%+-

Main rope :

- **51% excellent,**
- well 31%,%,
- Standard 12%.
- Poor/Very Poor 4% +-

Progress 4 - EcoFADs Condition

Throughout the 2021-2023 timeframe, **48%** of EcoFADs were categorized as **Very Good** in terms of driving, while only 2.7% were classified as **Very Poor.**

The three primary sections (cape, floating, and submerged) exhibited a comparable effect based on the duration of immersion.

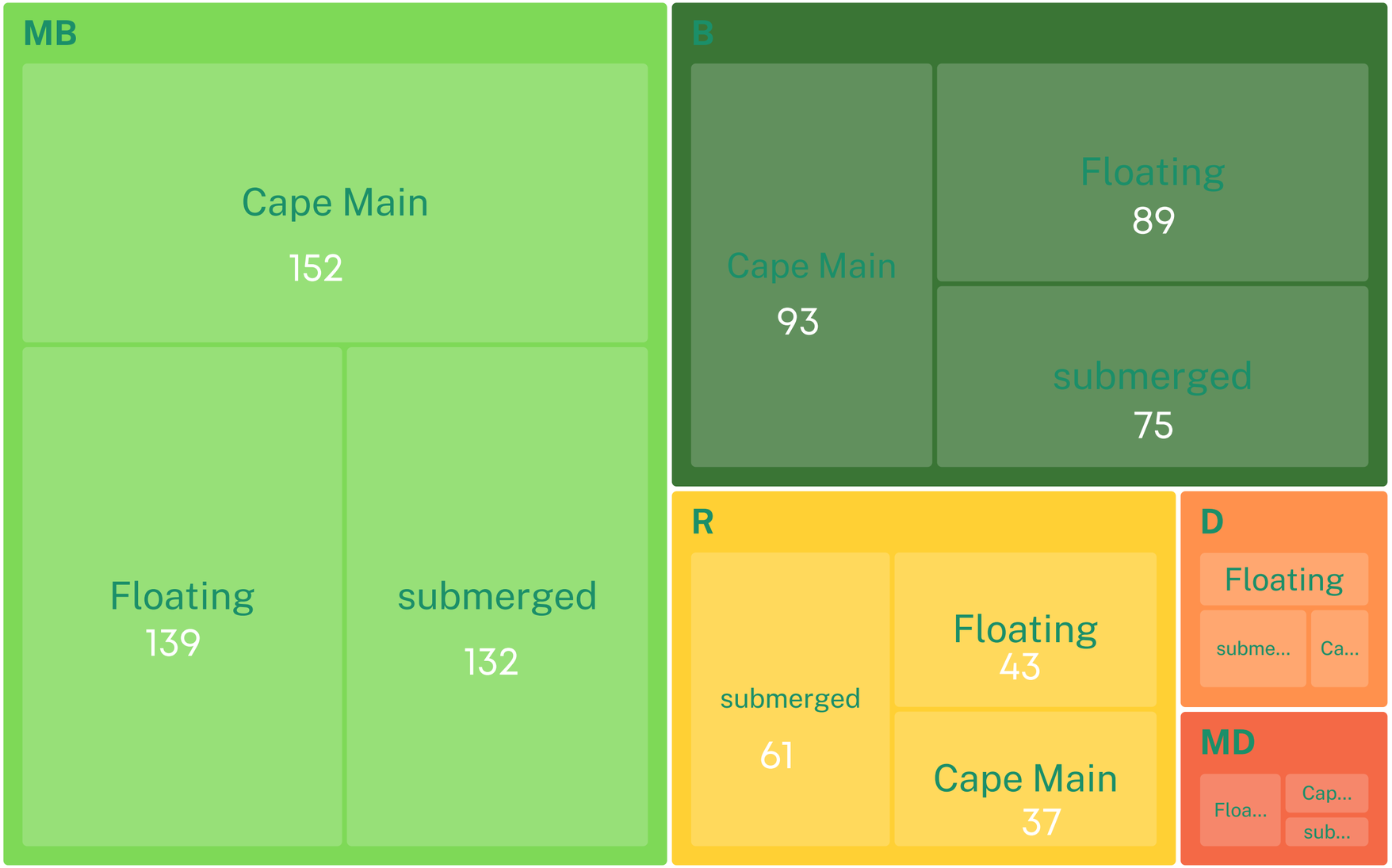
MB: Excellent

Satisfactory

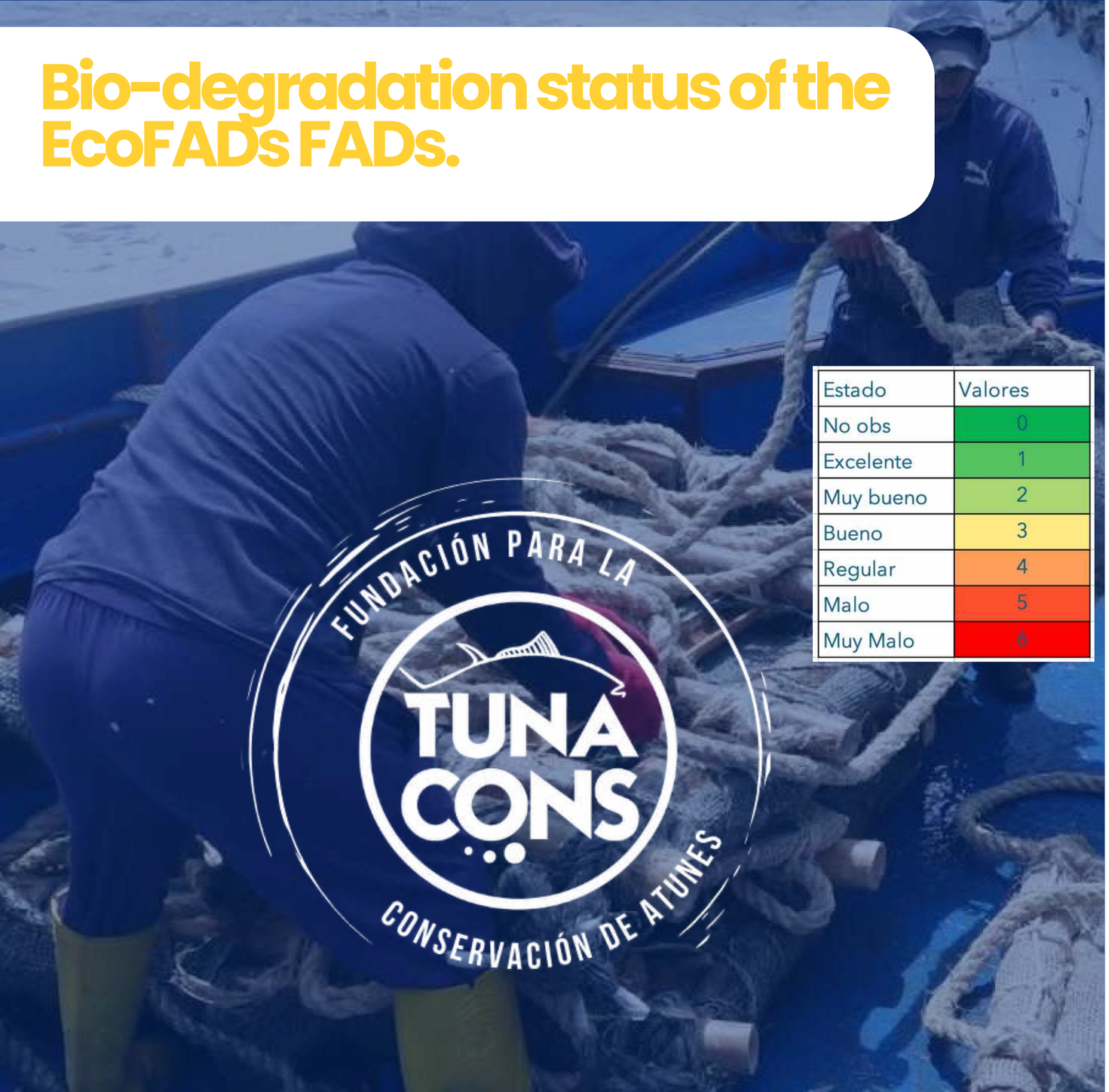
R: Standard

Deterioration

MD: Severely deteriorated



Bio-degradation status of the EcoFADs FADs.



Estado	Valores
No obs	0
Excelente	1
Muy bueno	2
Bueno	3
Regular	4
Malo	5
Muy Malo	6

Biodegradación de los EcoFADs 2021				
Periodo de Remojo	Datos	Tejido o tela		Cabo del Rabo
		Parte flotante	Parte sumergida	
≤ 30	29	1,9	2,1	2,1
31 - 60	44	2,8	3,2	2,8
61 - 90	19	3,7	4,7	3,4
> 91	2	4	4	3,3

Biodegradación de los EcoFADs 2022				
Periodo de Remojo	Datos	Tejido o tela		Cabo del Rabo
		Parte flotante	Parte sumergida	
≤ 30	42	2,2	2,1	2,2
31 - 60	80	2,7	2,7	2,5
61 - 90	32	3,7	3,2	2,9
91 - 120	7	3,8	4	2,2
> 121 ★	1		3	

Biodegradación de los EcoFADs 2023				
Periodo de Remojo	Datos	Tejido o tela		Cabo del Rabo
		Parte flotante	Parte sumergida	
≤ 30	45	2,2	2,1	2,1
31 - 60	64	2,5	2,6	2,4
61 - 90	32	3,4	3,3	2,6
91 - 120	9	3,3	3,6	3,1
★ > 121	2	4		

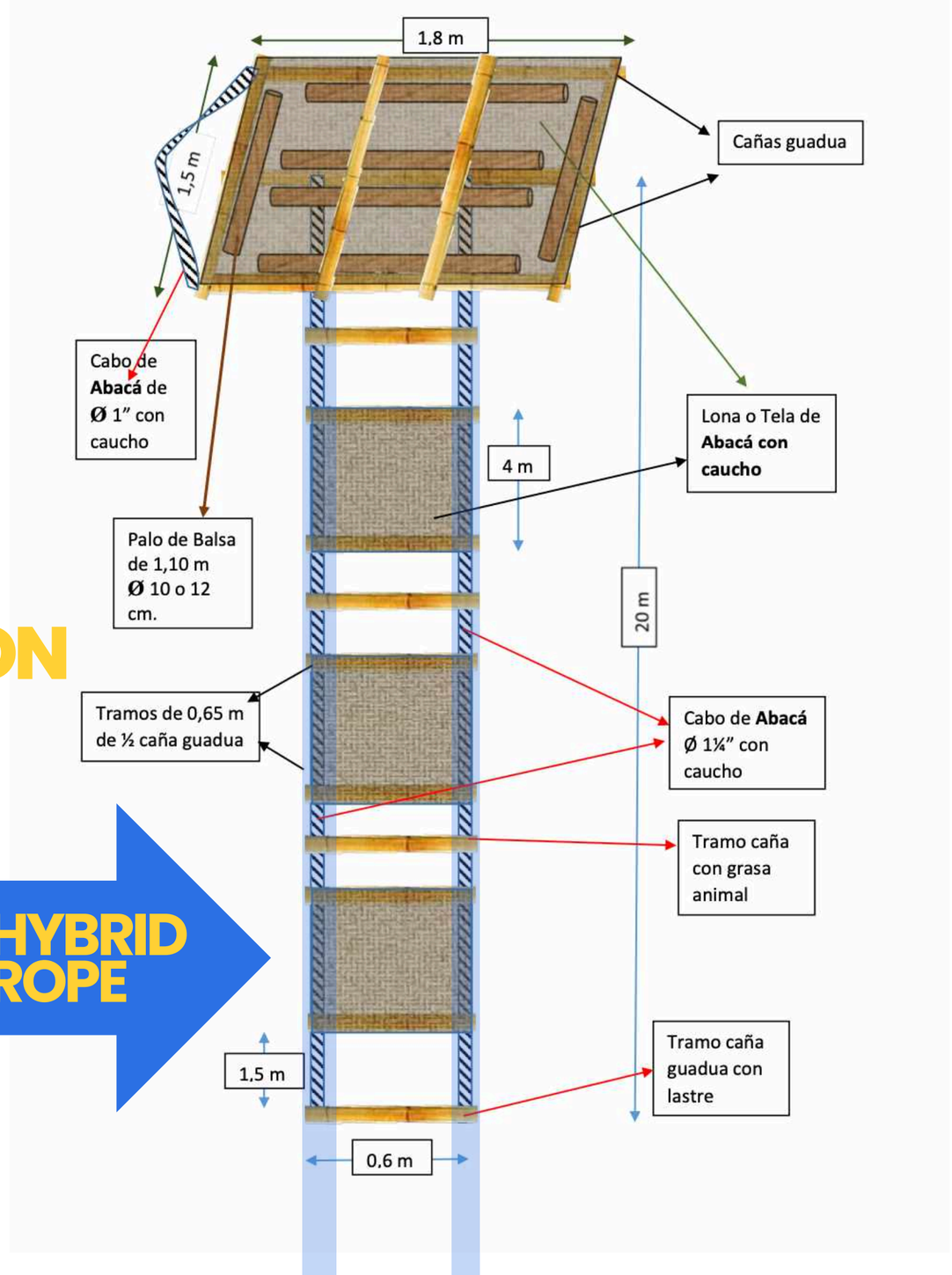
RECOMMENDATION BY FLEET MANAGERS

HYBRID DESIGN EXPERIMENTATION

*Testing a prototype with a 3-strand **rope** that combines abaca with **synthetic filament** is scheduled to determine its increased durability.*

For securing the tail rope and moorings.

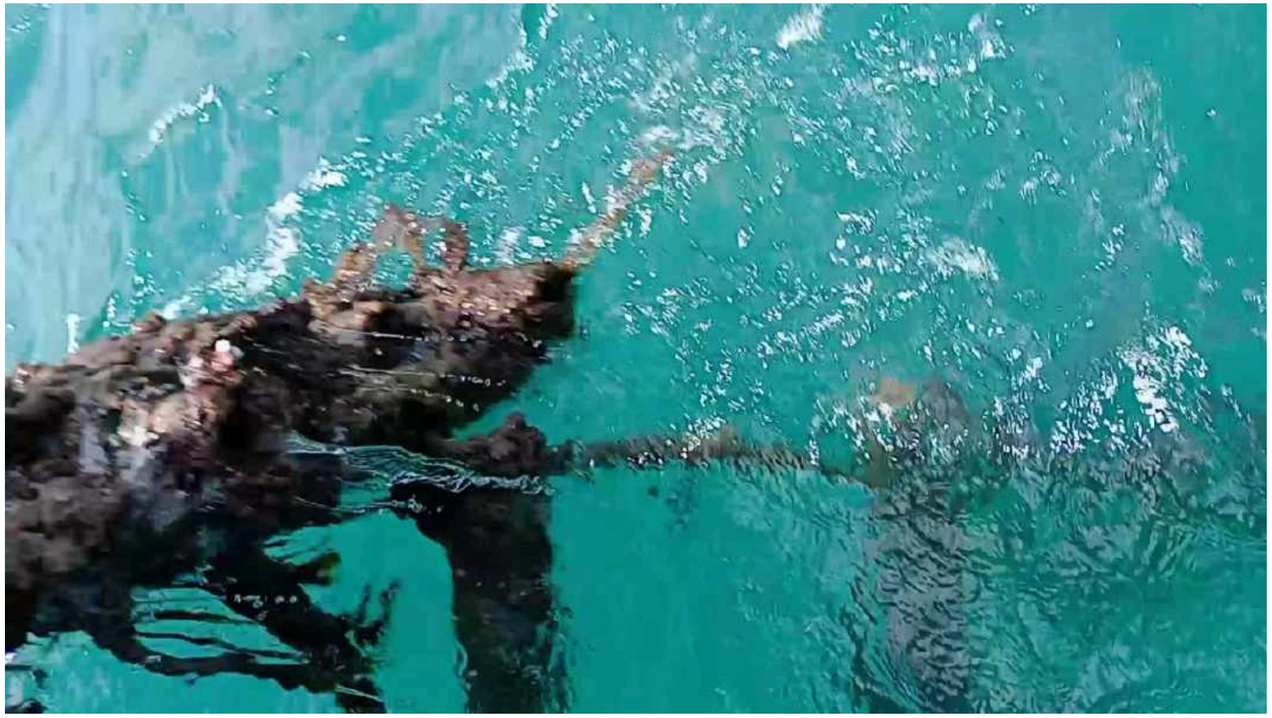
HYBRID ROPE



Sample features a main rope with 20% synthetic material.

Cantidad	Unidad	Descripción
7	m	7 Cañas de 1 m
4,2	m	6 Troncos de Palo de Balsa de 0,9 m largo y diámetro ~ 8 a 10 cm
84	m	Cabo de abacá 1/4" **híbrido** para amarre de cañas.
2,4	m	Tela de fibra de abacá teñida de 1,2 m ancho, para cubrir estructura
50	m	Cabo de abacá 5/16" **híbrido** para coser tela que cubre la estructura
3	m	Tela de fibra de abacá de 60 cm ancho, para la parte colgante.
16	m	Cabo de abacá de 1 1/4" **híbrido** para el rabo.
50	m	Cabo de abacá de 5/16" **híbrido** para amarrar tela al cabo del rabo
4	m	Cabo de abacá de 1" **híbrido** para amarrar plantado al cabo de la boya

FADs on 7/17/2022, five visits were conducted, with the **fifth visit** occurring on 2/3/2023, lasting **201 days at sea** (6.7 months).



The mooring **ropes** continue to secure the rods of the structure, while the tail ropes are in "**regular**" condition.

The **tail** was torn, but the synthetic cord still secures it.

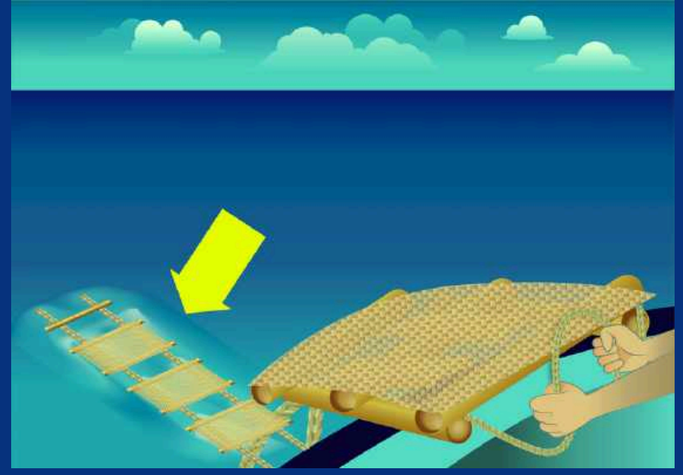
The **fabric** covering the damaged structure and the tail stripe tissue are absent.

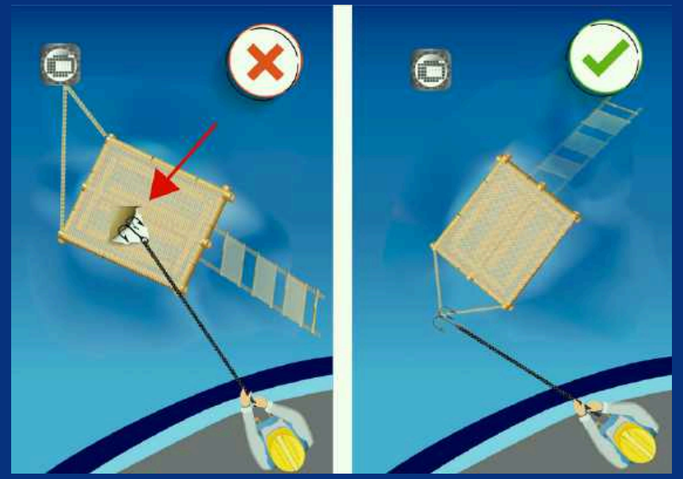
EcoFADs
for a thriving marine ecosystem

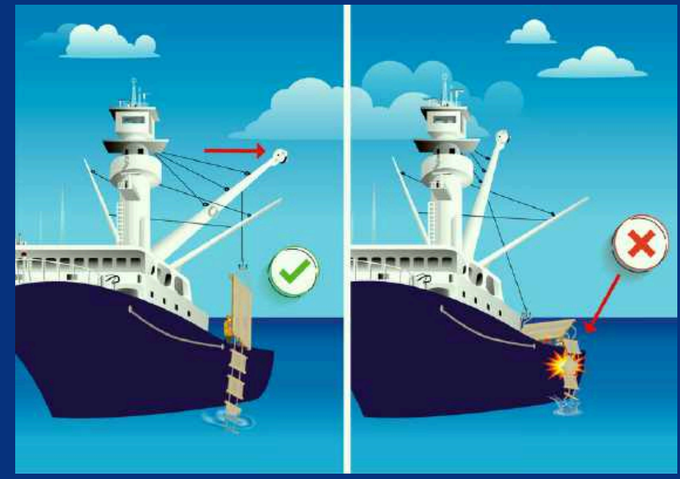
Educational materials for proper management practices of ECOFADs

Manejo de EcoFADs

EcoFADs
for a thriving marine ecosystem







CONCLUSIONS AND RECOMMENDATIONS

Main conclusions

The catch efficiency using ECOFADs are similar that of traditional FADs.

- **The average catch between 2021 and 2023 in the ECOFADS of TUNACONS prototype 2 was 23.06 tons per set, while for the same period in the FADS with traditional materials it was 23.19 tons, thus maintaining consistent production levels in the catches.**

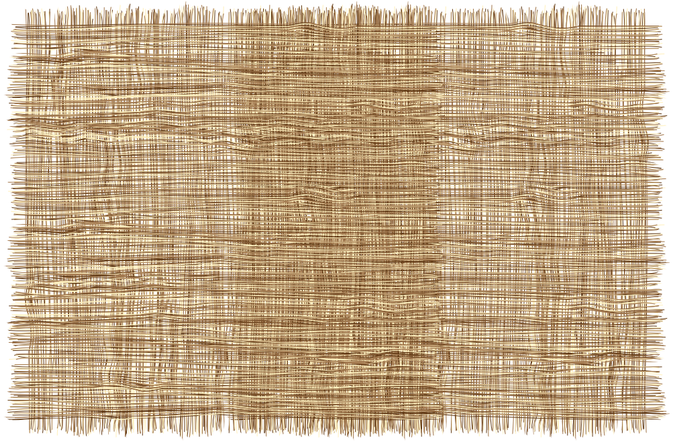
The duration of the ECOFADS fishing operation is shorter compared to traditional FADs.

- **The ECOFADS tested by TUNACONS have shown the ability to sustain a duration classified between "Very Good and Good" for an average of 90 days (sets are made for catches and can be re-deployed) and as "Regular" for probably up to 120 days on average (only sets can be made for catches).**
- **Based on discussions with Captains and fleet managers, traditional FADs can be utilized for an average of up to 180 days and are simpler to re-deploy.**

Key components still need to be blended with synthetic material, like the tail main rope connecting the floating and submerged sections, to enhance the structure's durability and resistance to manipulation during re-deployment.

Main conclusions

There is a necessity to create handling tutorials for ECOFADs to minimize damage that leads to accelerated deterioration of the structure.



By enhancing the abaca facbric and ropes with organic rubber and facilitating the replacement of worn fabrics on board, the longevity of the ECOFAD can be extended to enhance its utilization period.

The transition to utilizing 100% ECOFADS will lead to adjustments in the fishing approach, potentially impacting productivity per fishing trip because of its reduced duration.

Recommendations

- Enhance research on ECOFADs to **standardize the utilization of plant fibers**, protective treatments with **organic materials**, and enhance their construction to prolong the prototype's lifespan, particularly in **rope and abaca fabric.**

- Develop **manuals/guides/tutorials** about onboard handling for captains regarding the operation of Ecofads to minimize harm to the prototypes.

- Any potential future conservation measures concerning **number restrictions and arrays of FADs** should consider the shift towards utilizing ECOFADS and the resulting impact on fishing tactics.

ACHIEVING A 100% ECOFADS TARGET

Develop an environmentally friendly FAD production process that considers:

Availability of Materials

Construction management

Cost-effectiveness

Fishing efficiency.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