# Drifting FAD related data in Gen-5
## Biodegradable FADs, FAD identification number

**Lauriane Escalle**

Fisheries scientist, purse seine and dFAD dynamics

Stock Assessment and Modelling (OFP – SPC)

# OUTLINE

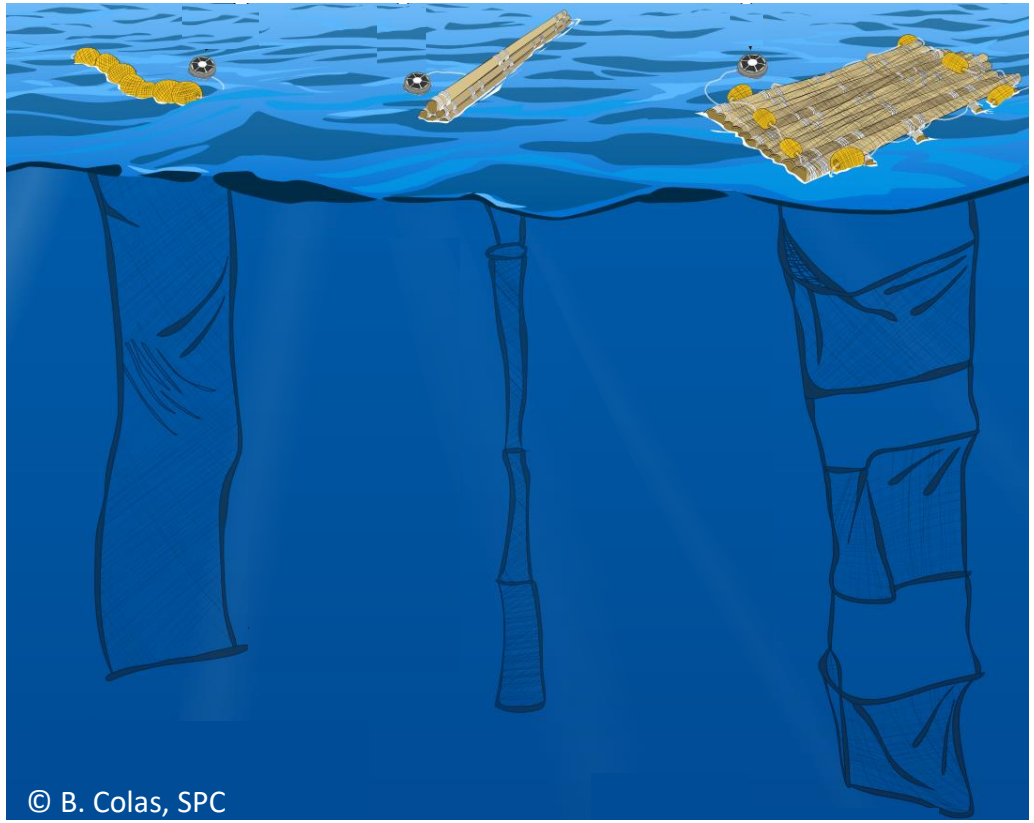
- FADs in the WCPO

- Management measures linked to FADs. Important information to record

- What is a non-entangling FAD / What is a biodegradable FAD

- How to record information on low/non-entangling FAD & biodegradable FAD ?

- Satellite buoy serial number



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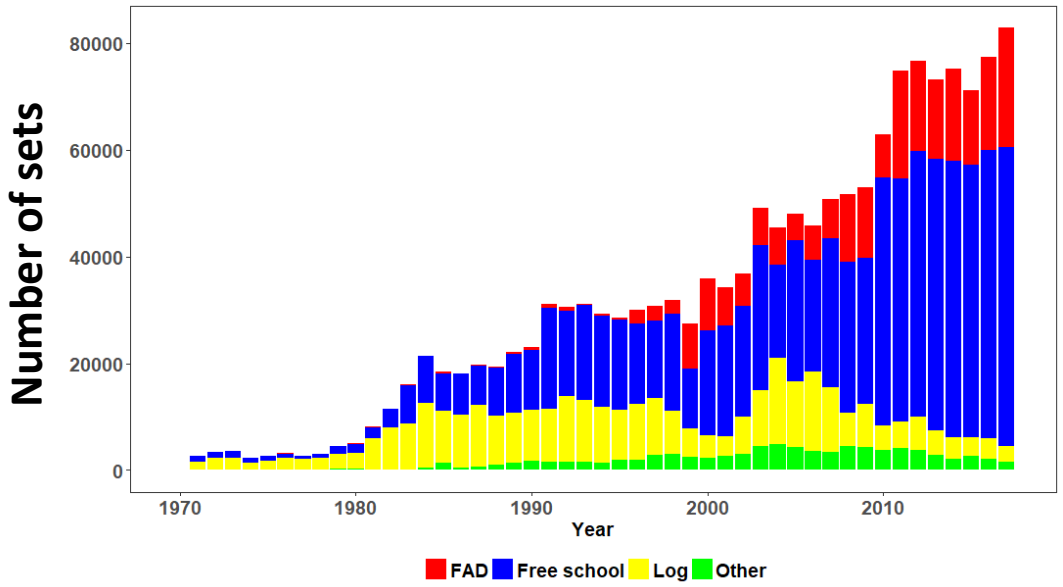
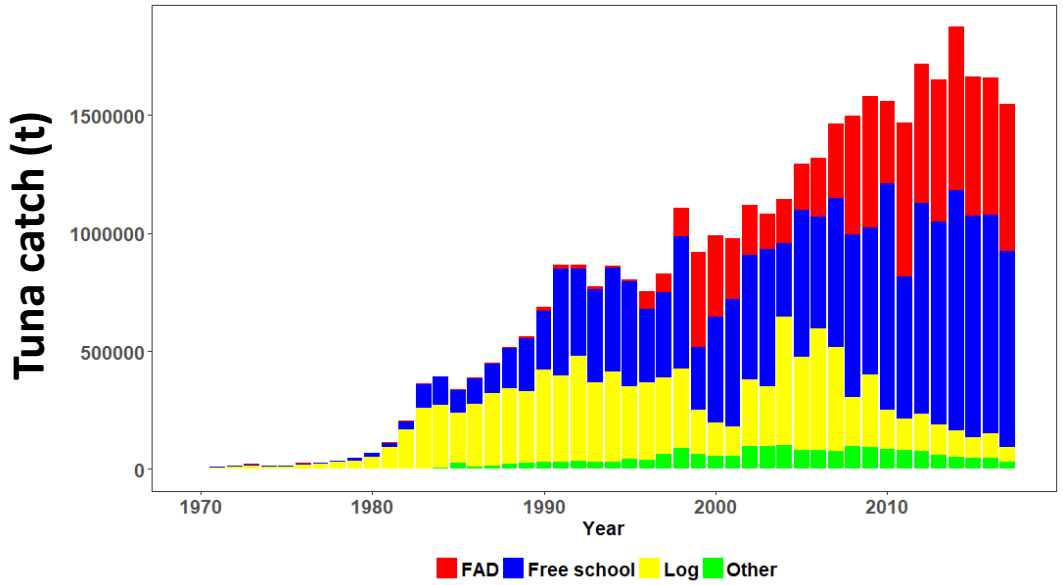
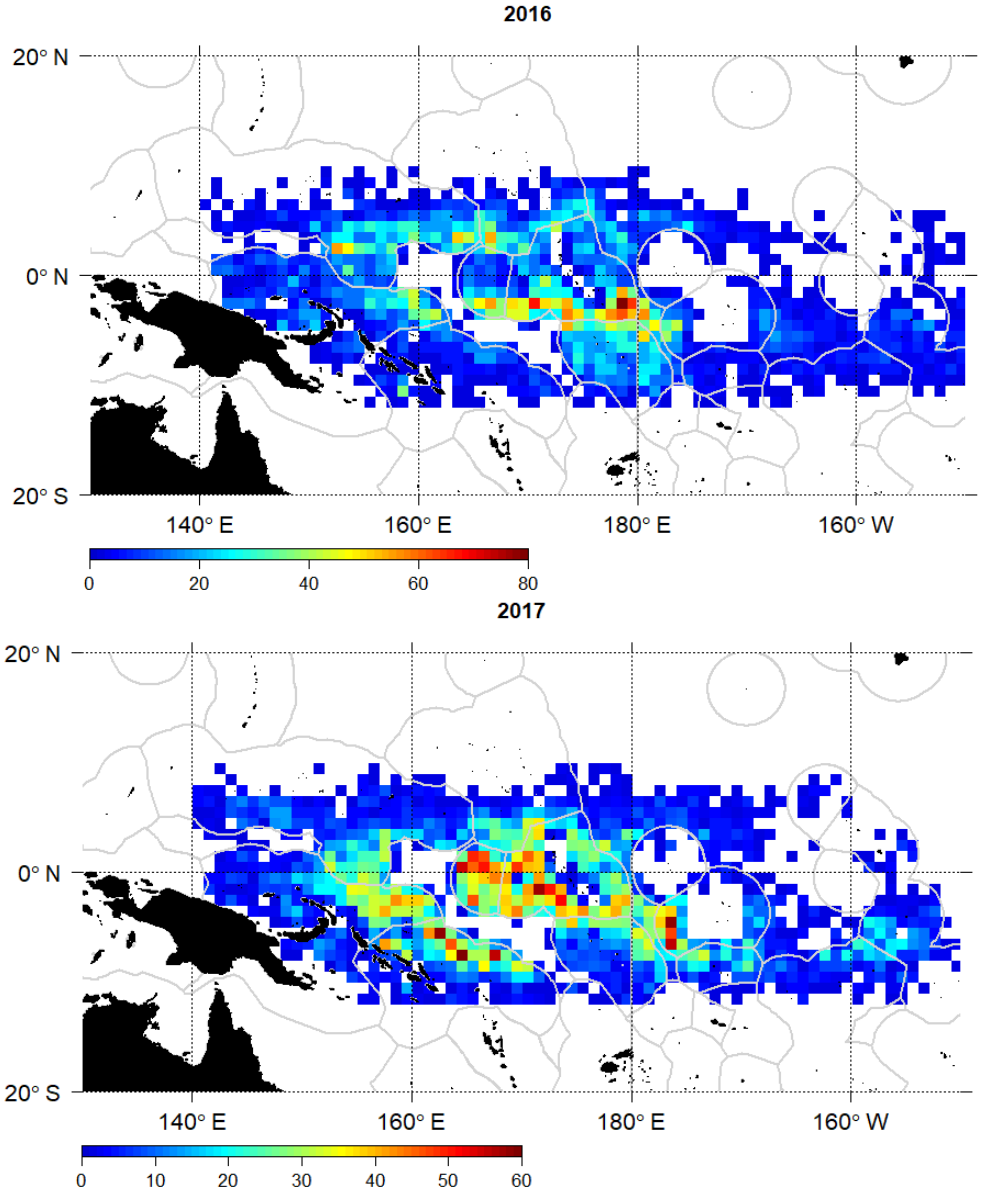
# WCPO purse seine fishery



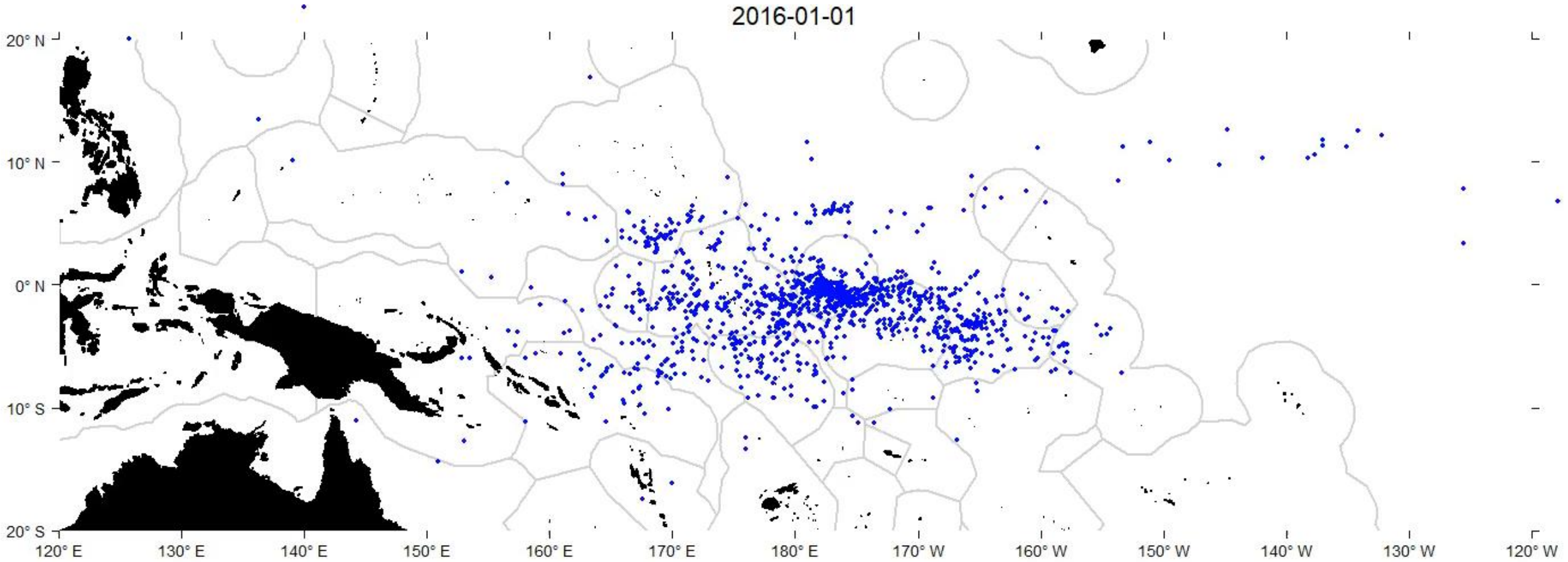




# dFAD sets



## Overview

- Parties to the Nauru agreement (PNA) **FAD tracking programme initiated in 2016**




**Objectives:** Better understanding of FAD dynamics and fleet behavior to inform management option

**Data:** Access date/time & position of transmissions from satellite buoys deployed on dFADs from each purse seiners fishing in PNA waters

# Impact of FADs on tuna stocks and on the ecosystem:

- High capture of juvenile bigeye tuna on FAD associated sets
- Higher bycatch rates
- Entanglement of species of special interest (shark, rays)
- dFAD loss: marine pollution, beaching

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# WCPFC management measures regarding FADs (CMM-2018-01)

- **3 months FAD closure**
- **Limit in the number of active satellite buoy on dFADs monitored: 350 at any given time (2018)**
- **Use of low entanglement risk FADs (January 2020)**
- **Use of non-plastic and biodegradable materials in the construction of FADs is encouraged**

**Instrumented Buoys** **(WCPFC CMM 2018-01)**

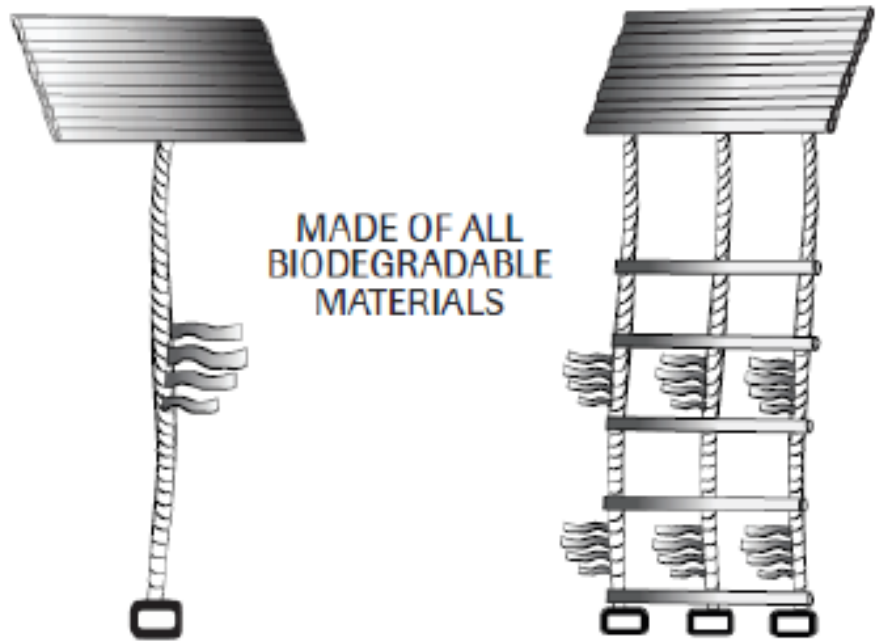
23. A flag CCM shall ensure that each of its purse seine vessels shall have deployed at sea, at any one time, no more than 350 drifting Fish Aggregating Devices (FADs) with activated instrumented buoys. An instrumented buoy is defined as a buoy with a clearly marked reference number allowing its identification and equipped with a satellite tracking system to monitor its position. The buoy shall be activated exclusively on board the vessel. A flag CCM shall ensure that its vessels operating in the waters of a coastal State comply with the laws of that coastal State relating to FAD management, including FAD tracking.

## Non-entangling FADs (WCPFC CMM 2018-01) JANUARY 2020

1. To reduce the risk of entanglement of sharks, sea turtles or any other species, as from 1st January 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.

2. 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.

# What is a biodegradable or non-entangling FAD ?



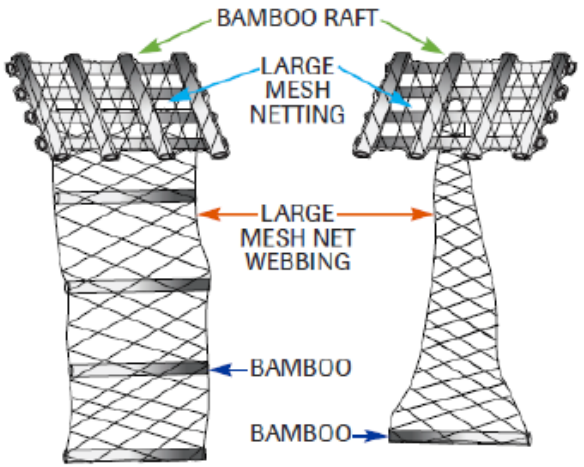
# Non-entangling & biodegradable FADs

MANDATORY

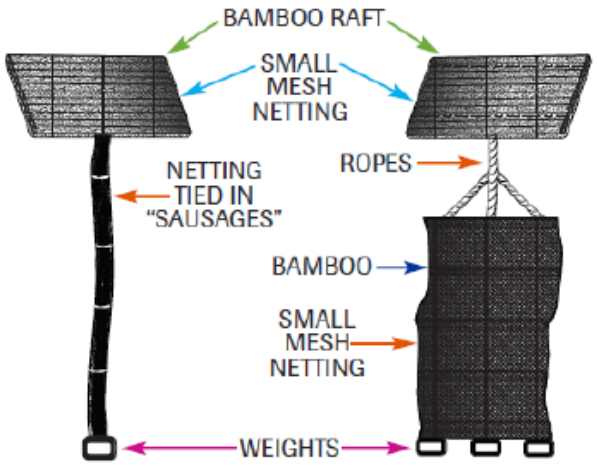
Encouraged

Trials

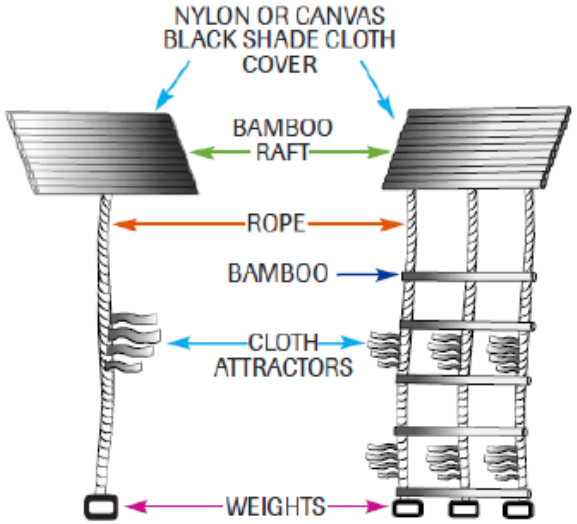
## HIGHEST ENTANGLEMENT RISK FADs:



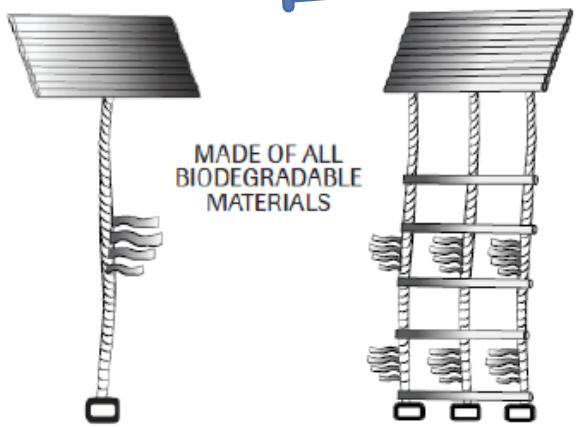

## LOWER ENTANGLEMENT RISK FADs:




## NON-ENTANGLING FADS:




## BIODEGRADABLE NON-ENTANGLING FADS:




HIGHEST RISK

LOWEST RISK

© ISSF guide for non-entangling FADs (2015)

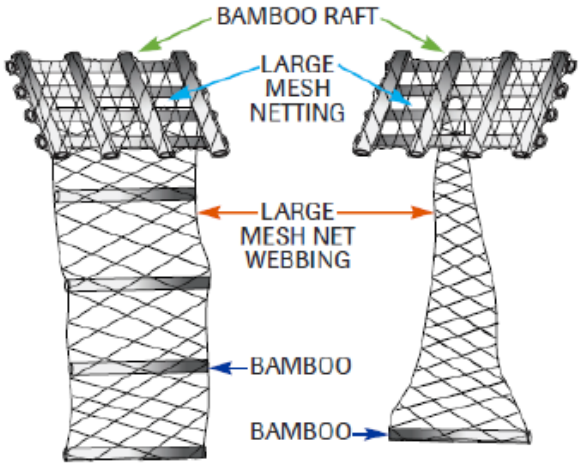
# Non-entangling & biodegradable FADs

MANDATORY

Encouraged

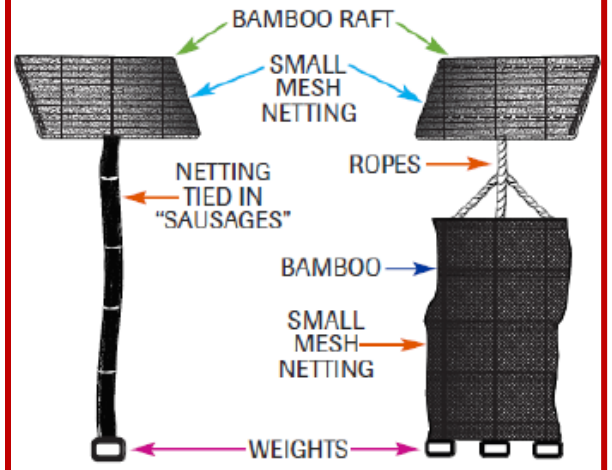
Trials

## HIGHEST ENTANGLEMENT RISK FADs:

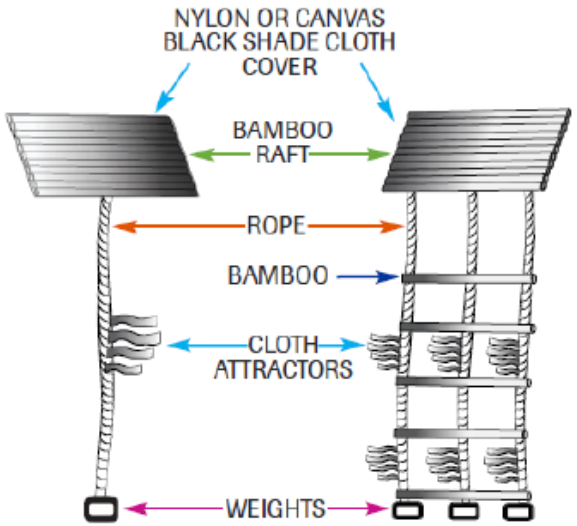



- Constructed with any netting materials, including old purse seine netting, used to cover rafts or suspended beneath in open panels
- These DFADs are known to cause entanglements with turtles and sharks

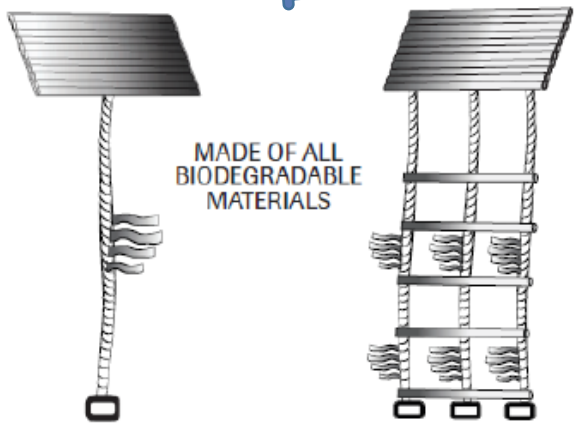
## LOWER ENTANGLEMENT RISK FADs:




## NON-ENTANGLING FADS:




## BIODEGRADABLE NON-ENTANGLING FADS:




HIGHEST RISK

LOWEST RISK

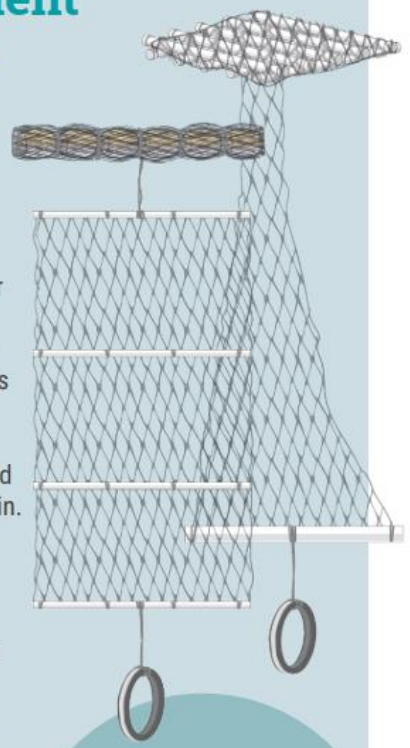
© ISSF guide for non-entangling FADs (2015)

# Non-entangling & biodegradable FADs

Encouraged

MANDATORY

## HIGH Entanglement Risk FADs



**RAFT**

- Covered with large mesh netting (e.g. > 2.5-inch mesh).*
- If mesh size is larger than 2.5 inches (both in the upper or submerged part), it is high entanglement, whether the net is tightly tied or covered by canvas or tarpaulin.

**TAIL**

- Submerged part of the FAD constructed with open panels of large mesh netting (> 2.5-inch mesh).

*Accounting for mesh sizes available in the market, 2.5 inch (7 cm) mesh size offers the lowest likelihood of entanglements across species and body parts.

**These FADs are known to cause entanglements with turtles and sharks.**

# Non-entangling & biodegradable FADs

## → Examples

### Raft

The surface structure should not be covered with netting or meshed materials (to reduce entanglement of turtles).

Bio-degradable

Construct with bamboo, balsa wood or other natural materials that degrade without causing impact on the ecosystem.

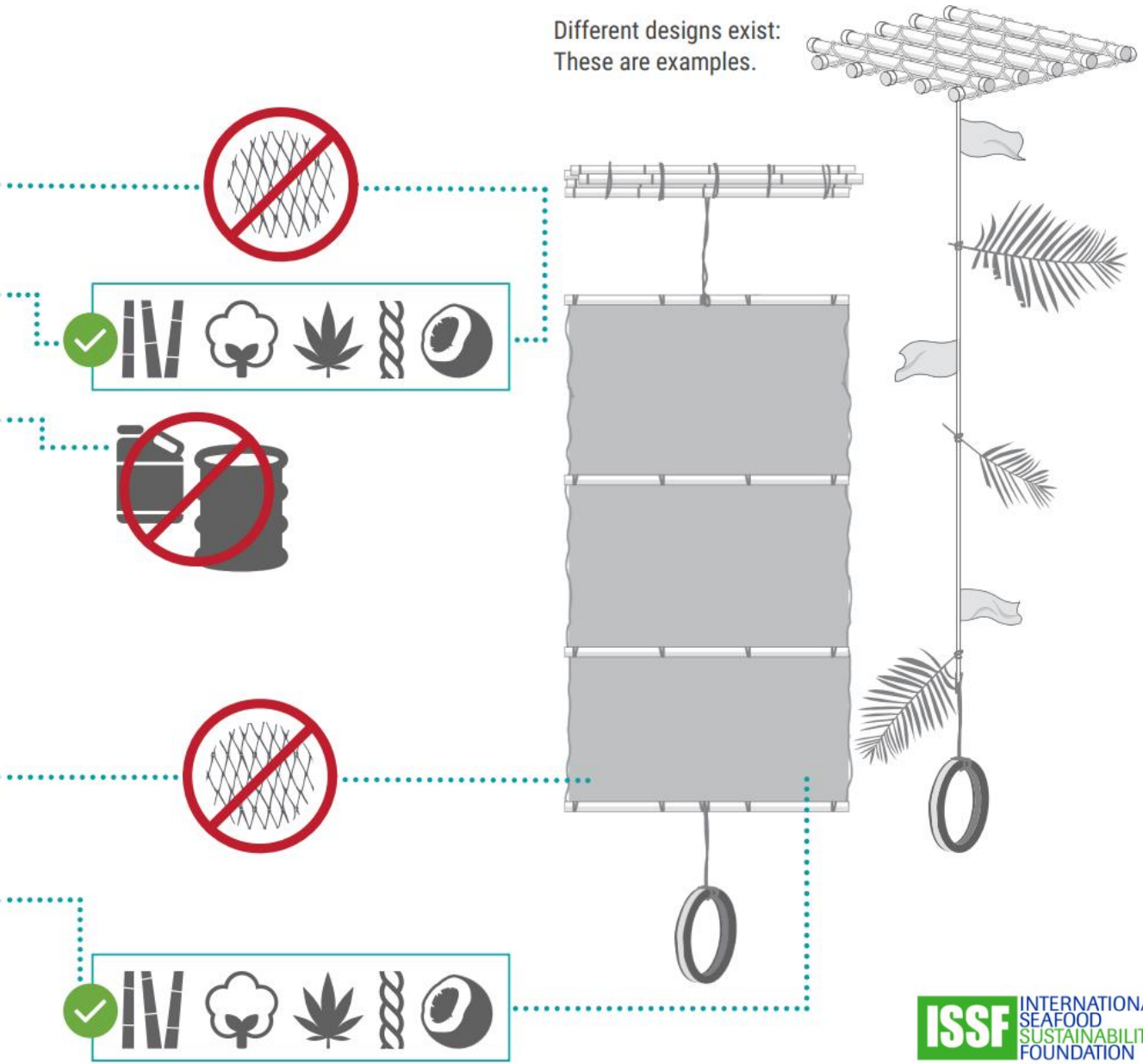
Use of plastic buoys and containers for flotation should be reduced as much as possible; for instance, reduce the weight and volume of the FAD structure.

### Tail

Only FADs constructed without netting can completely eliminate the entanglement of turtles, sharks and finfish species.

Bio-degradable

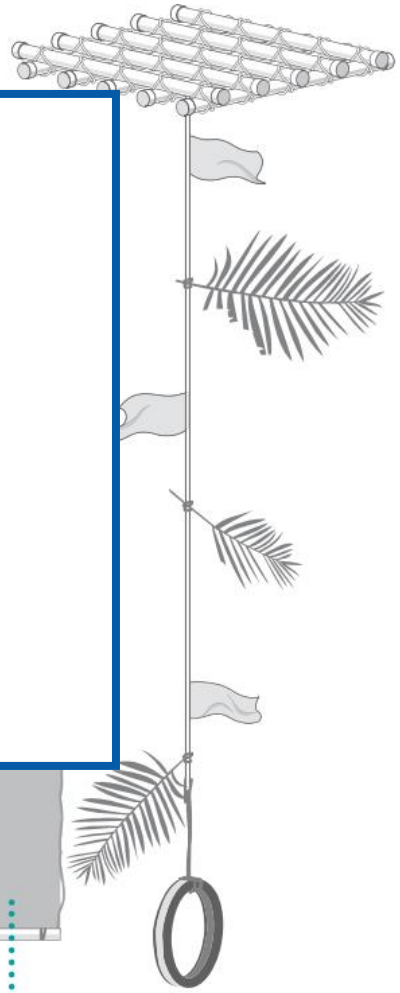
Use only natural and/or biodegradable materials—cotton ropes and canvas, manila hemp, sisal, coconut fiber—so that they degrade without causing ecosystem impact.



# Non-entangling & biodegradable FADs

→ Examples

Different designs exist:
These are examples.



## Raft

The surface structure
materials (to reduce e

Bio-degradable

Construct with
that degrade w

Use of plastic buoys a
as much as possible;
the FAD structure.

**Biodegradable FAD trials**

- **WCPFC/ SPC led project (2021 - start when possible)**
- **Fleet /companies initiatives**

## Tail

Only FADs constructed without netting can completely eliminate the entanglement of turtles, sharks and finfish species.

Bio-degradable

Use only natural and/or biodegradable materials—cotton ropes and canvas, manila hemp, sisal, coconut fiber—so that they degrade without causing ecosystem impact.

# How to record it in Gen-5 ???

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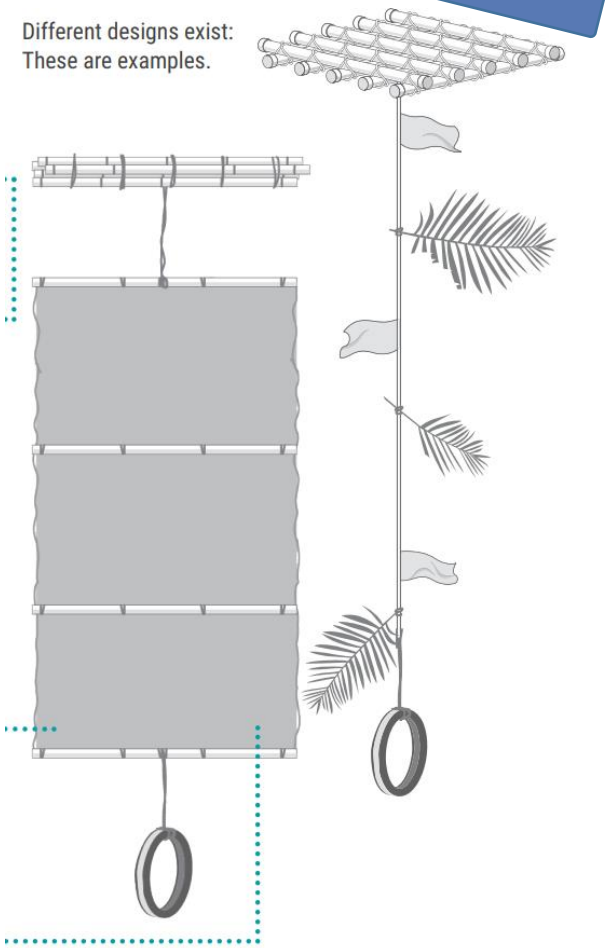
## Biodegradable FAD

Trials

Different designs exist:
These are examples.



Encouraged

### NON-Entangling FADs

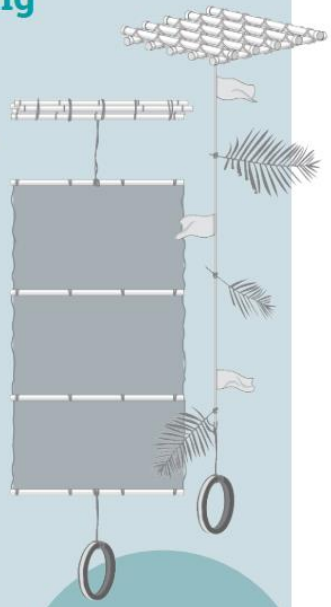
**RAFT**

- Not constructed or covered with canvas, tarpaulin or shade clothes.

**TAIL**

- Subsurface structure is made with ropes, canvas or nylon sheets, or other non-entangling materials.

More detail on the previous page.



No netting is used in any components (raft and tail)

These FADs are expected to have no risk of causing entanglement.

MANDATORY

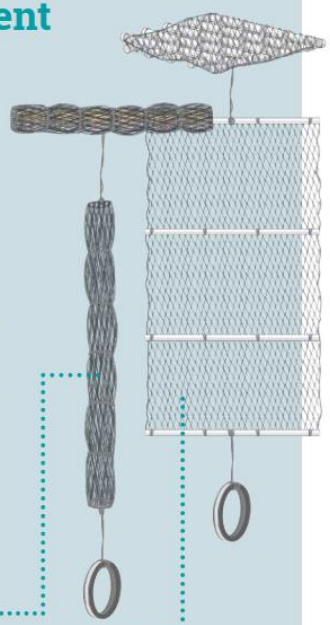
### LOWER Entanglement Risk FADs

**RAFT**

- Use only small mesh netting (< 2.5 inch / 7 cm stretched mesh) if covering with net (both upper and submerged parts).
- If small mesh netting is used as cover, it is tightly wrapped, with no loose netting hanging from the raft.

**TAIL**

- If net is used as submerged tail, could be of any mesh size if tightly tied into sausage-like bundles.
- If open panel netting is used, only small mesh size (< 2.5 inch [7 cm] stretched mesh) can be used, but weight the panel to keep it taut.



Despite using netting, these design elements reduce the risk of entanglement events.

### HIGH Entanglement Risk FADs

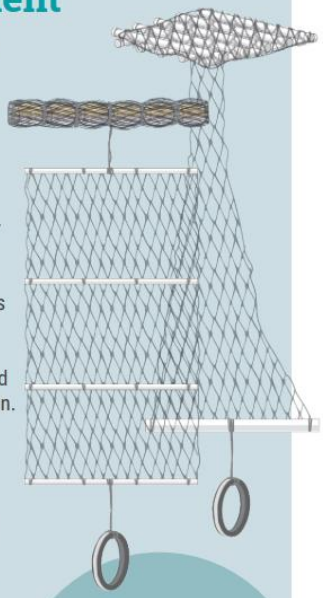
**RAFT**

- Covered with large mesh netting (e.g. > 2.5-inch mesh).*
- If mesh size is larger than 2.5 inches (both in the upper or submerged part), it is high entanglement, whether the net is tightly tied or covered by canvas or tarpaulin.

**TAIL**

- Submerged part of the FAD constructed with open panels of large mesh netting (> 2.5-inch mesh).

*Accounting for mesh sizes available in the market, 2.5 inch (7 cm) mesh size offers the lowest likelihood of entanglements across species and body parts.



These FADs are known to cause entanglements with turtles and sharks.

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# dFAD designs in the WCPO – observer records

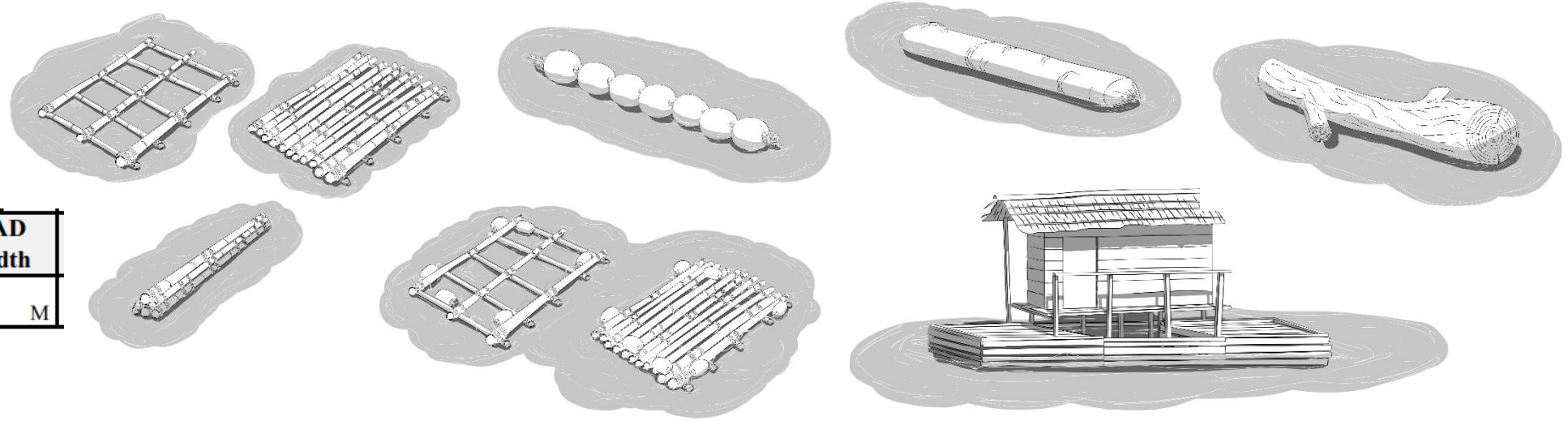
Form GEN-5

## RAFT

| FAD materials Main materials | | | net/mesh size |
|---|---|---|---|
| | | | cm |

| FAD length | FAD width |
|---|---|
| M | M |

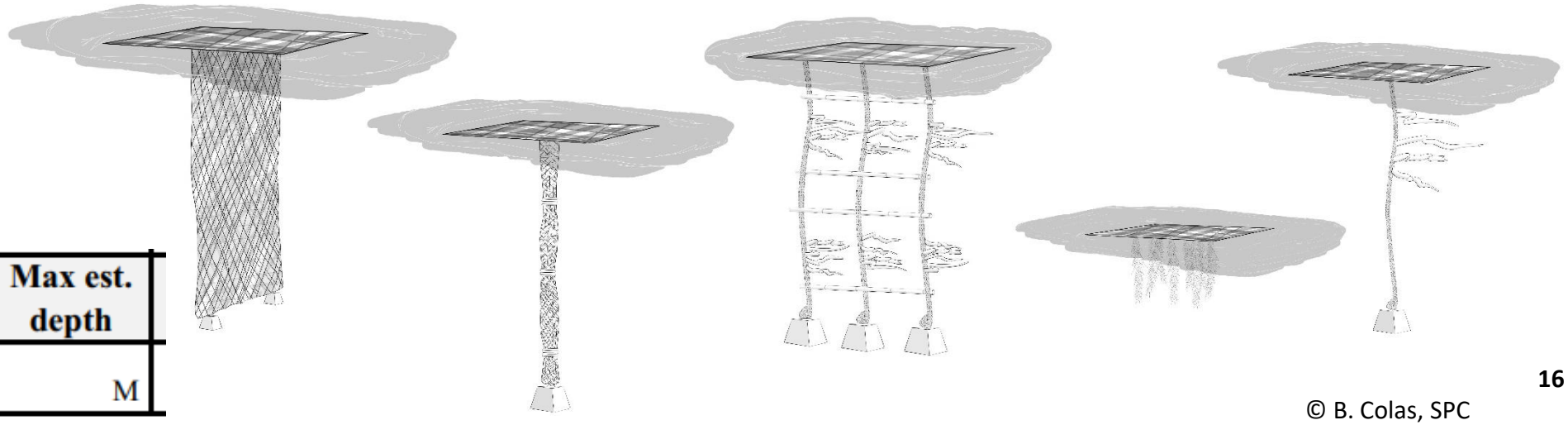
Diagrams- *label with 'Object*



## Submerged APPENDAGES

| Attachments | | | net/mesh size |
|---|---|---|---|
| | | | cm |

| Max est. depth |
|---|
| M |





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# Observer record of low/non-entangling & biodegradable FADs

- **Low entanglement risk** → **Compulsory January 2020**

**Net present but :**
**Net mesh <7cm**
**Net in attachment: mesh any size**
**but tied tightly in bundles (comments)**

| CODE | MATERIALS |
|---|---|
| 1 | Logs, Trees or debris tied together |
| 2 | Timber/planks/pallets/spools |
| 3 | PVC or Plastic tubing |
| 4 | Plastic drums |
| 5 | Plastic Sheeting |
| 6 | Metal Drums (i.e. 44 gallon) |
| 7 | Philippines design drum FAD |
| 8 | Bamboo/Cane |
| 9 | Floats/Corks |
| 10 | Unknown (describe) |
| 11 | Chain, cable rings, weights |
| 12 | Cord/rope |
| 13 | Netting hanging underneath FAD |
| 14 | Bait containers |
| 15 | Sacking/bagging |
| 16 | Coconut fronds/tree branches |

Net present ?

**FAD/PAYAO and FLOATING OBJECTS INFORMATION RECORD** — Form GEN-5

REVISED 2018

| OBSERVER NAME: | VESSEL NAME: | OBSERVER TRIP ID NUMBER: | PAGE OF |
|---|---|---|---|
| | | | |

| Date / Time (from PS-2) | Set No. | Object number | Origin of FAD | Deployment date | latitude dd°mm.mmm' | N S | and longitude ddd°mm.mmm' | E W | FAD as found | Beacon/ FAD lifted | FAD as left | Comments / Change details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Beac/FAD/ NO | | Low entanglement FAD |

| FAD materials Main materials | net/mesh size | Attachments | net/mesh size | Max est. depth | FAD length | FAD width | Buoy serial number | Beacon/FAD ID markings | SSI seen | SSI trapped | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | cm | | cm | M | M | M | | | Y / N / U | Y / N / U | Attachment net tied in bundles |

# Observer record of low/non-entangling & biodegradable FADs

- **Non entangling** → **Encouraged**

**No net**

| CODE | MATERIALS |
|---|---|
| 1 | Logs, Trees or debris tied together |
| 2 | Timber/planks/pallets/spools |
| 3 | PVC or Plastic tubing |
| 4 | Plastic drums |
| 5 | Plastic Sheeting |
| 6 | Metal Drums (i.e. 44 gallon) |
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| 10 | Unknown (describe) |
| 11 | Chain, cable rings, weights |
| 12 | Cord/rope |
| 13 | Netting hanging underneath FAD |
| 14 | Bait containers |
| 15 | Sacking/bagging |
| 16 | Coconut fronds/tree branches |

No net

**FAD/PAYAO and FLOATING OBJECTS INFORMATION RECORD** — **Form GEN-5**

REVISED 2018

| OBSERVER NAME: | VESSEL NAME: | OBSERVER TRIP ID NUMBER: | PAGE OF |
|---|---|---|---|
| | | | |

| Date (from PS-2) | Time | Set No. | Object number | Origin of FAD | Deployment date | latitude dd°mm.mmm' | N S | and longitude ddd°mm.mmm' | E W | FAD as found | Beacon/ FAD lifted | FAD as left | Comments / Change details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Beac/FAD/ NO | | Non entangling FAD |

| FAD materials Main materials | | | net/mesh size | Attachments | | | net/mesh size | Max est. depth | FAD length | FAD width | Buoy serial number | Beacon/FAD ID markings | SSI seen | SSI trapped |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | cm | | | | cm | M | M | M | | | Y / N / U | Y / N / U |

# Observer record of low/non-entangling & biodegradable FADs

ECOLOGICAL

- **Biodegradable FAD**

**No specific fields**
**Note any new designs/materials detected: comments + drawing**

→ **Encouraged**
**Several fishing company trials (marked or not)**
**Important to have information regarding the condition of the FAD, sets made on it, reason for not setting during visits, etc.**

| CODE | | MATERIALS |
|---|---|---|
| 1 | | Logs, Trees or debris tied together |
| 2 | | Timber/planks/pallets/spools |
| 3 | | PVC or Plastic tubing |
| 4 | | Plastic drums |
| 5 | | Plastic Sheeting |
| 6 | | Metal Drums (i.e. 44 gallon) |
| 7 | | Philippines design drum FAD |
| 8 | | Bamboo/Cane |
| 9 | | Floats/Corks |
| 10 | | Unknown (describe) |
| 11 | | Chain, cable rings, weights |
| 12 | | Cord/rope |
| 13 | ? | Netting hanging underneath FAD |
| 14 | | Bait containers |
| 15 | | Sacking/bagging |
| 16 | | Coconut fronds/tree branches |

**Natural only**

**FAD/PAYAO and FLOATING OBJECTS INFORMATION RECORD** — **Form GEN-5**

REVISED 2018

| OBSERVER NAME: | VESSEL NAME: | OBSERVER TRIP ID NUMBER: | PAGE OF |
|---|---|---|---|
| | | | |

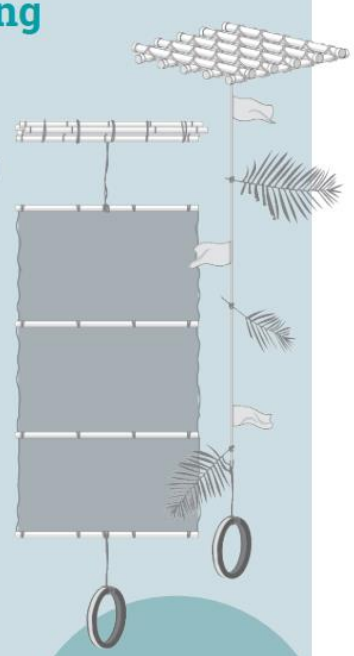
| Date (from PS-2) | Time | Set No. | Object number | Origin of FAD | Deployment date | latitude dd°mm.mmm' | N S | and longitude ddd°mm.mmm' | E W | FAD as found | Beacon/ FAD lifted | FAD as left | Comments / Change details |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Beac/FAD/ NO | | Biodegradable FAD → details … + Any marking on the FAD (ecological or biodegradable) ?? |

| FAD materials Main materials | | | net/mesh size | Attachments | | | net/mesh size | Max est. depth | FAD length | FAD width | Buoy serial number | Beacon/FAD ID markings | SSI seen | SSI trapped |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | cm | | | | cm | M | M | M | | | Y / N / U | Y / N / U |

# Observer record of low/non-entangling & biodegradable FADs

# Observer record of low/non-entangling & biodegradable FADs

## NON-Entangling FADs



**RAFT**

- Not constructed or covered with canvas, tarpaulin or shade clothes.

**TAIL**

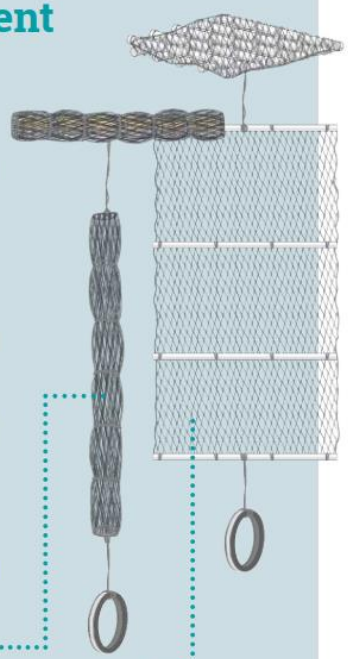
- Subsurface structure is made with ropes, canvas or nylon sheets, or other non-entangling materials.

More detail on the previous page.

**No netting is used in any components (raft and tail)**

**These FADs are expected to have no risk of causing entanglement.**

## LOWER Entanglement Risk FADs



**RAFT**

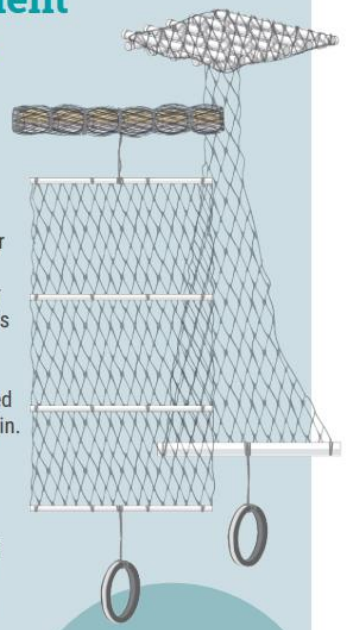
- Use only small mesh netting (< 2.5 inch / 7 cm stretched mesh) if covering with net (both upper and submerged parts).
- If small mesh netting is used as cover, it is tightly wrapped, with no loose netting hanging from the raft.

**TAIL**

- If net is used as submerged tail, could be of any mesh size if tightly tied into sausage-like bundles.
- If open panel netting is used, only small mesh size (< 2.5 inch [7 cm] stretched mesh) can be used, but weight the panel to keep it taut.

**Despite using netting, these design elements reduce the risk of entanglement events.**

## HIGH Entanglement Risk FADs



**RAFT**

- Covered with large mesh netting (e.g. > 2.5-inch mesh).*
- If mesh size is larger than 2.5 inches (both in the upper or submerged part), it is high entanglement, whether the net is tightly tied or covered by canvas or tarpaulin.

**TAIL**

- Submerged part of the FAD constructed with open panels of large mesh netting (> 2.5-inch mesh).

*Accounting for mesh sizes available in the market, 2.5 inch (7 cm) mesh size offers the lowest likelihood of entanglements across species and body parts.

**These FADs are known to cause entanglements with turtles and sharks.**

# Satellite Buoy serial number

## Why ? What? Where? How to record ?

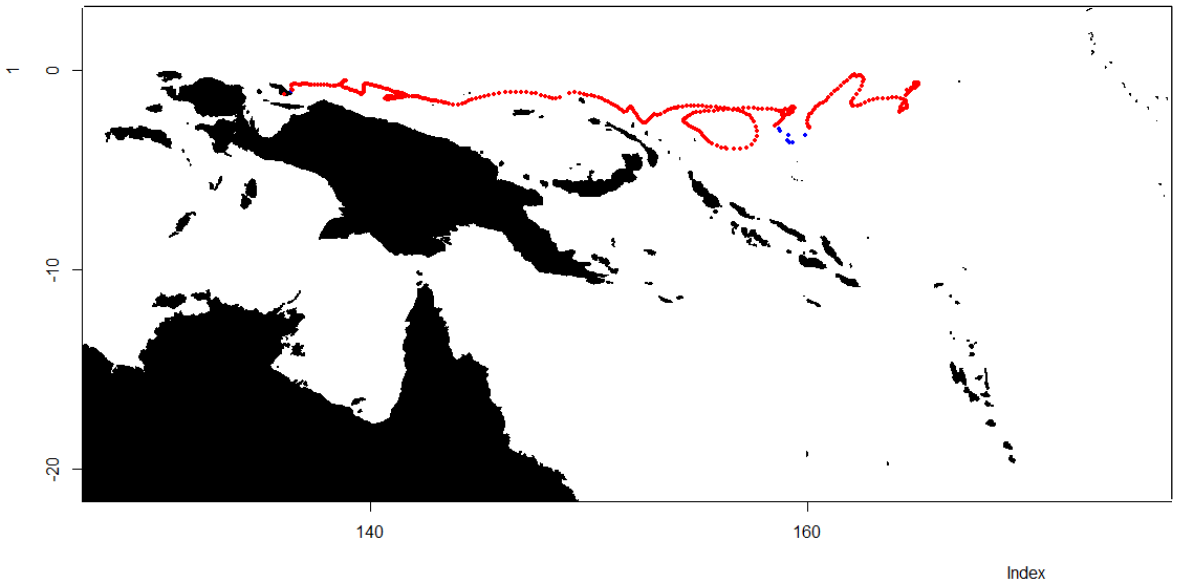
Pacific Community
Communauté du Pacifique

## WHY ?

- Various studies to better understand FAD use, effort, follow FAD life history, ecosystem impacts, etc.

- Match with FAD trajectories in the PNA FAD tracking programme

- CMM: number of active buoys monitored per vessel



# Satellite Buoy serial number

**FAD/PAYAO and FLOATING OBJECTS INFORMATION RECORD** — **Form GEN-5**

REVISED 2018

| OBSERVER NAME: | VESSEL NAME: | OBSERVER TRIP ID NUMBER: | PAGE OF |
|---|---|---|---|
| | | | |

| Date (from PS-2) | Time | Set No. | Object number | Origin of FAD | Deployment date | latitude dd°mm.mmm' | N S | and longitude ddd°mm.mmm' | E W | FAD as found | Beacon/ FAD lifted | FAD as left | *Comments / Change details* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Beac/FAD/ NO | | |

| FAD materials Main materials | | | *net/mesh size* | Attachments | | | *net/mesh size* | Max est. depth | FAD length | FAD width | Buoy serial number | Beacon/FAD ID markings | SSI seen | SSI trapped |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | cm | | | | cm | M | M | M | | | Y / N / U | Y / N / U |

* Recently changed from “Buoy number only”

**Rarely well recorded: absent or not the number expected. But very important to link with FAD trajectories**

| Buoy serial number recorded | All FAD activities (%) | Sets (%) | Deployments (%) |
|---|---|---|---|
| 2015 | 8.5 | 5.2 | 20.4 |
| 2016 | 10.5 | 5.8 | 27.1 |
| 2017 | 15.6 | 5.9 | 27.7 |
| 2018 | 17.0 | 4.0 | 35.0 |
| 2019 | 8.8 | 5.3 | 19.3 |

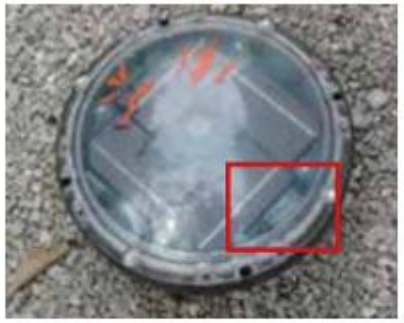
# Satellite buoy serial number : what are they and how to find them

ISL+123456

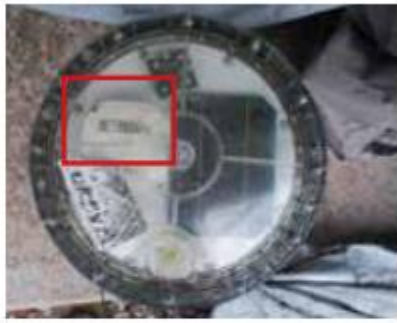
DSL+123456

M3I123456

T7+123456789
or Ze0123456789



P1234NF



123456

List of format not exhaustive …

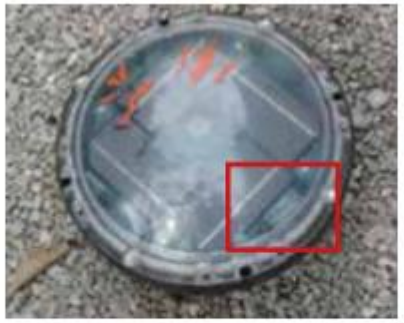
# Satellite buoy serial number : what are they and how to find them

ISL+123456

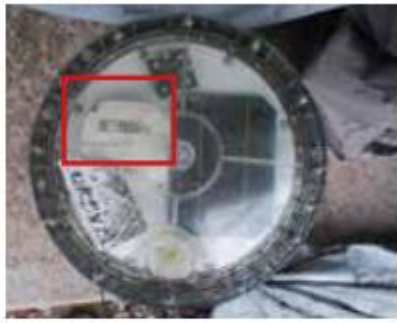
DSL+123456

M3I123456

T7+123456789
or Ze0123456789



P1234NF



123456

| Buoy serial number | Beacon/FAD ID markings |
|---|---|
| | |

**Observers should:**

**Carefully copy the buoys serial number exactly as found on the buoy**

**Not to do :**

**Forget the prefix (DSL+ ; ISL+ ; M3I, T7+ etc.)**
**Add other markings painted on the buoy, e.g. vessel name**

**Any other marking painted on the beacon, or marking on the FAD**

**A number, a vessel name or an abbreviation of a vessel name**

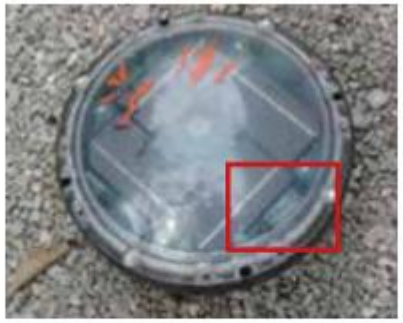
# Satellite buoy serial number : what are they and how to find them

ISL+123456

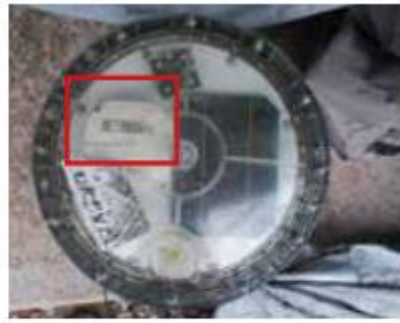
DSL+123456

M3I123456

T7+123456789
or Ze0123456789



P1234NF



123456

## Buoy serial number should be recorded for :

**All deployments the observer witnesses**
**Other activities → If the beacon is lifted**
**Other activities → If the beacon belongs to the vessel**

# Satellite buoy serial number : what are they and how to find them

## Satlink

ISL+123456

DSL+123456

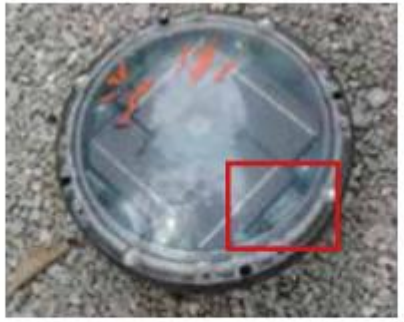
## Marine Instrument

M3I123456

## Zunibal

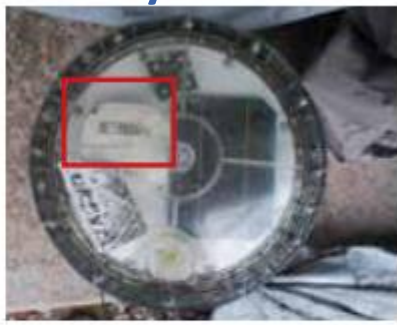
T7+123456789
or Ze0123456789

## Kato



P1234NF

## Ryokusei



123456

| Buoy serial number | Beacon/FAD ID markings |
|---|---|
| 141554 | |

→

| Buoy serial number | Beacon/FAD ID markings |
|---|---|
| ISL+141554 | |

| Buoy serial number | Beacon/FAD ID markings |
|---|---|
| CAPE MAY<br>DSL+125945 | |

→

| Buoy serial number | Beacon/FAD ID markings |
|---|---|
| DSL+125945 | CAPE MAY |

# Thanks for your attention

# Questions ??

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