Guidelines to reduce the impact of FADs on Sea Turtles

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- Scientists working in tuna RFMOs expert on FADs and bycatch (IATTC, WCPFC and SPC)
- Scientists experts on FADs (ISSF)
- Scientist experts on sea turtles (HPU, NOAA)
- Fleets operating in the Pacific (Ecuador, Micronesia, Spain)

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CIAT IATTC

Pacific Community Communauté du Pacifique

HAWAI'I PACIFIC UNIVERSITY

NOAA FISHERIES

Background: FAD impacts on sea turtles

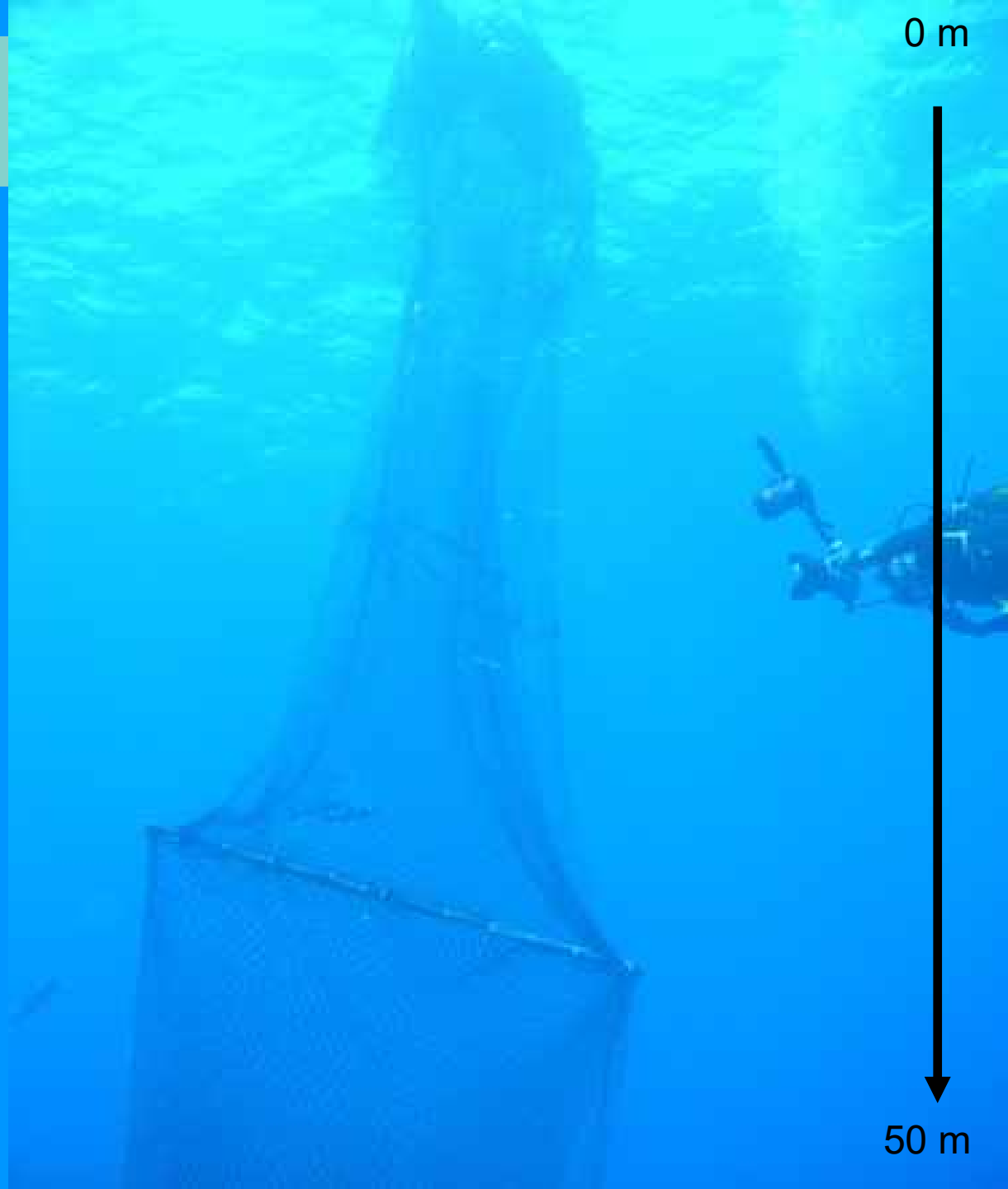
- Scientific assessments of the impact of tropical tuna purse seine fishery on sea turtle populations indicate historically **low turtle bycatch rates**.

- This conception has been derived from **direct capture or interaction of sea turtles with purse seine gear**, where turtles have been hauled on board with targeted schools of tunas.

- However, the massive increase in the use of drifting Fish Aggregating Devices (FADs) by the tropical tuna purse seine fishery worldwide raises concerns about potential impacts on sea turtles.

Background: Man-made FADs

54,000 / year Pacific Ocean



Background: Impacts of FAD Structure

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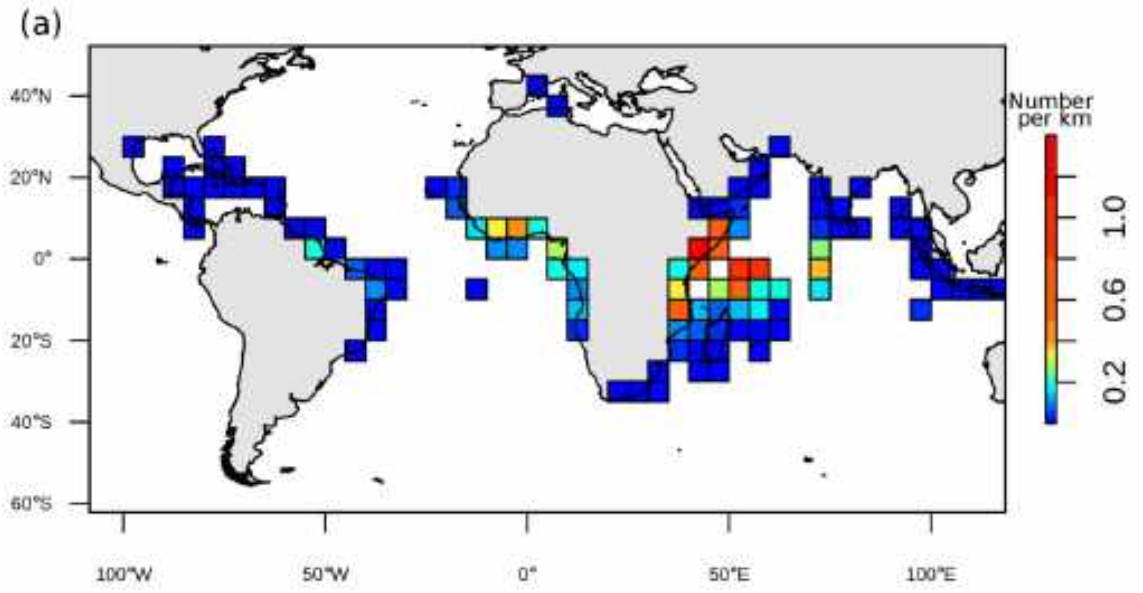
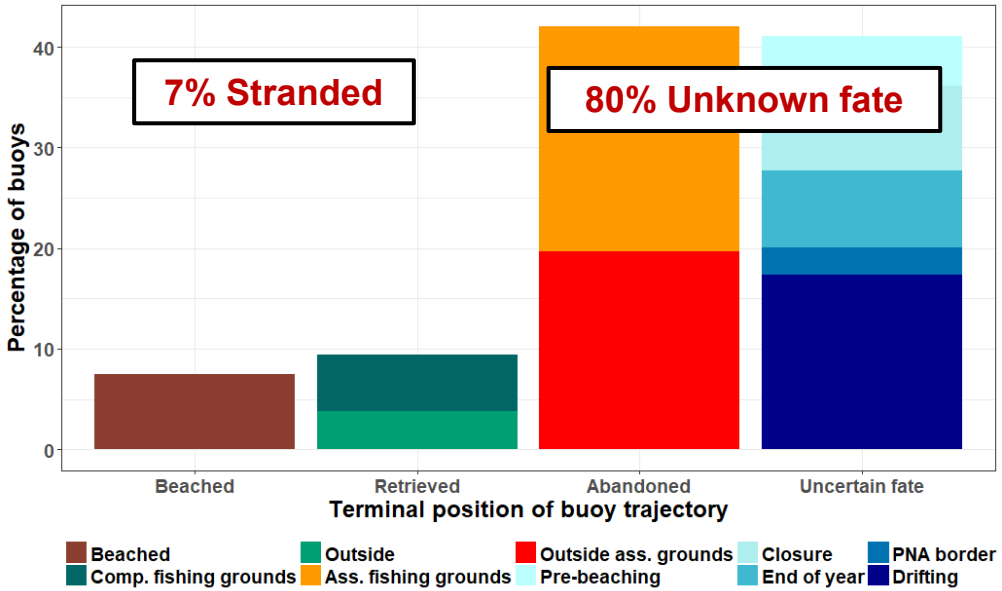
Ghost Fishing: Entanglement Issues

Damage to coastal and benthic habitats & Marine Pollution

Background: Fate of drifting FADs



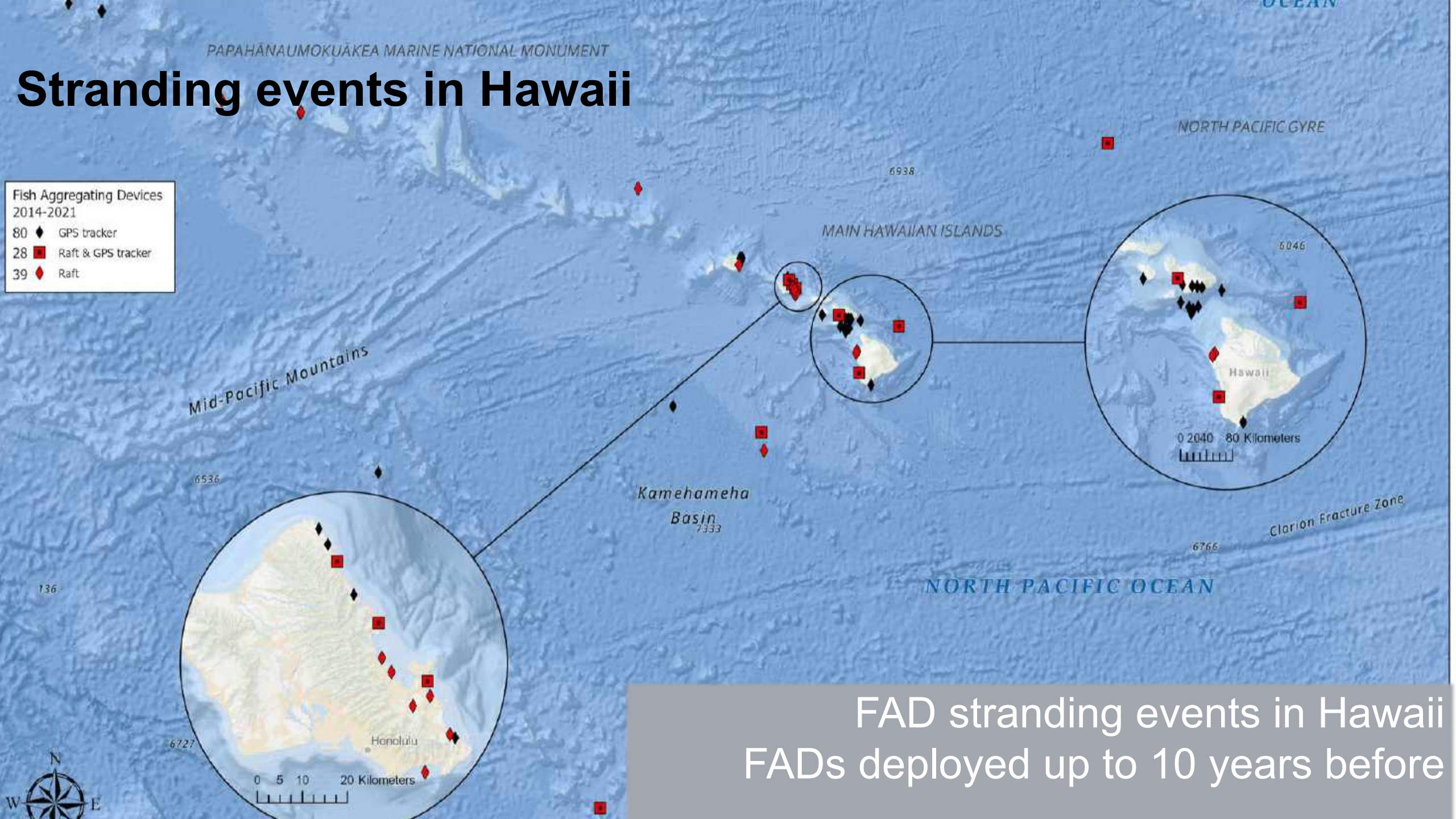


Atlantic Ocean 19-22% stranded

Indian Ocean 15-20% stranded (Imzilen et al. 2021)

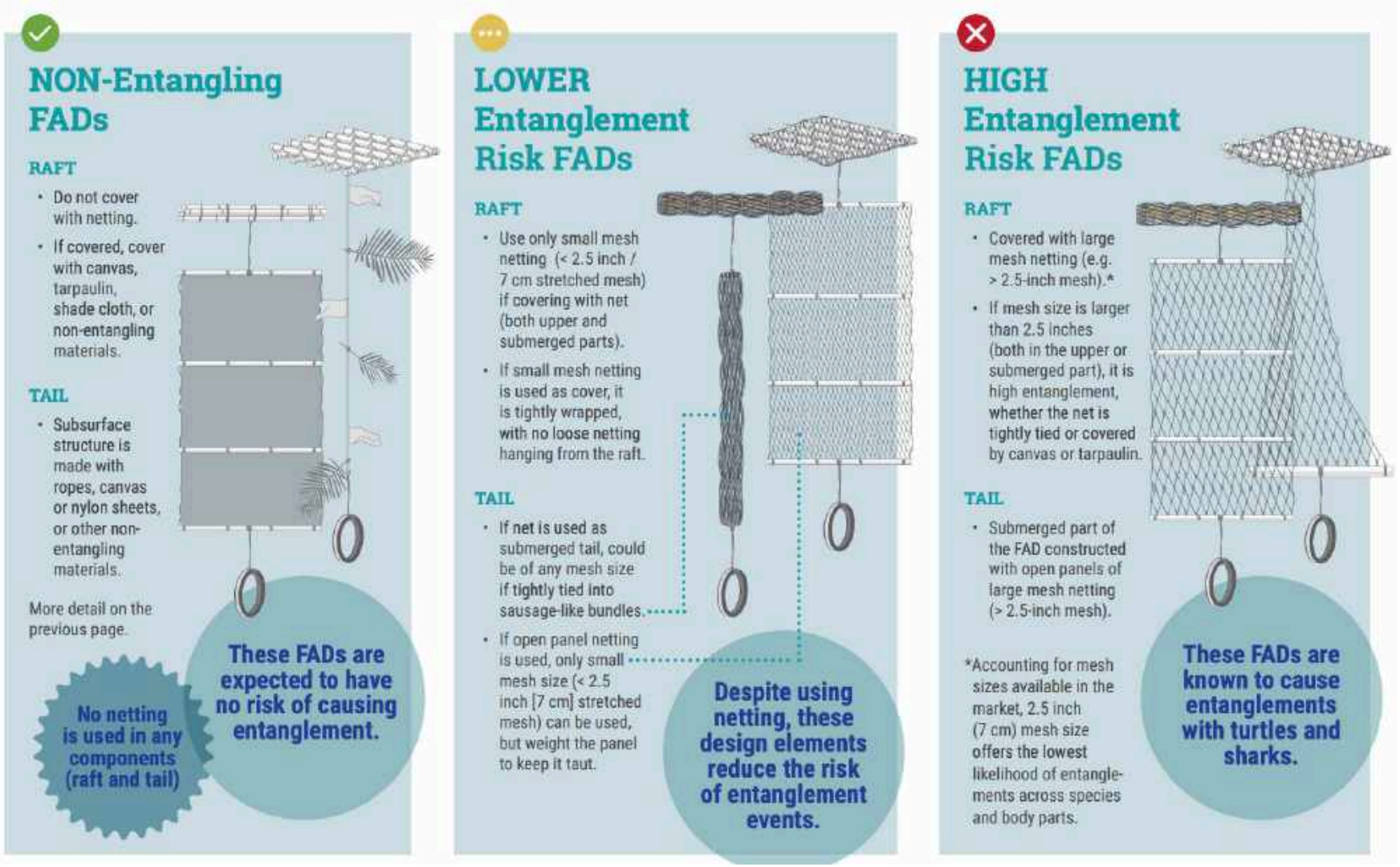
Western Pacific Ocean 7% stranded (Escalle et al. 2019)

Stranding events in Hawaii



FAD stranding events in Hawaii
FADs deployed up to 10 years before

Background: FAD structure requirements in tRFMOs



Easter Pacific Ocean
LOW RISK (IATTC)

Atlantic Ocean
LOW RISK (ICCAT)

Western Pacific Ocean
2024 Non-entangling (WCPFC)

Indian Ocean
Non-entangling (IOTC)

The use of BIODEGRADABLE materials is encouraged

Concerns: What is the extent of the issue?

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- What do we know about sea turtle entanglement events at sea?
- Are turtles found entangled in stranded FADs?
- What is the origin of FADs arriving at turtle-essential habitats?
- What are possible solutions to limit impacts to sea turtles?

Objectives of the project

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Objective 1. Research the known and potential impacts of FADs on sea turtles. Revisit data collection

Objective 2. Model FAD trajectories arriving at essential turtle habitats with special focus on leatherback turtle and Hawaiian Islands.

Objective 3. Skippers workshops to define best practices and to identify stranding / beaching areas, turtles zones and FAD trajectories

Best practice guidelines

Data Review: Active catch of turtles in sets

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FATE OF TURTLES CAUGHT IN A SET (ACTIVE CATCH)

	1994–1999		2000–2014		2015–2020	
Sea turtle fate	**Number**	**%**	**Number**	**%**	**Number**	**%**
Entangled alive	45	0.6	31	0.2	1	0.0
Released unharmed	6340	78.6	17163	88.4	4894	95.0
Light injuries	484	6.0	847	4.4	64	1.2
Grave injuries	372	4.6	234	1.2	15	0.3
Killed	175	2.2	87	0.4	5	0.1
Escaped/evaded net	340	4.2	874	4.5	160	3.1
Consumed	59	0.7	23	0.1	0	0.0
Other/Unknown	247	3.1	162	0.8	14	0.3
Total	8062		19421		5153	

Data Review: Entanglements (passive catch)

Year	Left entangled	Found dead	Released unharmed	Released light inj.	Released grave inj.	Other	Total
2014	0	34	97	18	5	3	157
2015	1	33	81	40	12	2	169
2016	2	24	100	28	5	4	163
2017	3	20	72	18	5	0	118
2018	0	14	51	16	3	0	84
2019	3	15	54	11	1	2	86
2020	1	3	31	7	1	4	47
2021	0	5	28	11	1	0	45
Total	10	148	514	149	33	15	869

- Average of **108 sea turtle entanglements** per year at FADs (min = 45, max = 169).
- Annual average of **24 mortalities** (min = 5 in 2020, max = 46 in 2015).

Is observer data sufficient?

Despite 100% observer coverage on class-6 (>363 mt) purse seine vessels, the data collected by human observers may **not be sufficient to fully support a low-impact scenario:**

- FADs remain at sea for several months to years and are only visited by an observer a limited number of times since deployment, and many are lost or abandoned without being visited again.

- Observers are restricted to work on the deck of the purse seine vessel, limiting their ability to detect sea turtle entanglements at FADs that may not be at a reasonable distance or depth (e.g. fishing vessels often remain several hundred meters away from the FAD before a set; and FADs submerged part could be 40-50 m depth).

- Turtle ntanglements, may only last a short time (Filmalter et al. 2013), may go mostly unobserved or unnoticed due to the operational characteristics of the FAD fishery.

Skippers workshops to define best practices

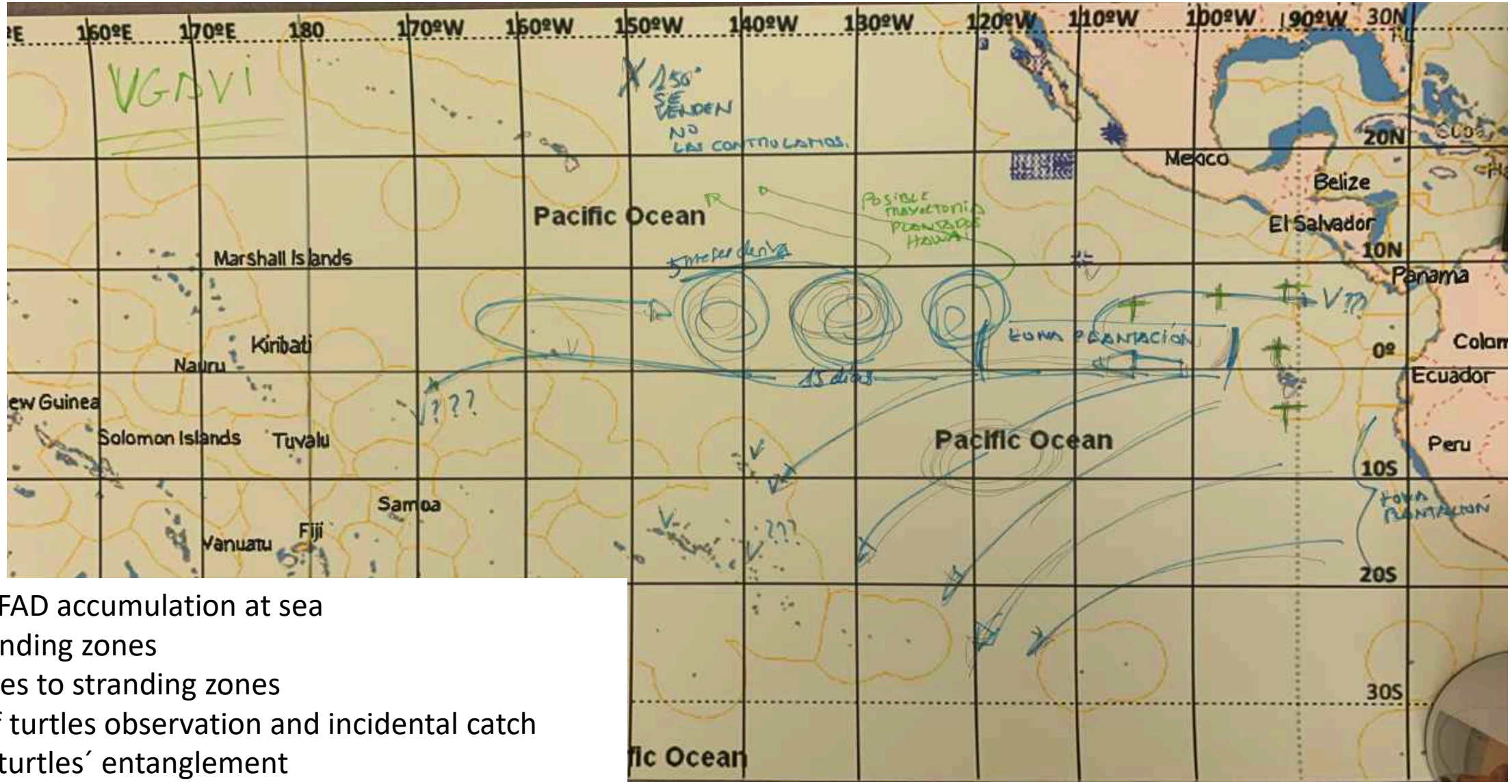
1. To identify stranding / beaching areas, turtles zones and FAD trajectories.

2. To identify best practices to reduce the negative interaction of FADs with sea turtles.

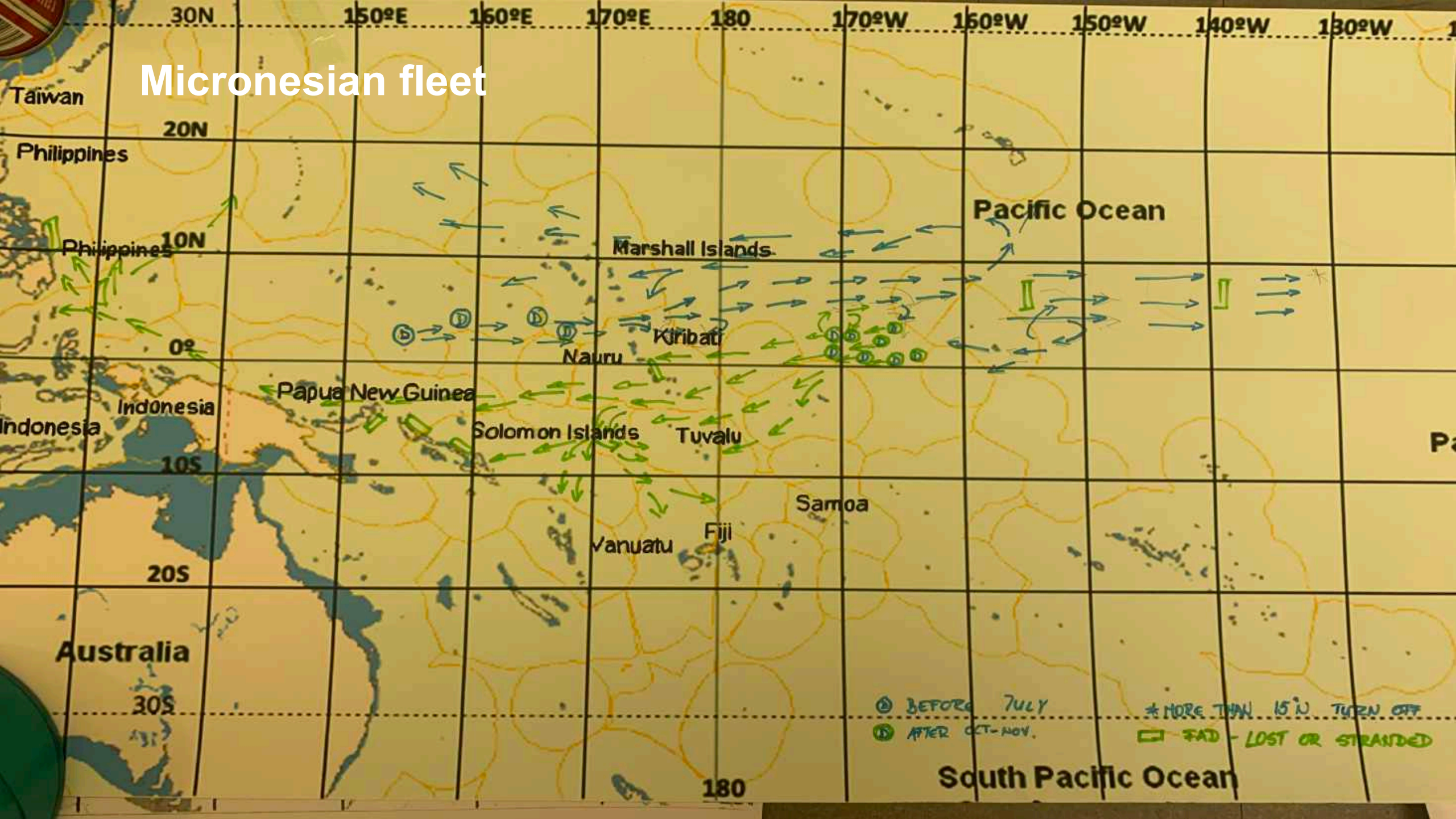
Fleets

1. **Ecuadorian**: Eastern Pacific O.
2. **Micronesian**: Western Pacific O.
3. **Spanish**: Eastern, Central & Western Pacific O.

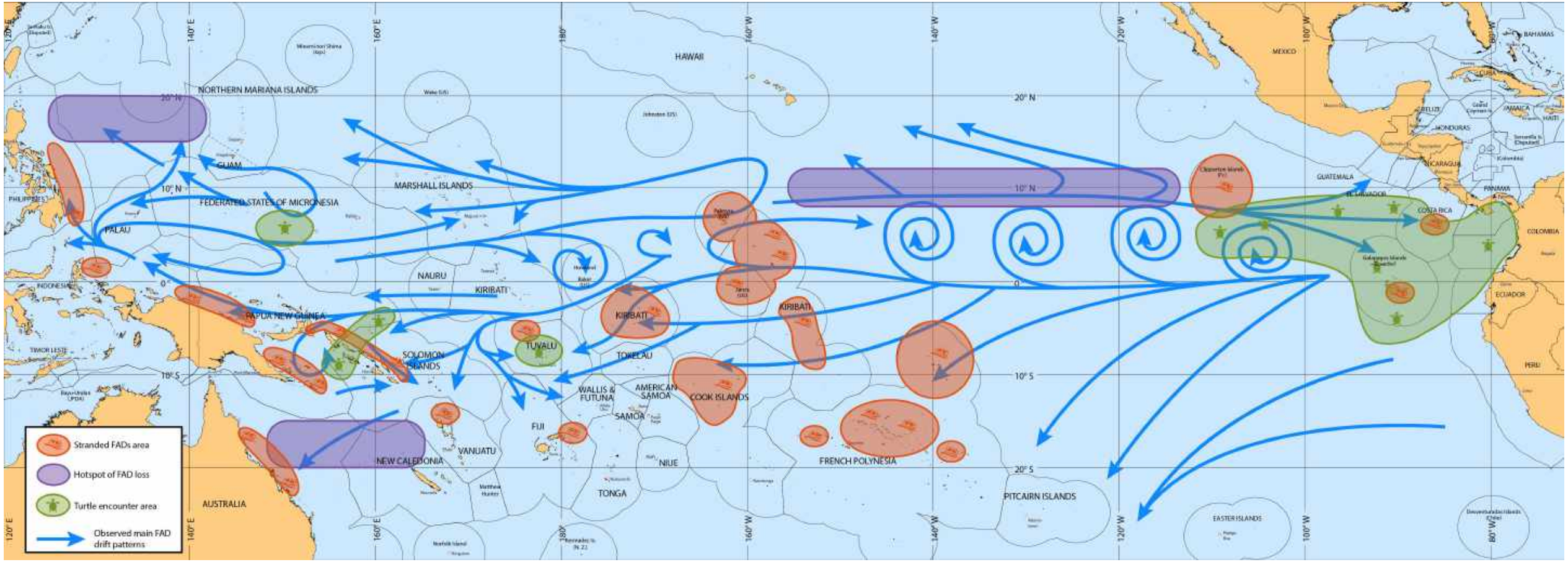
Mapping



A: areas of FAD accumulation at sea
V: FAD stranding zones
T: trajectories to stranding zones
CT: areas of turtles observation and incidental catch
E: Areas of turtles´ entanglement
C: fleet segment that operates in more coastal waters

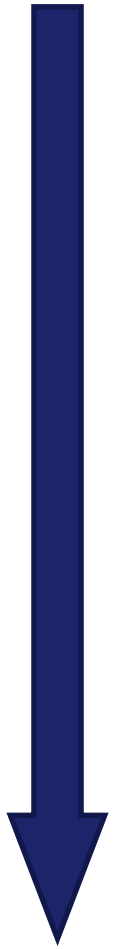

Micronesian fleet
30N
150ºE
160ºE
170ºE
180
170ºW
160ºW
150ºW
140ºW
130ºW
Taiwan
20N
Philippines
Philippines
10N
Pacific Ocean
Marshall Islands
Kiribati
Nauru
0º
Papua New Guinea
Indonesia
Indonesia
Solomon Islands
Tuvalu
10S
Samoa
Fiji
Vanuatu
20S
Australia
30S
BEFORE JULY
AFTER OCT-NOV.
* MORE THAN 15°N TURN OFF
FAD - LOST OR STRANDED
South Pacific Ocean
180

Summary Map


Stranded FADs area
Hotspot of FAD loss
Turtle encounter area
Observed main FAD drift patterns
HAWAII
NORTHERN MARIANA ISLANDS
GUAM
MARSHALL ISLANDS
FEDERATED STATES OF MICRONESIA
PALAU
NAURU
KIRIBATI
PAPUA NEW GUINEA
SOLOMON ISLANDS
TUVALU
TOKELAU
WALLIS & FUTUNA
AMERICAN SAMOA
SAMOA
COOK ISLANDS
FIJI
VANUATU
NEW CALEDONIA
NIUE
TONGA
FRENCH POLYNESIA
PITCAIRN ISLANDS
AUSTRALIA
MEXICO
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
COLOMBIA
ECUADOR
PERU
EASTER ISLANDS

Reduction of the impact by fleets

FAD´S LIFETIME



	FISHERS	SHIPOWNER	SCIENTISTS	OTHERS
CONSTRUCTION				
DEPLOYMENT				
VISIT				
SET				
DESACTIVATION				
RETRIEVAL				
OTHER				

Best practices

1. FAD CONSTRUCTION:

- **Fully Non-entangling and biodegradable FADs :**All groups identified this Best Practice as a crucial and high-priority element to minimize the potential impacts of FADs on sea turtles.
- **FADs supplied by fishing company:** to meet the required specifications
- **FADs built on land**

2. FAD DEPLOYMENT:

- **Further limit the number of FADs at sea:** A group of fishers and scientists proposed reducing the current limit on active FADs to reduce FADs at sea.
- **Avoid deployment areas of high risk of FAD loss:** If necessary, identification of these areas could be conducted through scientific studies with the collaboration of fishers.

Best practices

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3. FAD MONITORING:

- **Closer monitoring of FAD tracks**

  Fishers suggested that closer monitoring of FAD tracks would reduce FAD loss and abandonment events. This would allow for decisions in advance to retrieve or visit those FADs, both by the owner or in collaboration with other vessels.

4. VISITS AND SETS

- **Routinely lift the FAD:** When visiting or setting on a FAD, fishers could lift the FAD to check for any interaction and to repair/replace the structure, provided the structure if it is in bad condition or has entangling materials. Note that FADs in poor condition were identified as susceptible to higher probabilities of sinking or loss.

- **FAD retrieval during visits and sets:**

  Most fishers agreed that more FADs could be retrieved when visiting and setting on them, especially in these circumstances:

  (i) In areas close to the edges of the fishing ground, even if the FAD is still in good condition.
  (ii) When in doubt about leaving it at sea or retrieving it, favor the retrieval.
  (iii) Retrieve FADs without associated tuna as much as possible.
  (iv) Check FADs that are close to the one visited and if damaged, repair or retrieve them.

Best practices

5 FAD TRACKING BUOY DEACTIVATION

- **Actions before deactivation:**
  -Check if there is any vessel close to the FAD to help retrieve it.
  -Sell and share FADs before they are lost or abandoned (some fleets from the EPO are already selling FADs that drift into the WCPO).

- **No deactivation of the buoy used to track FADs:**
  The satellite buoy used to track the FAD should not be deactivated until the end of its lifetime. A definition of the end of the lifetime of a FAD would be required for that.

- **Other marking systems:**
  Scientists proposed considering a marking system independent from fisher´s satellite buoy to track the FAD until the end of its lifetime. This could give information on the FAD, regardless of fisher´s tracking buoy status (i.e., active/deactivated).

Best practices

6 RETRIEVAL

- **Retrieval at sea by purse seine vessels**
  When finding others´ FADs at sea, retrieve both the buoy and the structure. This could be improved by promoting communication among fleets to increase retrievals of lost or abandoned FADs or FADs that would be deactivated.

- **Retrieval at sea by other vessels**
  Different options were proposed for FAD retrieval by a third party or vessel. The following options could be economically explored:
  -Use of a purse seiner of the fleet that could be dedicated just to retrieve FADs for a limited time and shift among vessels.
  -Use of a cleaning vessel paid among all fishing associations or by fishing companies or by fishery management organization.

- **Participation in FAD retrieval programs**:
  For such a programs to be effective, minimum standards should be developed.

Summary of proposed activities

- Proposed many ideas to reduce FAD impacts on sea turtles
- Fishers identified mostly actions for themselves
- Many of the actions can be put in place now
- Other ideas need research and time to be developed
- The economic viability of some actions need to be studied

Recommendations

- Adopt and effectively implement **fully non-entangling FADs**
- Adopt and effectively implement **biodegradable FADs**
- Provide data on the **entire trajectory** of FADs, through new **FAD marking** systems or the buoy used by fishers or other systems.
- **Retrieve FAD at sea** by purse seiners: Put in place a set of best practices during visits/sets at FADs, such as routinely lifting the FAD at sea, repairing or retrieving it of damaged, retrieving FADs on the edge of fishing grounds, and communicating with other vessels to share/sell and retrieve FADs.
- **Participate in FAD retrieval programs**: Fishing companies should explore different options mentioned above to retrieve FADs in collaboration with third parties or other fishing companies. Scientists should help define standards for those programs to be effective.