Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission

Review of IATTC Resolutions C-16-01 and C-17-02: available information, data gaps and potential improvements for monitoring the FAD fishery (FAD-03-INF-A)

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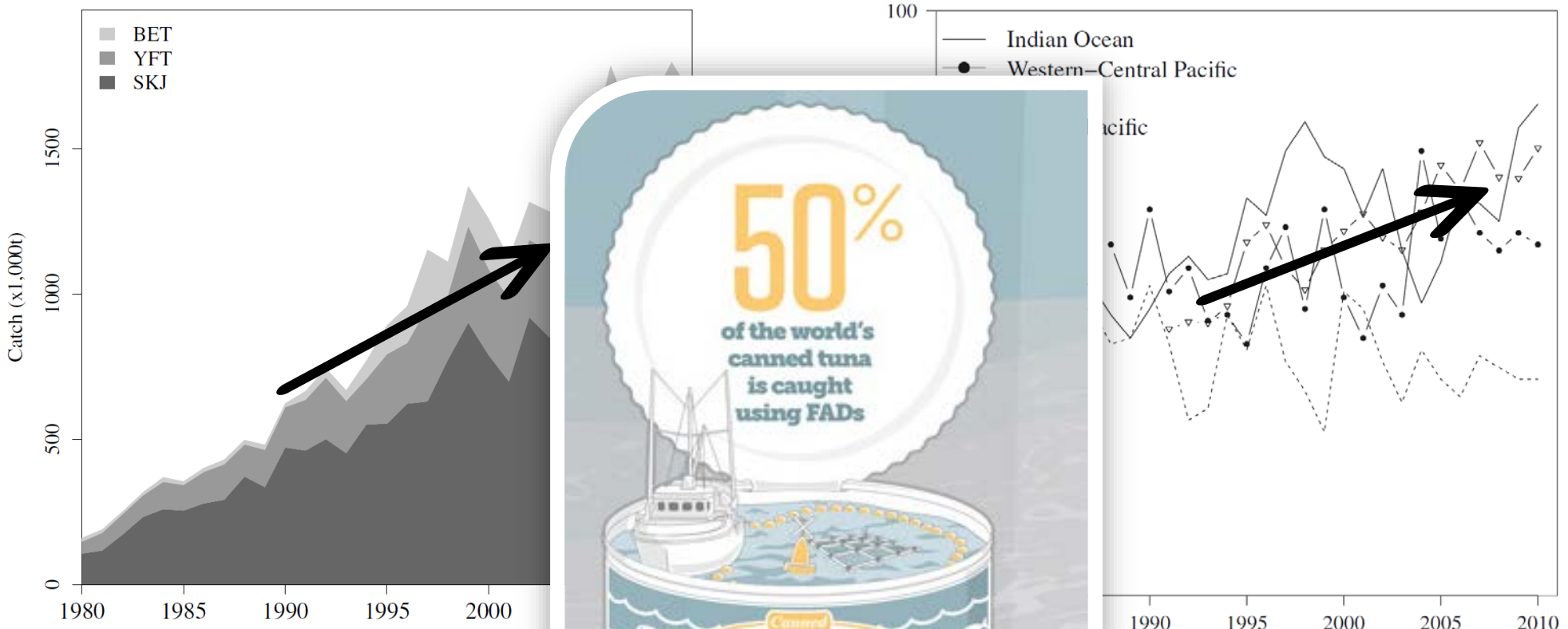
3rd Meeting of the Ad Hoc Working Group on FADs La Jolla, California USA, 11-12 May 2018

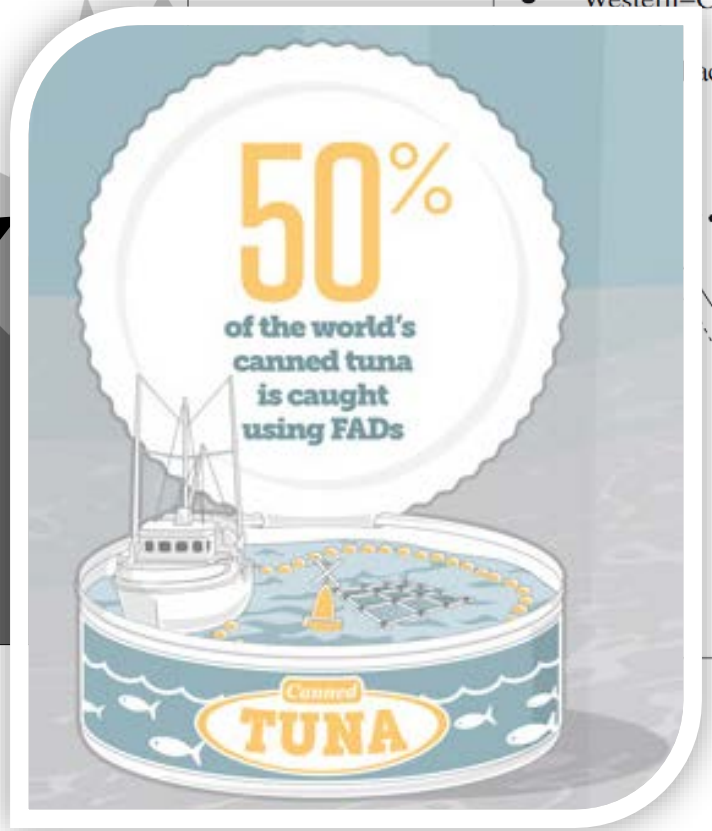
Outline

- Introduction
- Resolution intentions, requirements, assumptions and shortcomes
- Data collection forms, existing or proposed, and weaknesses
- FAD-related data provided to the Secretariat
- Summary of data gaps and potential solutions
- What are other RFMOs doing?
- Conclusions and Recommendations

Introduction

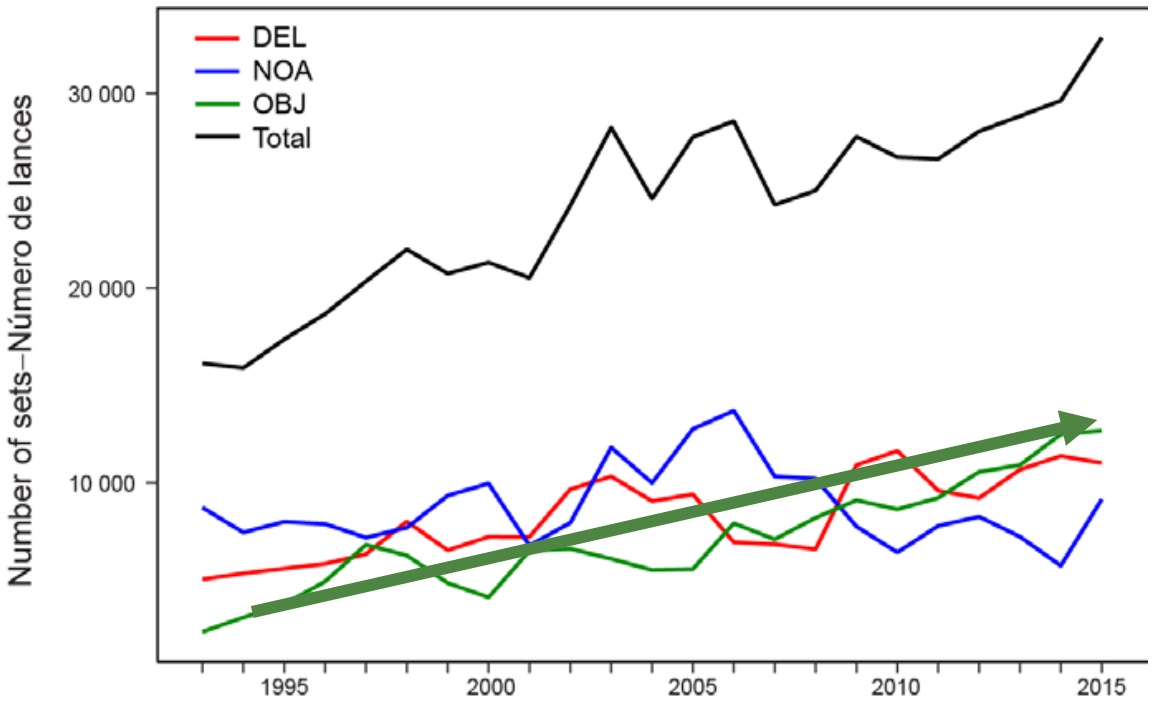
Massive global increase of FAD use

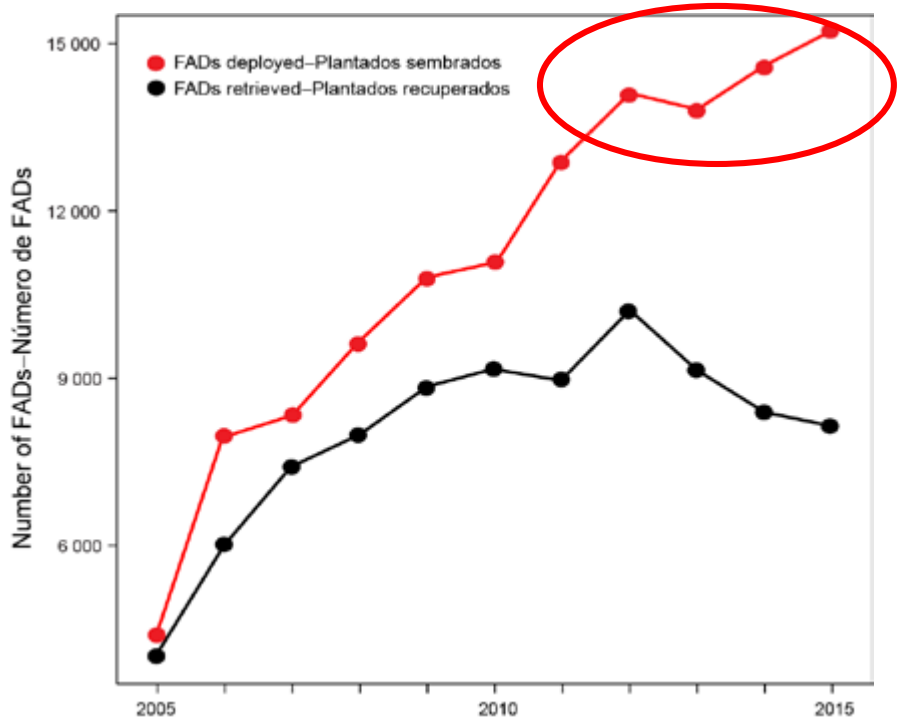




Introduction

The Eastern Pacific Ocean case





source: Hall and Roman, 2017

Introduction

- Because FADs may impact the environment, t-RFMOs have implemented CMMs to monitor and control FAD use, including but not limited to:

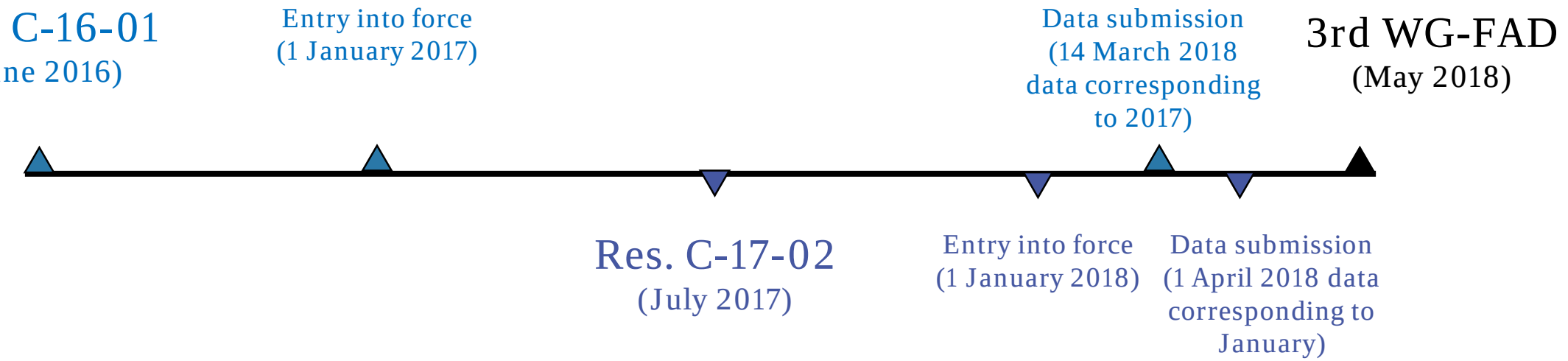
i. FAD plans at both CPC and RFMO levels,
ii. FAD data collection systems,
iii. FAD limits per vessel,
iv. Ecologically friendly FADs,
v. FAD marking and identification schemes.

- Two Resolutions have been established in the EPO in recent years

1. C-16-01 on the collection and analyses of data on FADs
2. C-17-02 on the conservation measures for tropical tunas during 2018-2020

Introduction

Timeline of events with regards Res. C-16-01 and C-17-02



Introduction

4. No later than the IATTC annual meeting in 2018, the scientific staff of the IATTC, in coordination with the SAC, shall present to the Commission the preliminary results of its analyses of the information collected pursuant to Paragraph 2, and shall identify additional elements for data collection, as well as specific reporting formats, necessary to evaluate the effects of the use of FADs on the ecosystem of the EPO fishery. The analyses shall also incorporate information from data on FADs collected by observers through the *Flotsam Information Record*.

- This document presents a **review of Resolutions** C-16-01 and C-17-02, analyzes the **current forms and proposals** for collecting data on FADs, describes current **data availability**, identifies **data gaps**, explores new methodologies for **FAD marking and tracking**, and discusses the **implications** the current situation and the suggested changes may have **for monitoring and managing the FAD fishery**

Resolution intentions, requirements, assumptions and issues

Res.	Applies to	Intends	Assumptions	Requested data	Responsible	EIF
16-01	All **purse seine vessels*** **only source of FAD-related information for vessels of class 1-5*	**FAD data collection** **FAD identification** Non-entangling FADs Ban on setting on live whale Sharks Establish an ad hoc WG on FADs	Data provided by class 1-5 vessels (mainly with no observer) is accurate Logs do not need to be reported (unless they are equipped with a buoy) All FADs are marked with some type of identifier FAD tracking can be done using Buoy ID (Buoy ID is always available for the observer/skipper)	Form 9/2016 (or similar, but containing all the information in annex 1) For each interaction with a FAD: i. Position; ii. Date; iii. Hour; iv. FAD identification; v. FAD type (*e.g.*, drifting natural FAD, drifting artificial FAD); vi. FAD design characteristics (dimension and material of the floating part and of the underwater hanging structure); vii. Type of the activity (set, deployment, hauling, retrieving, loss, intervention on electronic equipment, other (specify)); viii. If the activity is a set, the results of the set in terms of catch and bycatch; and ix. Characteristics of any attached buoy or positioning equipment (positioning system, whether equipped with sonar, *etc.*).	Skipper/CPCs [Form FAD 9/2016 or similar]	1 January 2017

Resolution intentions, requirements, assumptions and issues

Res.	Applies to	Intends	Assumptions	Requested data	Responsible	EIF
16-01	All **purse seine vessels*** **only source of FAD-related information for vessels of class*	**FAD data collection** **FAD identification** Non-entangling FADs Ban on setting on	**Data** provided by **class 1-5** vessels (mainly with no observer) **is accurate** **Logs do not need to be reported** (unless they are equipped with a buoy)	Form 9/2016 (or similar, but containing all the information in annex 1) For each interaction with a FAD: i. Position; ii. Date; iii. Hour; iv. FAD identification; v. FAD type (*e.g.*, drifting natural FAD, drifting	Skipper/CPCs [Form FAD 9/2016 or similar]	1 January 2017
			available for the observer/skipper	positioning equipment (positioning system, whether equipped with sonar, *etc.*).		

1. For the purposes of this Resolution, the term "Fish-Aggregating Device" (FAD) means anchored, drifting, floating or submerged objects deployed and/or tracked by vessels, including through the use of radio and/or satellite buoys, for the purpose of aggregating target tuna species for purse-seine fishing operations.

Resolution intentions, requirements, assumptions and issues

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9. No later than 1 January 2017, CPCs shall require the owners and operators of their applicable flagged purse-seine fishing vessels to identify all FADs deployed or modified by such vessels in accordance with a Commission identification scheme detailed in footnote 1 of Annex 1.

[1] CPCs shall obtain unique alphanumeric codes from the IATTC staff on a periodic basis and distribute those numbers to the vessels in their fleets for FADs that may be deployed or modified, or in the alternative, if there is already a unique FAD identifier associated with the FAD (*e.g.*, the manufacturer identification code for the attached buoy), the vessel owner or operator may instead use that identifier as the unique code for each FAD that may be deployed or modified.

Resolution intentions, requirements, assumptions and issues

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16-01	All **purse seine vessels*** **only source of FAD-related*	**FAD data collection** **FAD identification** Non-entangling FADs	**Data** provided by **class 1-5** vessels (mainly with no observer) **is accurate** **Logs do not need to be**	Form 9/2016 (or similar, but containing all the information in annex 1) For each interaction with a FAD: **i. Position;** **ii. Date;**	Skipper/CPCs [Form FAD 9/2016 or similar]	**1 January 2017**

2. Beginning 1 January 2017, CPCs shall require the owners and operators of all purse-seine vessels flying their flag, when fishing on FADs in the IATTC Convention Area, to collect and report the information contained in Annex I. The data may be collected through a dedicated logbook, modifications to regional logsheets, or other domestic reporting procedures.

CPCs are required to ensure their vessel owners and operators record and report to the appropriate national authorities any interaction with FADs, using a standard format to be developed by the Commission staff.

Resolution intentions, requirements, assumptions and issues

Res.	Applies to	Intends	Assumptions	Requested data	Responsible	EIF
17-02	All **class 4-6 purse-seine** vessels and **longline vessels > 24 meters** (**FAD management measures also apply to purse-seines of class 1-3**).	**Conservation of tropical tunas** in the EPO **2018-2020**, among others: Monitor and **limit the number of active FADs at sea** at any one time. Limits are class specific: • Class 6 (>1,200): **450** FADs • Class 6 (< 1,200 m3): **300** FADs • Class 4-5: **120** FADs • Class 1-3: **70** FADs	Each vessel deploys its own FADs/Buoys. There is no FAD deployed without a buoy attached, All FAD deployments are conducted with active buoys. Buoys cannot be activated/deactivated remotely, Buoys are being tracked solely by the owner (and the fishing company). Active FADs (as defined in the Resolution) represent a good proxy of total number of FADs at sea.	Buoy daily information, not clearly specified, but the WG on FADs suggested the following fields to be collected: i. Buoy ID ii. Owner (Vessel) iii. Location iv. Speed (also suggested official daily deactivations to compute different parameters that could be of interest for stock assessment [CPUE standardization]).	Buoy manufacturers/National Verification Entities (NVE)-CPCs [Guidelines proposed by the IATTC WG on FADs] 60-90 days of delay	1 January 2018

Resolution intentions, requirements, assumptions and issues

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Resolution intentions, requirements, assumptions and issues

INF1

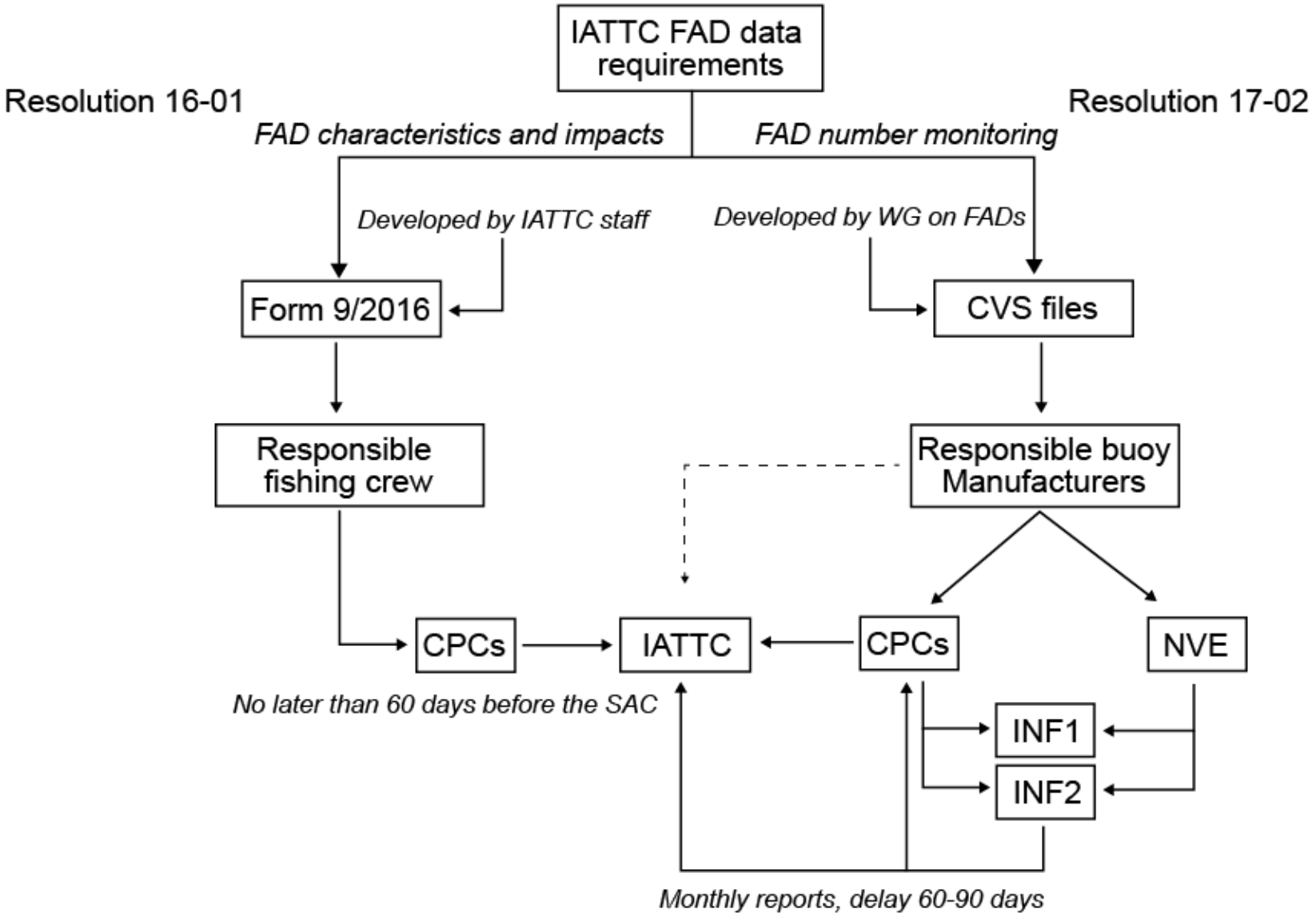
Date	Vessel	No. active
2018/04/01	9003421	345
2018/04/02	9003421	342
2018/04/03	9003421	340
…	…	…

INF2

Year	Month	CPC	Vessels	Lat	Lon	Average no. active FADs
2018	1	xxx	6	10.5	-132.5	1.93
2018	1	xxx	6	9.5	-132.5	0.84
2018	1	xxx	6	8.5	-132.5	2.32
…	…	…	…	…	…	…

equested data	Responsible	EIF
information, not clearly t the FAD-WG suggested the ds to be collected: **Vessel**) **n** vations s that ssment	Buoy manufacturers/ National Verification Entities (NVE)-CPCs [Guidelines proposed by the IATTC WG on FADs] 60-90 days of delay **INF1** and **INF2**	**1 January 2018**

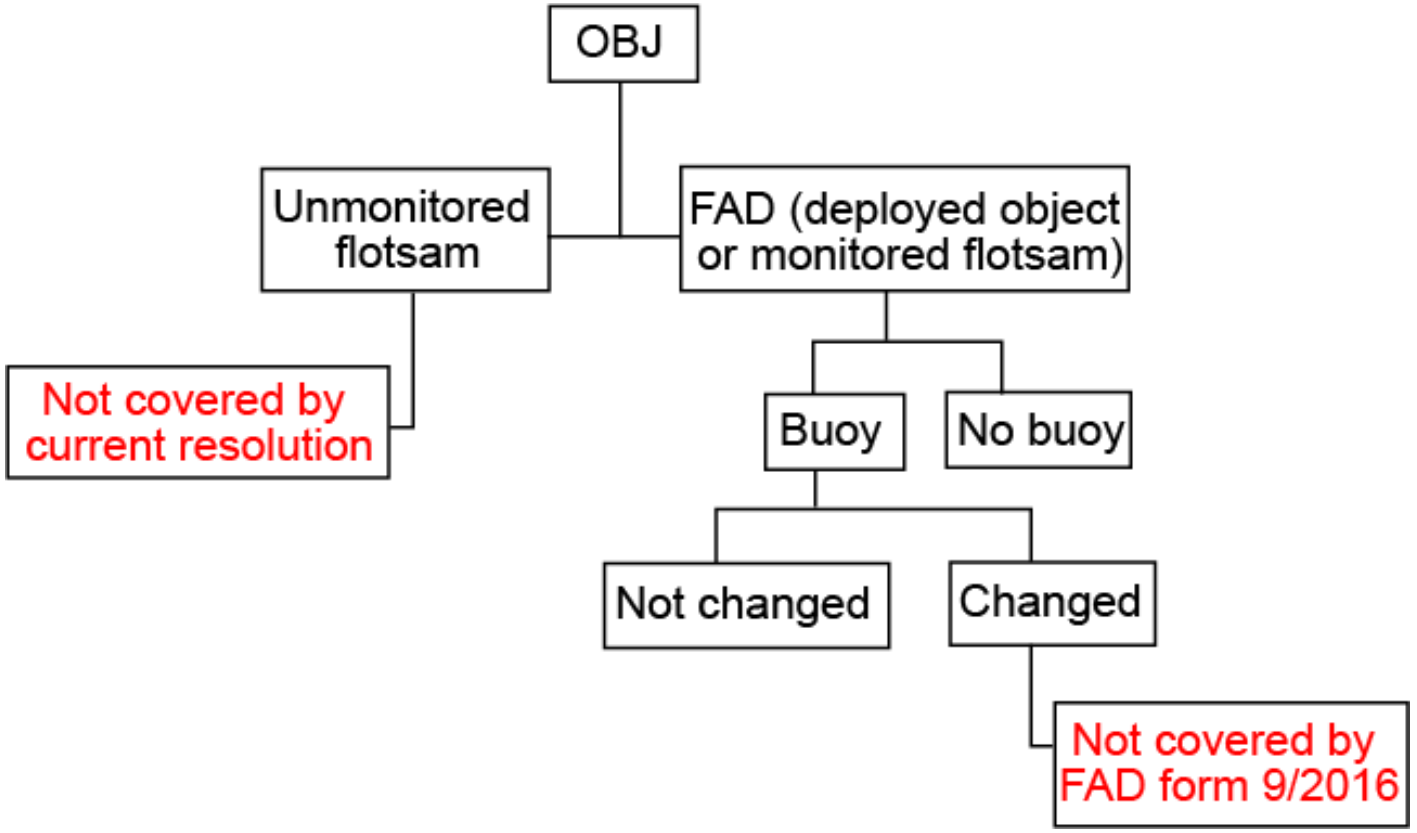
DATA COLLECTION FORMS, EXISTING OR PROPOSED, AND WEAKNESSES



DATA COLLECTION FORMS, EXISTING OR PROPOSED, AND WEAKNESSES

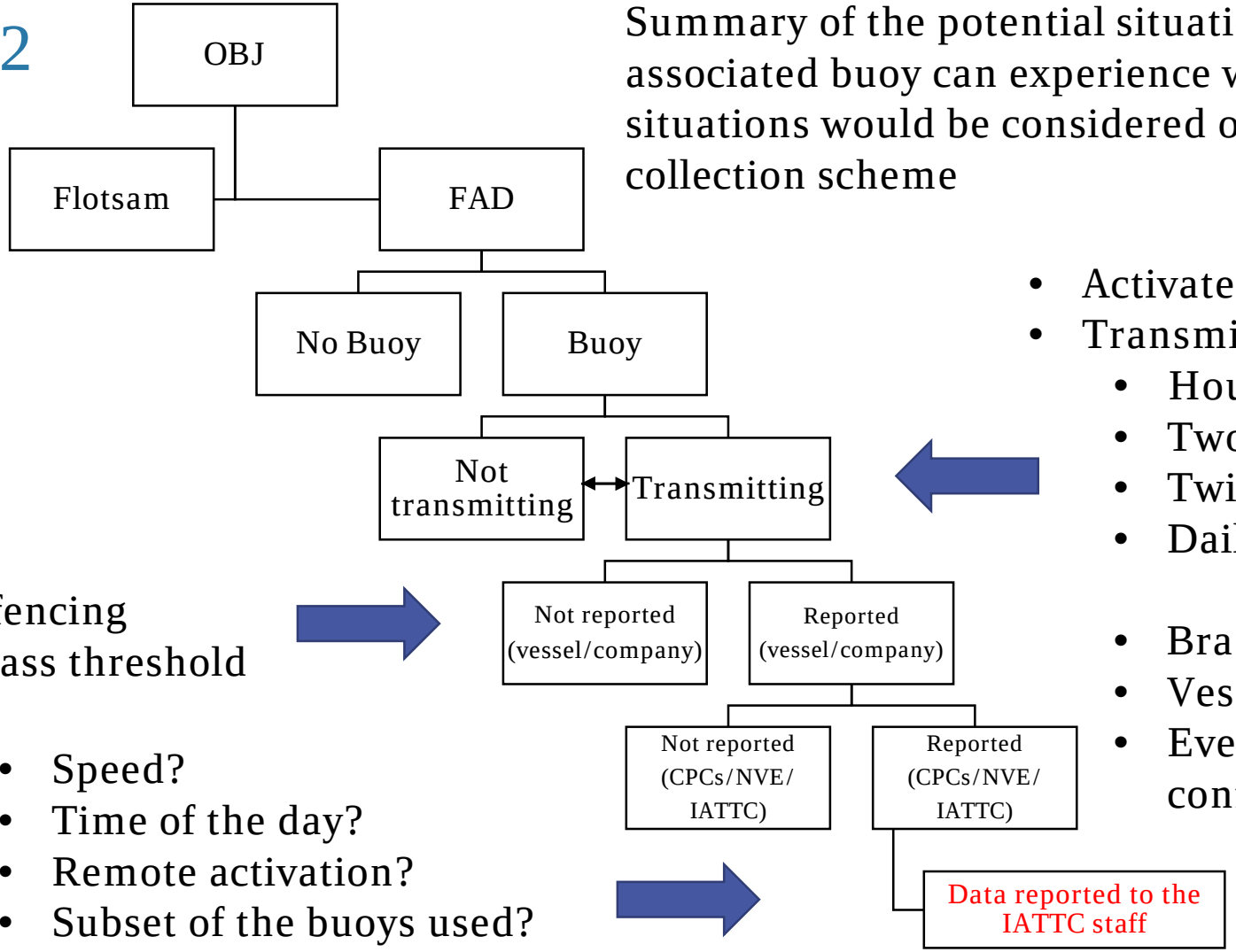
Res. C-16-01

Summary of the main situations a floating object can experience at sea, and the ability of FAD Form 9/2016 to capture them.



DATA COLLECTION FORMS, EXISTING OR PROPOSED, AND WEAKNESSES

Res. C-17-02



Summary of the potential situations a floating object and its associated buoy can experience when at sea, and which situations would be considered or not by the proposed data collection scheme

- Activated before deployment
- Transmission frequency
  - Hourly
  - Two-hourly
  - Twice a day
  - Daily

- Geo-fencing
- Biomass threshold

- Brand specific
- Vessel specific
- Event specific (approaching a FAD, configuration changes, etc.)

- Speed?
- Time of the day?
- Remote activation?
- Subset of the buoys used?

FAD-RELATED DATA PROVIDED TO THE IATTC STAFF AS OF 13 APRIL 2018

Res. C-16-01

Data provided to the IATTC staff, as of 13 April 2018, under Resolution C-16-01, from trips starting in 2017, by fleet.

2017	Número de viajes - Number of trips								
	A			B			C		
	Total			Con lances OBJ			Formularios provistos		
				With OBJ sets			Forms provided		
Clase - Class	1-4	5	6	1-4	5	6	1-4	5	6
COL	9	7	44	9	6	44	2		44
ECU	255	70	369	248	67	347			
MEX	1	2	198			87			
NIC			30			17			
PAN			80			77			9
PER	10	17	18			11			
SLV			12			11			11
UE - EU			8			8			
USA	83		46			46			
VEN			41			26			
Subtotal	**358**	**96**	**846**	**257**	**73**	**674**	**2**	**0**	**64**
Total			**1,300**			**1,004**			**66**
%									**6.6%**

FAD-RELATED DATA PROVIDED TO THE IATTC STAFF AS OF 8 MAY 2018

Res. C-17-02

Data provided to the IATTC staff, as of 8 May 2018, under Resolution C-17-02, by fleet.

CPC	No. PS in the Act. RVR	Buoy data•	Reports	
			Rep. 1	Rep. 2
COL	14		-	-
ECU	116		72	*by vessel
MEX	51			
NIC	7	*1	*1	*1 (av. wrong)
PAN	17		1	1
PER	14			
SLV	2			
UE - EU	4			
USA	34	5 (March)	-	-
VEN	21			

+ Rep. 3?

•Only one brand of buoys per vessel

Res. C-16-01: Potential solutions

1) Modify FAD form 9/2016 and Flotsam information record to include new fields that will enable FADs to be tracked over time:

- FAD form 9/2016:

A. replace the "Identification" field with three fields
   (1) "Previous Buoy ID",
   (2) "Current Buoy ID"; and
   (3) "Buoy change (Y/N)",

B. Include activity codes for "FAD re-deployment" and "Buoy replacement".
C. Provide the "unknown" option in Buoy ID.

- Flotsam information record will be updated accordingly.

2) Modify the definition of the term FAD, or the resolution, to consider also "logs" to be reported. + Modify text to reduce assumptions.

Advantages and disadvantages of different FAD marking schemes

	Advantages	Disadvantages
FAD ID only	- **Relatively easy** to implement - Agreed in **Res. 16-01** - Gear marking requirements (**FAO, UN**) met - **Partial life history** obtained - **Patterns of FAD use** (number of sets, visits, soak time, etc.)	- **Lose** track **information between sightings** - **Lose** information on **effective life** (deactivations, lost, etc.) - Need to **generate non-reusable ID** codes - Need to **specify marking rules** (size, color, material, pre-printed tags, etc.) - **Observer** presence **for verification**
Buoy ID only	- Easy to implement - Automatic ID using the buoy - No additional cost (tracking data can be sent to various users) - Full life history of the FAD (if buoy changes are recorded) - Patterns of FAD use (number of sets, visits, soak time, stranding areas, etc.) - Patterns of Buoy use (reporting frequency, activation/deactivation areas, swapping rate, etc.)	- Difficult to obtain lifetime track if a buoy change is missed - Assumes all FOBs are equipped with buoys - No info on FOBs equipped without a buoy - Observers not always have access to buoy ID information (*e.g.* remote activation-deactivation, buoy info inaccessible, wrong ID) - Data entry of large codes is difficult and prone to errors - Potential loss of information if geo-fencing or similar occurs - Previous initiatives noted that this data may only be a subset of all used buoys (Escalle *et al.* 2017)
Both FAD and Buoy ID	- Complete track of the lifetime - Gear marking requirements (FAO, UN) met - Low cost (tracking data can be sent to various users) - Will increase info on the real number of FADs (new deployments + FOBs at sea progressively) - Info on swapping rates - Better knowledge of total FOBs, including FOBs with no buoy - The more complete info to progress in several scientific topics. - Patterns of FAD use (number of sets, visits, soak time, stranding areas, etc.) - Patterns of Buoy use (reporting frequency, activation/deactivation areas, swapping rate, etc.)	- Need to generate non-reusable ID codes - Need to specify marking rules (size, color, material, pre-printed tags, etc.) - Observer presence for verification

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Buoy ID only	- **Easy** to implement - **Automatic ID** using the buoy - **No additional cost** (tracking data can be sent to various users) - Full **life history** of the FAD (**if** buoy **changes are recorded**) - **Patterns of FAD use** (number of sets, visits, soak time, stranding areas, etc.) - **Patterns of Buoy use** (reporting frequency, activation/deactivation areas, swapping rate, etc.)	- Difficult to obtain **lifetime track if a buoy change** is missed - Assumes **all FOBs** are **equipped with buoys** - **No info on FOBs equipped without a buoy** - **Not always** have **access to buoy ID** information (*e.g.* remote activation-deactivation, buoy info inaccessible, wrong ID) - **Data entry** of large codes is difficult and **prone to errors** - **Potential loss of information** if geo-fencing or similar occurs - Previous initiatives noted that this data may only be **a subset of all used buoys** (Escalle *et al*. 2017)
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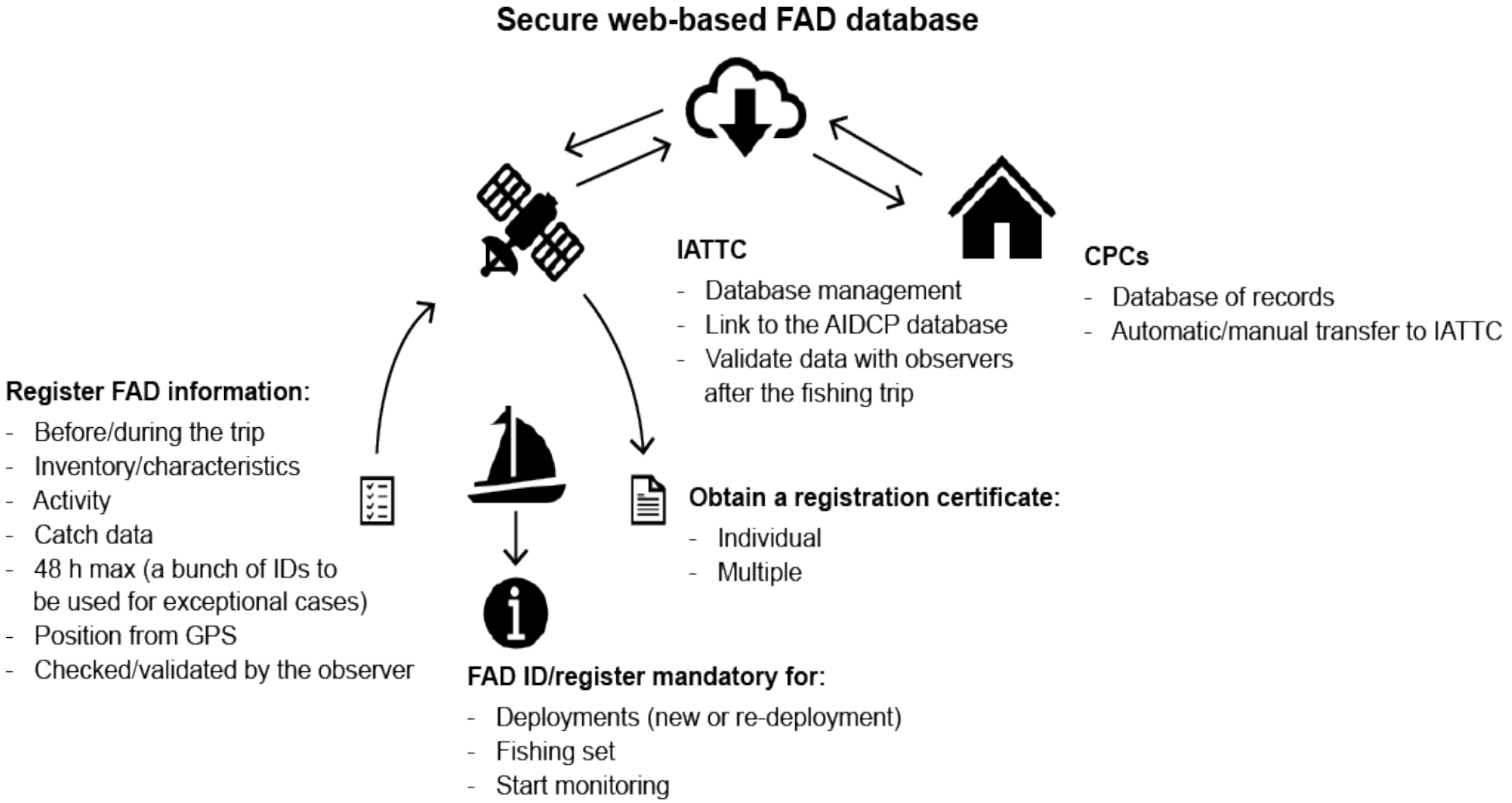
The secure web-based FAD database



Res. C-17-02: Potential solutions

1) Obtain high-resolution data with the same characteristics that vessel operators are receiving [the PNA experience → no additional cost]

2) Copy the buoy information for the fishing trip from the vessel computers to password-protected USB drives

3) Higher-resolution buoy data during critical periods (i.e. activation and deactivation events)

4) Modify text of resolution to reduce assumptions

5) Use additional control mechanisms
   - VMS data
   - Observer data
   - FAD form 9/2016 data

Potential solutions - Discussion

1) FAD limits monitored by several entities → essential to develop and establish standardized and harmonized working methodologies.

2) Current FAD form 9/2016 (with no tracking capability) and buoy data (single position per day) may not be enough to assess compliance.

3) Need to have reliable data from captains/observers to be comparable

4) FAD and Buoy ID and higher-resolution buoy data will contribute to answering important questions, including but not limited to:
   - ✓ FAD densities
   - ✓ FAD and buoy use patterns
   - ✓ CPUE standardization
   - ✓ Ecological and behavioral aspects
   - ✓ Alternative abundance indices, etc. [Buoy data + biomass]

What are other RFMOs doing?

	FAD marking and data collection	FAD limit and monitoring	
		Limit	Activation Onboard?
IATTC	**Res. 16-01** FAD physical marking and, alternatively, Buoy ID *Data reporting*: **FAD form 9/2016** (or similar but containing the same information)	**Res. 17-02** **70-450** *Data reporting*: TBC, **likely INF1 and INF2**	Yes
ICCAT	**Rec. 16-01** FAD plans need to consider FAD marking but no specific guidance is provided. WG FADs 2016: proposes Buoy ID as marking scheme *Data reporting*: **Form ST08-FadsDep**	**Rec. 16-01** **500** *Data reporting*: **Form ST08-FadsDep**	No
IOTC	**Res. 15-08 and 17-08** All artificial FADs marked (FAD ID or Buoy ID, to be adopted by the Commission). *Data reporting*: **Form 3FA**	**Res. 17-08** **350** (and **700** annual purchases) *Data reporting*: **Form 3FA**	Yes
WCPFC	SC13, TC13, and **CMM 17-01**: Buoy ID scheme while exploring fully marking system *Data reporting*: **FAD plans**	**CMM 17-01** **350** *DFADs with activated instrumented buoys*	Yes

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IATTC	**Res. 16-01** FAD physical marking and, alternatively, Buoy ID *Data reporting*: **FAD form 9/2016** (or similar but containing the same information)	**Res. 17-02** **70-450** *Data reporting*: TBC, **likely INF1 and INF2**	Yes
ICCAT	**Rec. 16-01** FAD plans need to consider FAD marking but no specific guidance is provided. WG FADs 2016: proposes Buoy ID as marking scheme *Data reporting*: **Form ST08-FadsDep**	**Rec. 16-01** **500** *Data reporting*: **Form ST08-FadsDep**	No
IOTC	**Res. 15-08 and 17-08** All artificial FADs marked (FAD ID or Buoy ID, to be adopted by the Commission). *Data reporting*: **Form 3FA**	**Res. 17-08** **350** (and **700** annual purchases) *Data reporting*: **Form 3FA**	Yes
WCPFC	SC13, TC13, and **CMM 17-01**: Buoy ID scheme while exploring fully marking system *Data reporting*: **FAD plans**	**CMM 17-01** **350** *DFADs with activated instrumented buoys*	Yes

What are other RFMOs doing?

	FAD marking and data collection	FAD limit and monitoring	
		Limit	Activation Onboard?
IATTC	**Res. 16-01** FAD physical marking and, alternatively, Buoy ID *Data reporting*: **FAD form 9/2016** (or similar but containing the same information)	**Res. 17-02** **70-450** *Data reporting*: TBC, **likely INF1 and INF2**	Yes
ICCAT	**Rec. 16-01** FAD plans need to consider FAD marking but no specific guidance is provided. WG FADs 2016: proposes Buoy ID as marking scheme *Data reporting*: **Form ST08-FadsDep**	**Rec. 16-01** **500** *Data reporting*: **Form ST08-FadsDep**	No
IOTC	**Res. 15-08 and 17-08** All artificial FADs marked (FAD ID or Buoy ID, to be adopted by the Commission). *Data reporting*: **Form 3FA**	**Res. 17-08** **350** (and **700** annual purchases) *Data reporting*: **Form 3FA**	Yes
WCPFC	SC13, TC13, and **CMM 17-01**: Buoy ID scheme while exploring fully marking system *Data reporting*: **FAD plans**	**CMM 17-01** **350** *DFADs with activated instrumented buoys*	Yes

What are other RFMOs doing?

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IATTC	**Res. 16-01** FAD physical marking and, alternatively, Buoy ID *Data reporting*: **FAD form 9/2016** (or similar but containing the same information)	**Res. 17-02** **70-450** *Data reporting*: TBC, **likely INF1 and INF2**	Yes
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IOTC	**Res. 15-08 and 17-08** All artificial FADs marked (FAD ID or Buoy ID, to be adopted by the Commission). *Data reporting*: **Form 3FA**	**Res. 17-08** **350** (and **700** annual purchases) *Data reporting*: **Form 3FA**	Yes
WCPFC	SC13, TC13, and **CMM 17-01**: Buoy ID scheme while exploring fully marking system *Data reporting*: **FAD plans**	**CMM 17-01** **350** *DFADs with activated instrumented buoys*	Yes

Conclusions & Recommendations

1. PROVISION OF DATA ON FADS

CPCs are required by Resolution C-16-01 to provide data on FADs for the previous calendar year "no later than 60 days prior to each regular meeting of the SAC", and the scientific staff of the IATTC is required to present a preliminary analysis of that information to the SAC. However, given the many other tasks required of the staff in preparation for the meeting of the SAC, this does not allow sufficient time for a thorough analysis of the data, therefore more timely provision of data is desirable.

RECOMMENDATION:

CPCs should provide the FAD data from each fishing trip to the IATTC staff as soon as they receive them at the end of that trip.

Conclusions & Recommendations

2. UPDATES OF FAD DATA COLLECTION FORMS

FAD form 9/2016 (Annex 1) and the IATTC Flotsam Information Record (Annex 3) are reasonable sources of data on FAD structures, characteristics, and associated catch, and they record a large part of the data necessary to assess the impacts of FADs on the ecosystem. However, they are not designed to track floating objects over time, and the resulting lack of tracking data is impeding scientific research.

RECOMMENDATION:

Modify FAD form 9/2016, and the observer program's Flotsam Information Record, to include new fields that will enable FADs to be tracked over time

Conclusions & Recommendations

3. PROVISION OF HIGH RESOLUTION BUOY DATA AND ADDITIONAL CONTROL MECHANISMS

Resolution C-17-02 limits the number of active FADs that a vessel may have at any one time, and allows activating FADs "exclusively aboard a purse-seine vessel". Also, it states that "a FAD is considered active when it: (a) is deployed at sea; and (b) starts transmitting its location and is being tracked by the vessel, its owner, or operator". The data currently requested from the buoy manufacturers contain a single data point per vessel per day, the selection criteria for which are still unclear. These data may not have a high enough resolution to allow validation of compliance with these requirements, especially on-board activation, but some simple measures may help to improve monitoring of the number of active FADs per vessel in the context of Resolution C-17-02.

RECOMMENDATION:

CPCs should provide to the IATTC staff:

(a) the same raw buoy data received by original users (i.e. vessels, fishing companies).

(b) Vessel Monitoring System (VMS) data to assess compliance with respect to Resolution C-17-02 more robustly.

Conclusions & Recommendations

4. REVIEW AND REFINE THE TEXT OF RESOLUTIONS C-16-01 AND C-17-02 WITH REGARDS TO FAD ISSUES

Some terms and language in Resolutions C-16-01 and C-17-02 are unclear and/or undefined, or conflict with definitions used in other IATTC programs or other t-RFMOs. For example, the definition of a FAD in the AIDCP observer manual is different to that of Resolution C-16-01, the terms “active FAD” and “operator” in C-17-02 are not defined, nor is the distinction between “vessel” and “owner”. Also, as noted in Sections 2.1.3 and 2.2.3, there are apparent assumptions made in the resolutions that should be clarified and resolved, and apparent oversights, such as not requiring unmonitored natural floating objects to be reported, should be rectified. A partial list of such terms is included in Annex 4.

Some of this work could be carried out in coordination with the ad-hoc working group established under Resolution C-17-05 to review the legal and operative coherence of IATTC resolutions.

RECOMMENDATIONS:

1. Define and/or clarify terms and concepts used in instruments and documents related to FAD issues.

2. As appropriate, standardize and harmonize the terminology related to FAD issues used in different ocean regions, especially within tuna RFMOs.

Conclusions & Recommendations

5. AN EFFECTIVE AND RELIABLE FAD MARKING SCHEME

Monitoring and tracking FADs consistently from the moment of deployment is key to a better understanding of the effects of these devices on the fishing strategy of the fleet, as well as on the ecosystem and the exploited resources. The most effective way to mark and monitor FADs has been widely discussed globally in recent years by scientists, managers, and other stakeholders, but has not been implemented yet. Considering that proper FAD marking and identification would enable progress on many scientific questions, developing a robust and effective FAD marking scheme should be a priority.

RECOMMENDATIONS:

Conduct field research on FAD marking to develop a robust and effective FAD identification scheme supported by the fishing industry, managers, and scientists (Document SAC-09-02, Proposal C.1.a)

Conclusions & Recommendations

6. THE WEB-BASED SECURE FAD DATABASE

FAD data are currently collected using different forms, and may not be easily accessible and ready to store and use efficiently. As a natural step in the technological era, cloud-based databases should be developed to advance in this field, where a variety of data can be merged in a single database that reduces the workload for captains and accelerates data availability and reliability.

RECOMMENDATION:

Develop a secure, remotely-accessible, web-based database that includes all available information on FADs (activity, structures, identification, etc.).

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Questions