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System of verification of the code of good practices on board ANABAC and OPAGAC tuna purse seiners and preliminary results for the Atlantic Ocean

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Summary

Spanish tuna purse-seiner organizations ANABAC and OPAGAC established in 2012 a common agreement for the application of good practices for responsible tuna purse-seine fisheries. The aim of this agreement is to reduce the mortality by entangling or by incidental catch of FAD-associated sensible species (sharks, rays/mantas whale sharks and sea turtles). The good practices defined in this agreement comprise the use of non-entangling FADs as well as the application of release operations for FAD-associated sensible fauna.

In order to monitorize and assess the actual level of application of these good practices, a system of verification is being implanted in all the vessels of the ANABAC and OPAGAC fleets – i.e. 59 purse seiners and 19 supply vessels in April 2015, including both Spanish flags and other flags – operating in the 3 Oceans, in areas corresponding to 4 tuna RFMOs (ICCAT, IOTC, WCPFC and IATTC). This verification is based on in-situ registration of the good practices by observers.

This document presents the initial situation (October 2014) in terms of application of good practices, the training for crew and observers, and the first data of good practices observed in the Atlantic Ocean (34 fishing trips on 19 vessels since December 2014). These first results are overall encouraging, with a majority of vessels displaying a level of compliance superior to 80% for non-entangling FADs and reaching 100% for fauna release operations. In the case of boats with lower levels of compliance, significant progress could be observed in consecutive fishing trips.

Key-words: non entangling FADs, bycatch mitigation, sharks, rays, turtles, observers, purse-seine

1. Introduction

Spanish tuna purse seiners organizations ANABAC and OPAGAC established in February 2012 a common agreement for the application of good practices in the tropical tuna fleet (purse seiners and supply vessels). The goal of this self-imposed initiative is to reduce the mortality by entangling or by incidental catch of FAD-associated sensible species (sharks, rays/mantas whale sharks and sea turtles). The good practices defined comprise the use of non-entangling FADs and the application of release operations for FAD-associated sensible fauna.

In order to assess the actual level of application of these good practices in the fleet, a system of verification is being implanted in all the vessels of the ANABAC and OPAGAC fleets – i.e. 60 purse seiners and 19 supply vessels in April 2015, including both Spanish flags and other flags – operating in the 3 Oceans, in areas corresponding to 4 tuna RFMOs (ICCAT, IOTC, WCPFC and IATTC). This verification is based on in-situ registration of the good practices by observers. This implies a 100% coverage of the fleet by observers.

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This document presents the initial situation (October 2014) in terms of application of good practices, the training for crew and observers, and the first data of good practices observed in the Atlantic Ocean.

2. Materials and Method

2.1. Analysis of initial situation

The initial situation was assessed through questionnaires distributed to all skippers in October 2014. The goal of the questionnaires was to know the level of use of non-entangling FADs (both raft and submersed part) and of application of fauna release operations. The questionnaire was composed of 38 detailed questions regarding the observer coverage, the structure of the raft and of the submersed part of the FADs used, and the different possible release operations for sharks, rays/mantas, whale sharks and sea turtles. The answers of the skippers are presented in section 3.1.

2.2. Training

To help skippers to identify the correct way of designing FADs as well as safety measures and fauna release operations, a short guide has been designed and is being distributed. Details of correct handling of fauna are given, focusing both on crew safety and on avoidance of damages to the animals.
For the observers, training sessions are being done in the different structures taking part into the observation. These training sessions comprise (1) a general overview of the use of FADs in tuna purse-seine fishery, the related impact on non-targeted fauna and the mitigation measures, (2) instructions on how to identify and describe fauna release operations and FADs through ad-hoc forms, and (3) exercises to train the observers for filling the corresponding forms.

2.3. Associated cost

The observation of the good practices implies 100% coverage of the fleet. The global cost of this coverage is over 2.5 million euros per year (Table 1).

Table 1: cost of the observation onboard ANABAC and OPAGAC vessels in the three oceans.

	Atlantic	**Indian**	**Pacific**
Year, all vessels	1.209 M€	882 000€	485 000€

In addition, specific equipment for fauna release (such as hoppers, lateral doors, specific conveyor belt) are fitted on the boats, their cost ranges from 1000 to 2500 euros per vessel.
Finally, the use of non-entangling FADs also has an additional coast. The price per FAD is around 4-7 times the cost of old entangling FADs (table 2).

Table 2: cost of the entangling and non-entangling FADs

	Atlantic	**Indian**	**Pacific**
Old, entangling FADs, unit	27.50€	27.50€	27.50€
Non-entangling FADs, unit	122-191€	122-191€	160-170€
% of initial cost	444-695%	444-695%	582-618%

2.4. In-situ observation

The release of sharks, rays, whale sharks and sea turtles is registered through specific forms named B2 (for sharks) and B3 (for whale sharks, rays and turtles), see fig. 1 and fig. 2).

These forms refer to the current form B used to describe the characteristics of the fishing set. A specific form (B2) was prepared for sharks only, because they can occur in important amounts in a fishing set. Whale sharks, rays and turtles appear usually in smaller amounts, so they were associated in a same form B3. The forms B2 and B3 register the characteristics of each individual release, through four fields:

- a general field regarding individual characteristics (species, size, and sex if identifiable)
- a field in which the release mode is registered. Five release modes are accepted for sharks in the code of good practices: (1) using the brailer, (2) using light equipment such as stretcher, fabric, sarria or cargo net, (3) using specific equipment such as a hopper or lateral doors, (4) manually from deck or (5) after disentangling. In case of observing a non-conform release (e.g. handling a shark with a rope), the observer ticks the corresponding case and mentions the reason of the non-conformity: RI (residual unavoidable mortality: the animal comes dead, or is not detected and is kept on board, o is detected in lower deck and cannot be handled safely); M (lack of material to handle the animal properly and safely); NC (not complying: good practices are not applied although the conditions allow their application)
- a field to register the time at which an animal is detected and the time at which it is released, so as to measure the amount of time required to release each animal.
- a field to estimate the state of the animal when it is released at sea. If they can be observed, the eyes, the head, the fins, the skin and the gill slits of each released animal are scored P ("perfect", no damage), M ("moderate", moderate damages), S ("severe", important damage with a risk for the animal's survival) or U ("unknown", could not be observed). These elements, together with the release mode and the release time, give an indication on the animal's ability to survive after release.

The form B3 has a similar structure (figure 2), only the release modes and the body parts differ, as they correspond to each group of animals (whale sharks, rays, turtles).

The FADs detailed characteristics are also registered through a specific form named D2 (figure 3) and referring to the actual form D relative to FAD general characteristics. This form D2 registers:

- the material of the FAD, so as to discriminate objects made of wood and vegetable elements from plastic or metallic objects
- the superior and inferior coverage of the FAD, for which three possibilities are allowed by the code of good practices (non-covered, covered with net whose mesh size is < 3cm, covered with non-meshed material), and one considered entangling (covered with net whose mesh size is > 3cm)
- the subsurface structure, for which three types are allowed by the code of good practices (net gathered in sausages, open net with mesh size is < 3cm, ropes or other non-meshed material) and one considered entangling (open net with mesh size > 3cm).

The presence of single pieces of net in the subsurface part and their mesh size are also registered.

- the presence of other components (plastic containers, corks…)
- the fact of modifying or replacing the raft or the subsurface structure.

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Verification of Good Practices ANABAC/OPAGAC

RELEASE OF ASSOCIATED FAUNA

Form **B2** version 2015

fishing set n°:	Date:	fishing trip code
route form n°:	route line n°:	

fauna liberation form n°:

strapping start time			
h	h	m	m

Released fauna - sharks (1 line by individual, see example)

	individual			release mode								time		(4) state of the animal				
	(1) species	(2) size	(3) sex	using brailer	by stretcher, fabric, sarria, cargo net	with specific equipment	manual from deck	after disentangling	non conform	reason of non conformity (6)		animal detected	animal released	eyes	head	fins	skin	gill slits
0	FAL	140	2					1				7:35	7:47	P	P	M	M	P
1																		
2																		
3																		
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30																		

Notes (5):

(1) put species code - see usual observers handbook. (2) in centimeters Data verified

(3) sex: 1 male; 2 female; 3 undetermined (4) score: P ("perfect") intact, no damage; M ("moderate") superficial damages; S ("severe") damages with important risk for survival; U ("unknown") cannot be observed.

(5) if photos of the individuals were taken, mention code of the corresponding photos **(6)** RI (residual unavoidable mortality: the animal comes dead, or is not detected and is kept on board, o is detected in lower deck and cannot be handled safely); M (lack of material); NC (not complying: good practices are not applied although the conditions allow their application

If more than 30 individuals are released, continue on a new form

Figure 1: form B2 used to register the information of shark releases

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Verification of Good Practices ANABAC/OPAGAC

RELEASE OF ASSOCIATED FAUNA

Form **B3** version 2014

fishing set n°:	Date:	fishing trip code
route form n°:	route line n°:	
fauna release form n°:		strapping start time (h h m m)

Released fauna - whale sharks, rays (1 line/individual, see example)

	individual			release mode									time		(4) state of the animal				
	(1) species	(2) size	(3) sex	drowning the corks	notch in the net	using the brailer (small shark)	using the brailer	by stretcher, fabric, sarria, cargo net	with specific equipment	manual from deck	non conform	reason of non conformity (6)	animal detected	animal released	eyes	head	fins	skin	gill slits
0	RHN	520	3	1									7:49	8:36	P	P	M	M	P
1																			
2																			
3																			
0	RMB	120	2							1			8:44	8:49	P	P	M	M	P
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			

Released fauna - turtles (1 line/individual, see example)

	individual			release mode					onboard 1d	time		(4) state of the animal				
	(1) species	(2) size	(3) sex	after disentang.	manual from deck	through removing net/plastic remains or hook	non conform	reason n.c.		animal detected	animal released	eyes	head	legs	skin	shell
0	TTL	90	1		1					9:04	9:21	P	P	P	M	P
1																
2																
3																
4																
5																
6																
7																

Notes (5):

(1) put species code - see usual observers handbook. (2) in centimeters Data verified

(3) sex: 1 male; 2 female; 3 undetermined (4) score: P ("perfect") intact, no damage; M ("moderate") superficial damages; S ("severe") damages with important risk for survival; U ("unknown") cannot be observed.

(5) if photos of the individuals were taken, mention code of the corresponding photos **(6)** RI (residual unavoidable mortality: the animal comes dead, or is not detected and is kept on board, o is detected in lower deck and cannot be handled safely); M (lack of material); NC (not complying: good practices are not applied although the conditions allow their application

Figure 2: form B3 used to register the information of whale sharks, rays and turtle releases.

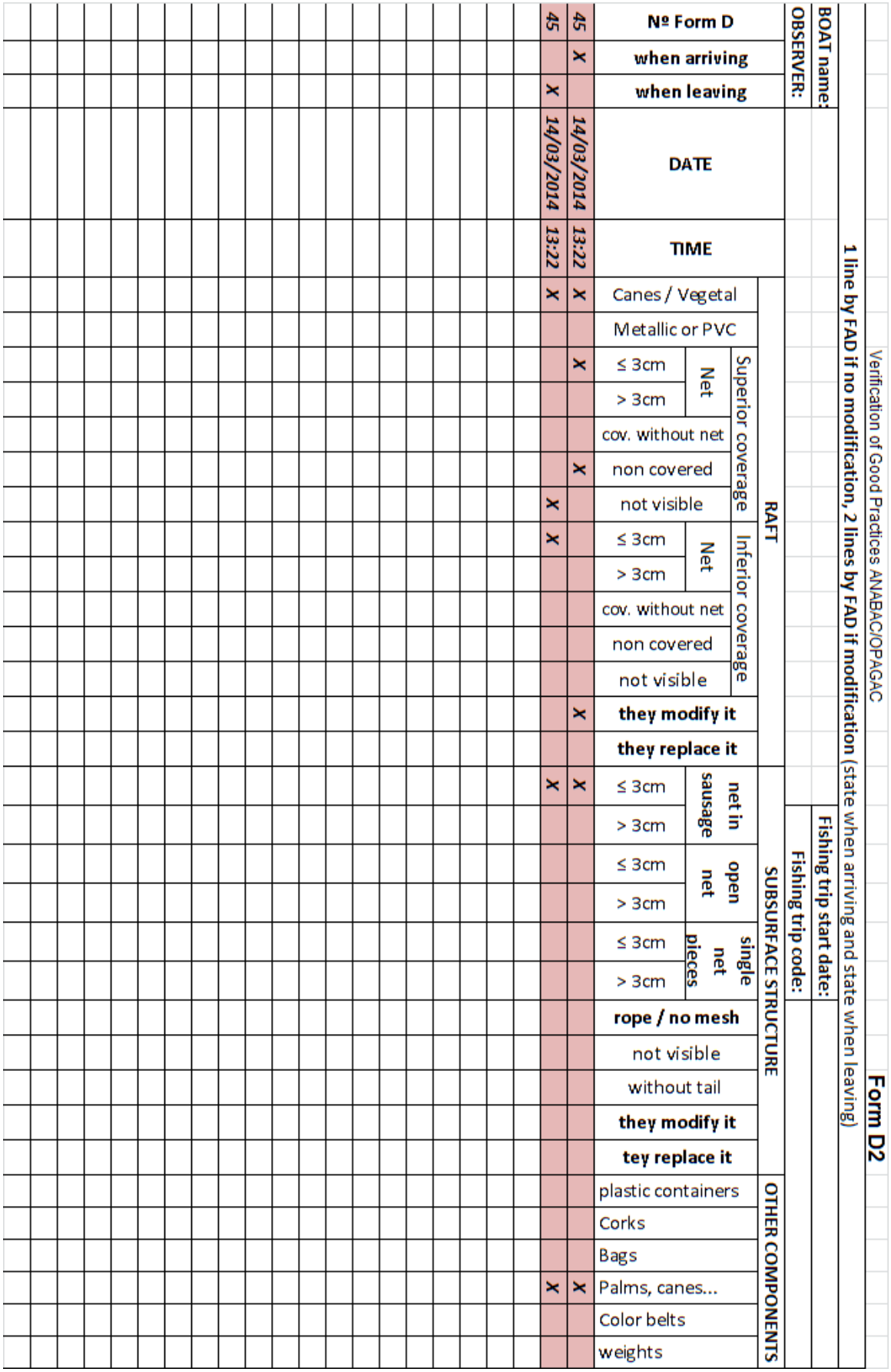

Figure 3: form D2 used to register the characteristics of FADs and to determine their entangling or non-entangling nature.

3. Results and discussion

3.1. Initial situation (skippers' declarations)

All the skippers use at least one of the non-entangling FAD types defined in the code (raft and submersed part). According to skippers' replies, FAD structure is non-entangling for 98.5% of rafts and 100% of subsurface structures. The most frequent raft coverage used is a non-entangling material such as fabric or sisal canvas (96%) and the second most used is net with mesh size < 3cm (57%) – see figure 4.

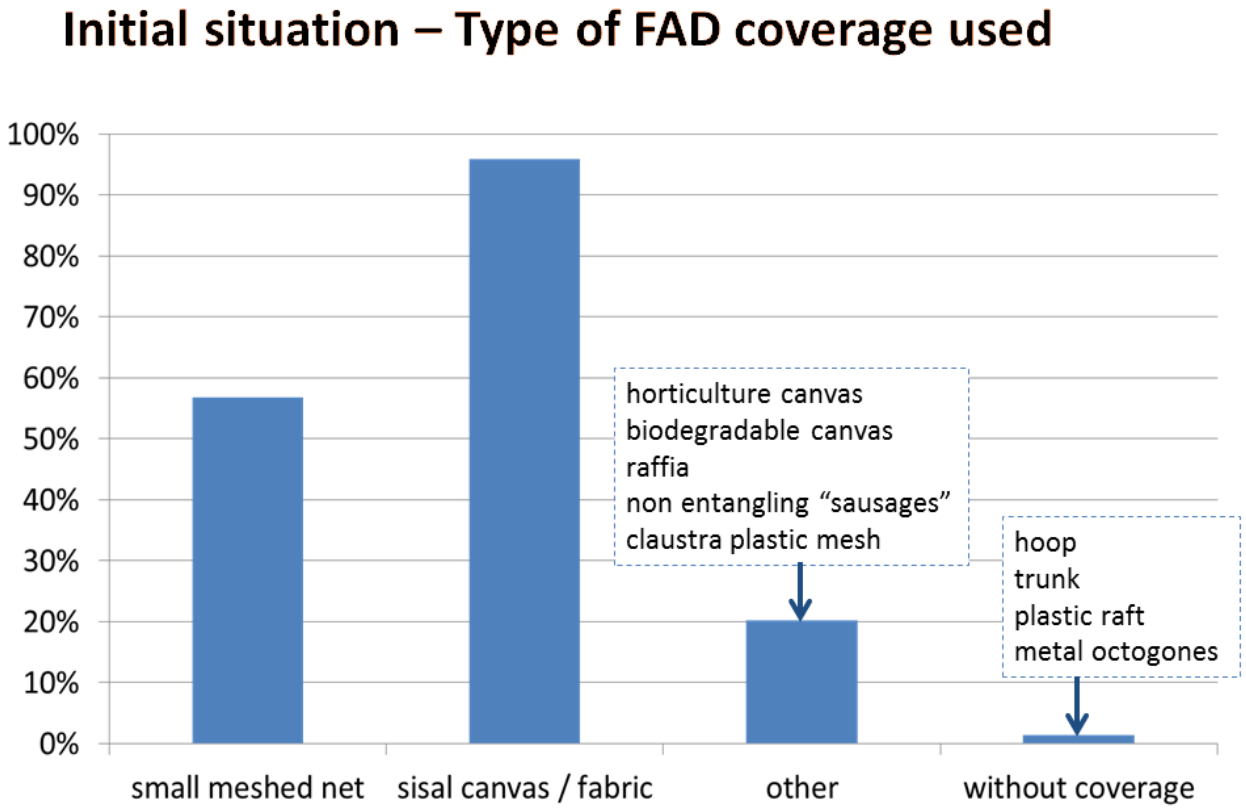

Figure 4: types of FAD coverage used by the ANABAC/OPAGAC skippers

Regarding the subsurface structure, the most frequent types used are old nets rolled in sausages (77%) and small meshed nets (65.2%).

Fauna release operations are applied by 93,7% to 100% of the skippers, depending on the species; 100% were reached in the case of turtles.
In the case of sharks, 93.7% of skippers declared they are released manually from deck. In the case of rays, 87% of skippers declared they are usually released manually from deck, 68% can use the brailer to extract them directly from the purse seine, 56% use light equipment such as stretchers, "sarria" round nets, cargo nets or tarpaulins. For whale sharks most skippers (97%) drown the cork line of the net when they detect a whale shark, so as to let it swim out of the purse seine.

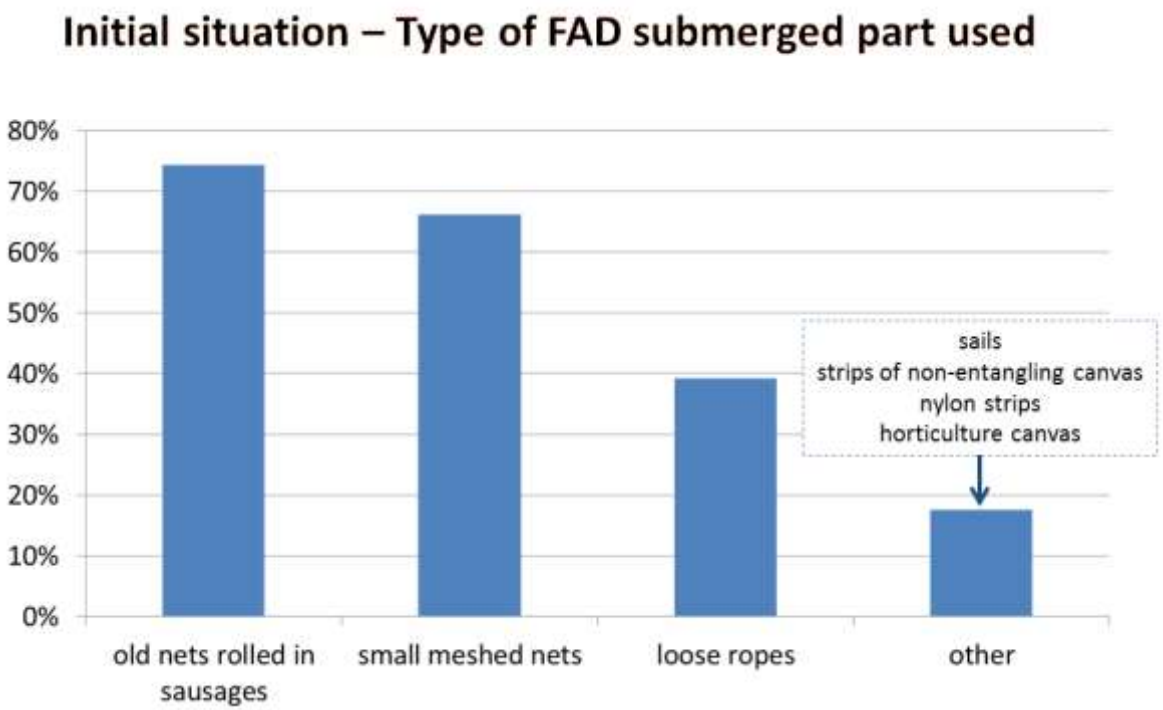

Figure 4: types of FAD coverage used by the ANABAC/OPAGAC skippers

3.2. In-situ observation in the Atlantic Ocean

We present here preliminary results corresponding to data from 19 vessels operating in the Atlantic Ocean. FADs structure and fauna release operations were observed on these boats between December 2014 and June 2015. Among these 19 boats, the use of FADs with non-entangling raft was superior to 80% in 59% of the fishing trips observed, and the use of FADs with non-entangling submersed part was superior to 80% in half of the fishing trips (Figure 5).

The cases of non-conformity were due to partial information of skippers. As a matter of example one of the skippers believed that the subsurface part should be non-entangling from the surface to 20m depth, and considered that large meshed open nets below 20m were harmless. This situation was easily solved through providing more detailed information and advice on FAD design. Another reason of the non-conformity is the necessary period to substitute all old entangling FADs by new non-entangling FADs. This work is still in progress in some regions, which also explains the lower rates of conform FADs observed in some areas.

One interesting feature was the progress made by several vessels in which consecutive fishing trips could be observed. This was the case for 6 vessels noted e, k, l, o, q and r on figure 5. In several of them the progresses between two consecutive trips were dramatic, for example for vessels e, k and r (figure 5).

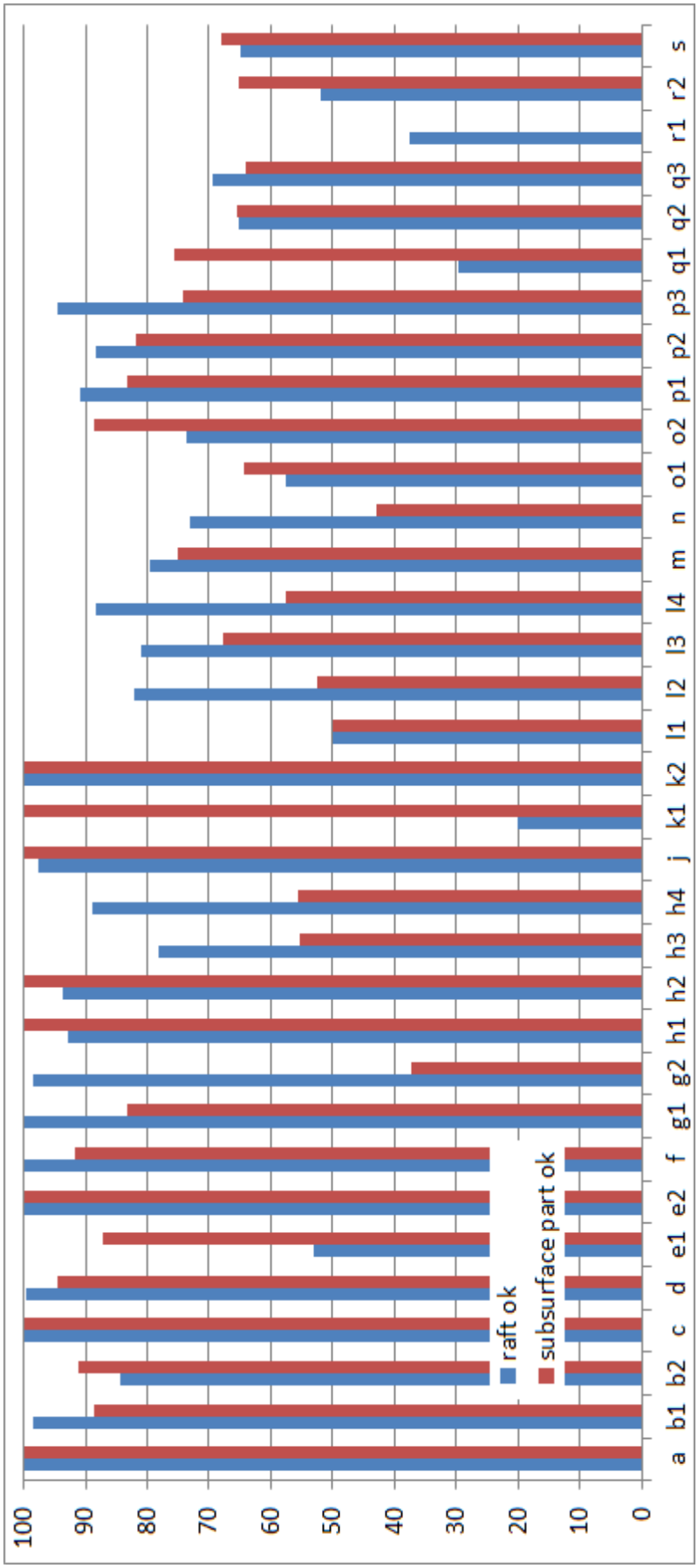

Figure 5: percent of conform rafts and subsurface parts observed on FADs used by each of 34 fishing trips surveyed. Letters in the x-axis correspond to vessels, associated numbers correspond to consecutive trips observed on the vessel

In the case of by-catch releases, the rate of conform release for sharks and rays was superior to 90% for most vessels (Figure 6 and 7). The operations were 100% conform in 15 of 25 trips in the case of sharks (Figure 6) and in 11 of 19 trips the case of rays (Figure 7). In the case of sharks, similarly to the progresses made for FAD structure, we could observe progresses between consecutive trips of a same vessel, through improvement of shark detections and handling. This was the case for vessels noted b, o and q.

In the results we present here, we did not classify yet the non-conform releases into inevitable, due to a lack of material or due to non-compliance. The actual rate of non-conformity due to non-compliance is therefore inferior to the global rate of non-conformity exposed in the present document.

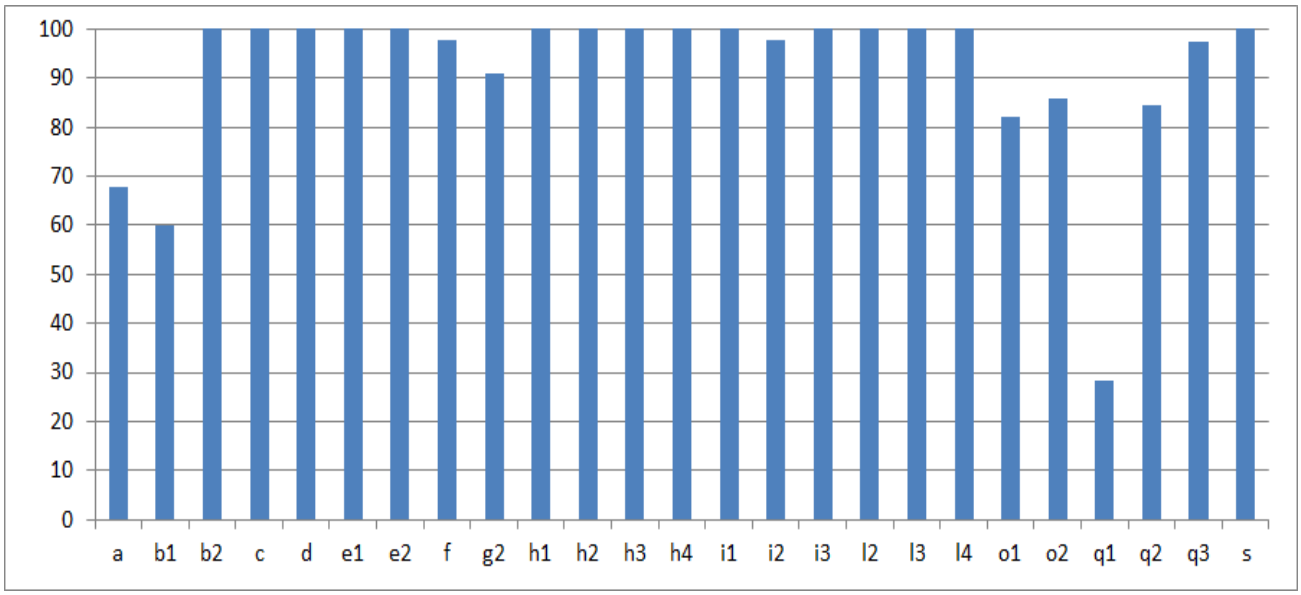

Figure 6: percentage of conform shark releases on each of the fishing trips surveyed in which sharks were bycaught. See Fig.5 for x-axis labels.

In the case of rays, the most dramatic progress was made by vessel q shifting from 0 to 100% of correct releases from one trip to the next one (Figure 7).

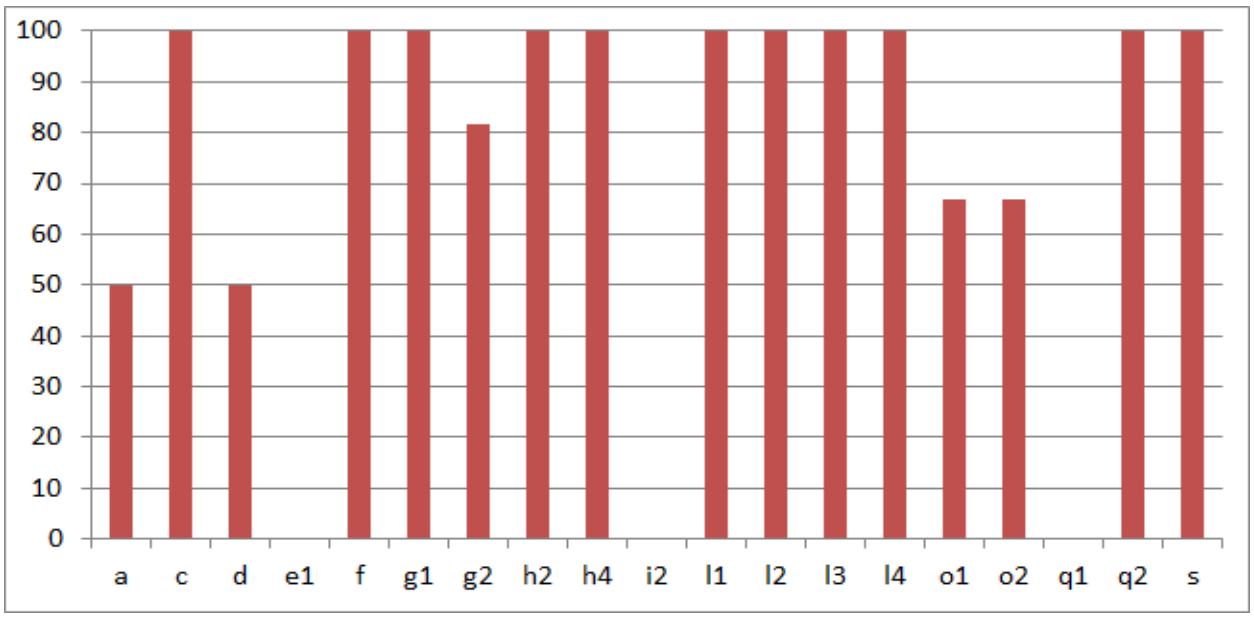

Figure 7: percentage of conform ray releases from each of the nine vessels surveyed in which rays were bycaught. See Fig.5 for x-axis labels.

An important feature to take into account in the case of rays is the size of the animals. The lower correct release rates observed were due to a lack of material, which made the manual release of large rays (frequently over 250 cm) unsafe for the crew when the animal was detected on deck and could not be released earlier. Improvements are expected from the installation of adequate material for ray release (such as tarpaulin, cargo nets etc. associated with a crane).

We also need to take into account that the overall number of rays released in the totality of the surveyed vessels was low (n=60) and that correct release rates when considered by individual vessel are based on a very low number on individuals. In particular, the three cases in which the correct release rates were 0% correspond to either one or two individuals, whereas the fishing trip with the highest number of rays observed (n=7) had a correct release rate of 100%. The overall rate of correct release for rays is 78.63%.

For turtles, the operations observed so far were 100% conform in 20 of 21 fishing trips in which turtles were bycaught (figure 8) and 92.3% in the remaining one.

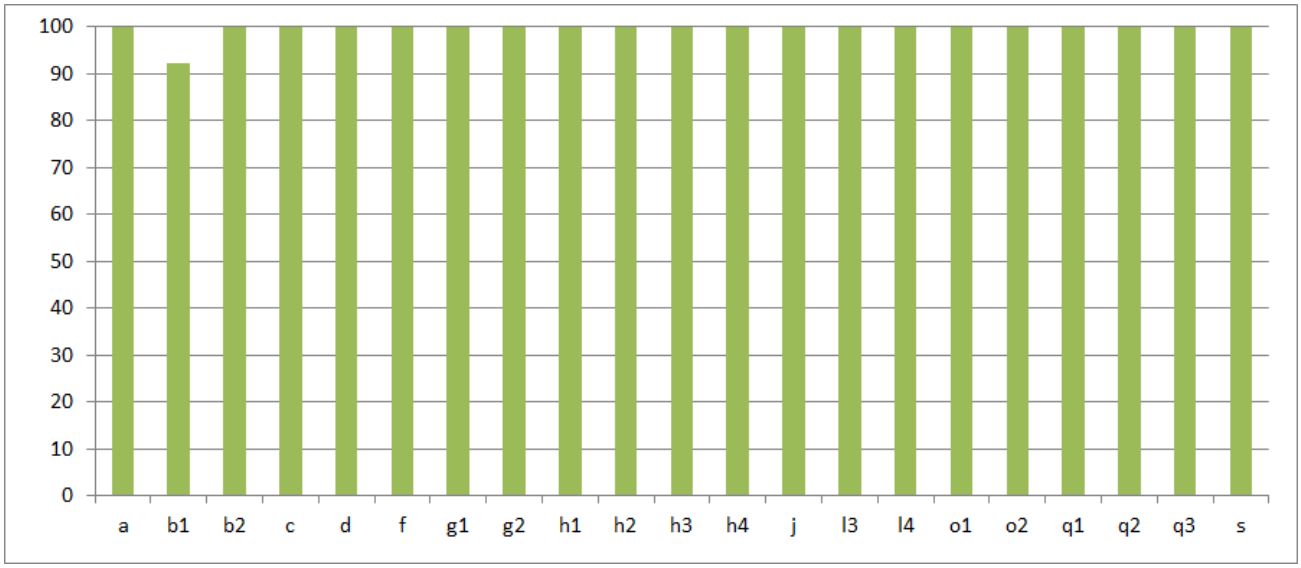

Figure 8: percentage of conform turtle releases on each of the fishing trips surveyed in which turtles were bycaught. See Fig.5 for x-axis labels.

Most rays were released either directly from the purse seine using the brailer or manually from deck. Most sharks and turtles were released manually from deck.

The registered release time was overall short (figure 9). 75% of sharks were released in the first five minutes after detection (59% after three minutes); more than 65% of rays were released in the first five minutes after detection and 87% of turtles were released in the first four minutes (34% in the first minute).

These first results are overall encouraging, on the one hand in terms of correct fauna release operations (reaching 100% in most vessels) and on the other hand in terms of progresses made by individual vessels during consecutive fishing trips. We expect similar results in the Indian and Pacific Ocean where the observation started later, and we expect a full conformity of both FADs and release operations in the short term.

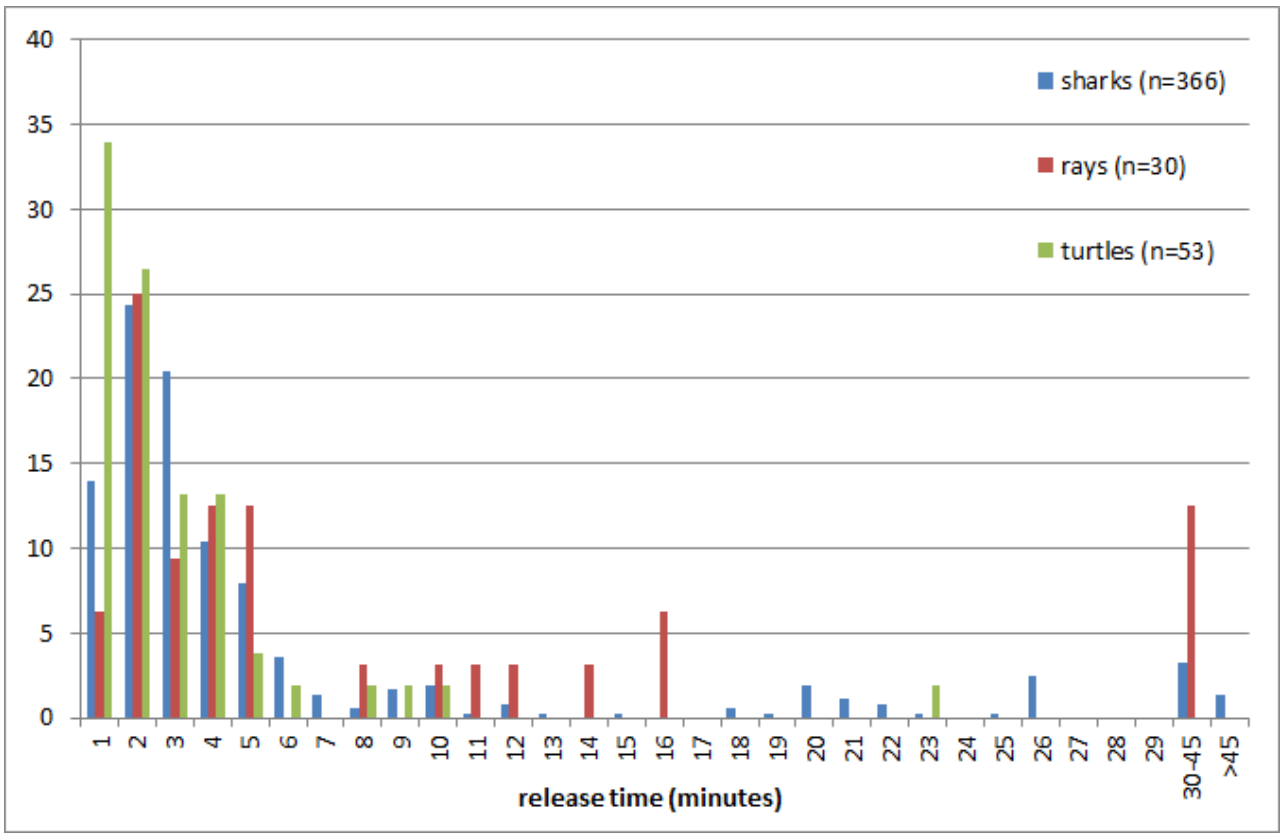

Figure 9: distribution of the release time of sharks (blue bars), rays (red bars) and turtles (green bars) from 9 purse seiners in the Atlantic Ocean between December 2014 and March 2015.