



## At-sea tests of releasing sharks from the net of a tuna purse seiner in the Atlantic ocean (SCRS/2019/029)

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**ISSF** INTERNATIONAL  
SEAFOOD  
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# 1.INTRODUCTION

## ISSF at-sea research

- In order to define and test technical solutions to bycatch reduction, **ISSF conducts at-sea research cruises to investigate potential mitigation measures centered on tropical tuna purse seine fisheries operating with floating objects.**
- **Seventeen** research cruises have been conducted in the western Indian Ocean, Eastern Pacific, Western and Central Pacific and Atlantic Oceans **since 2011** ([Restrepo et al., 2018](#))

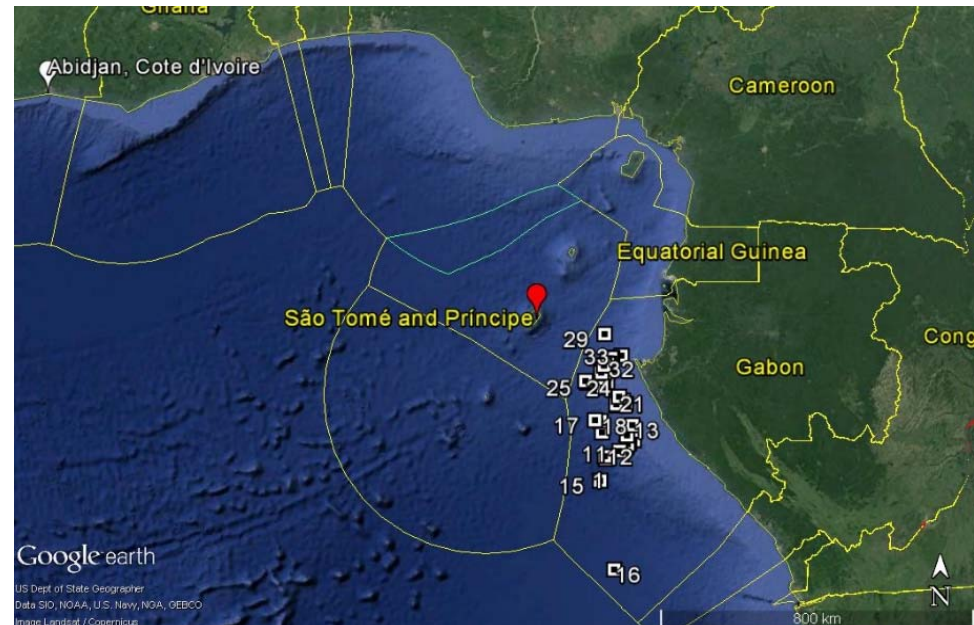


- This report summarizes the activities of the **fourth ISSF bycatch reduction research cruise in the Atlantic Ocean** onboard the purse seine vessel PACIFIC STAR

## 2a. CRUISE DESCRIPTION

- VESSEL:
  - PACIFIC STAR (Curaçao flag)
  - 107 m tuna purse seiner built in Spain in 1990 with 3,500 m<sup>3</sup> of fish hold volume
- DATES:
  - 25 June 2018 (Cote d'Ivoire) – 21 July 2018 (Sao Tome)
- TEAM:
  - ISSF-supported scientists Melanie Hutchinson, Alfredo Borie and Alexander Salgado (who also served as observer onboard)
  - technical support provided by the vessel captain and crew

➤ A total of **40 sets** were made in the EEZ of Gabon



## 2b. CRUISE OBJECTIVES



### (1) Estimate post-release survival of sharks (from the net)

- To estimate the survival rate of juvenile silky sharks caught inside the net (with handlines) then released outside the net using satellite tags



### (2) Test the feasibility of crew members releasing sharks (from the net)

- To test the feasibility of the above method being utilized by the crew to remove sharks from the net.



### (3) Estimate post-release survival of whale sharks (from the net) – *opportunistically*

- Assess survival of whale sharks released from the net



### (4) Estimate post-release survival of rays (from deck) – *opportunistically*

- Assess survival of mobulid rays released from the deck.

## 3.1 Materials, methods and results



### (1) Estimate post-release survival of sharks (from the net)

- Scientists used the 5 m **'panguita' boat (35-50 minutes)**.
- **Stretcher** was made out of two PVC pipes forming a V, heavy metal chain to sink the opening and two layers of small mesh FAD netting.
- Sharks were captured using **handlines composed of small circle hooks** with depressed barbs, 0.5 meters of braided wire leader to 20 m of nylon line.
- Captured sharks were tagged with satellite **miniPAT tags (180 days)**
- Sharks were **released with the hook** to simulate the condition of release by commercial fishers

## 3.1 Materials, methods and results

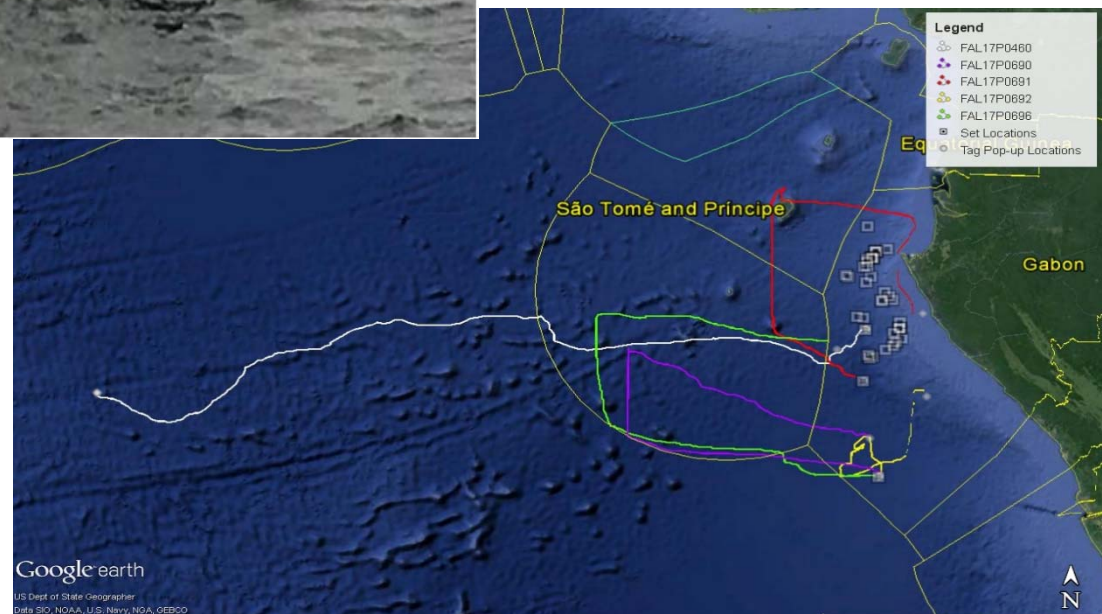


### (1) Estimate post-release survival of sharks (from the net)

- Tested during all FAD sets (n=3) and during 6 free-school sets
- Sharks were only hooked and captured on **FAD sets (all juvenile FAL)**
- There were additional sharks landed via normal fishing operations (entangled or brail)
- All **miniPATs** released before the 180-day period due to malfunction (53-118 days), but **none in the first 10 days ~ indicator or shark survival**
- Assumed all 5 tagged FAL survived the fishing interaction

Date	Set	Species	Sex	TL/DW	Tag serial	Released from	Release Condition	Fate	Deployment period (days)
3-Jul-18	11	<i>Carcharhinus falciformis</i>	F	105 cm	17P0460	Fished from net	Excellent	Survivor	57
6-Jul-18	15	<i>Carcharhinus falciformis</i>	F	120 cm	17P0691	Fished from net	Excellent	Survivor	98
7-Jul-18	16	<i>Carcharhinus falciformis</i>	F	110 cm	17P0690	Fished from net	Excellent	Survivor	118
7-Jul-18	16	<i>Carcharhinus falciformis</i>	M	159 cm	17P0692	Fished from net	Excellent	Survivor	53
7-Jul-18	16	<i>Carcharhinus falciformis</i>	M	106 cm	17P0696	Fished from net	Excellent	Survivor	85

**Figure 2.** Stretcher configuration prior to adding the netting (left) and use at sea (right).



## 3.2 Materials, methods and results



(2) Test the feasibility of crew members releasing sharks (from the net)

- **Only one scientist** onboard the panguita, with **2 crew members** doing the shark fishing
- Scientist would count the number of sharks caught and released outside the net, document any difficulties encountered and measure time needed.
- Sharks would **not be tagged**



## 3.2 Materials, methods and results



(2) Test the feasibility of crew members releasing sharks (from the net)

- There was **no opportunity to conduct this activity**
- **Issues:**
  - the vessel set on FADs in only 3 of the 40 sets
  - The 37 free-school sets almost always contained large adult sharks not biting, probably foraging on tuna schools
  - Large sharks are active and would have been difficult to handle by crew

## 3.3 Materials, methods and results



(3) Estimate post-release survival of whale sharks  
(from the net)

- **PAT tags** were to be used **opportunistically**
- Tagging was done **from the panguita**
- **Tagging pole** fabricated from a  $\frac{3}{4}$ " diameter pipe found onboard the purse seiner

### 3.3 Materials, methods and results



#### (3) Estimate post-release survival of whale sharks (from the net)

- **Three RHN encircled and released** following best practices, **two of them tagged.**
- Two FSC sets:
  - Set #33: one, no tuna losses
  - Set #38: two, but only one could be tagged. **Null set, unclear if due to RHN release maneuvers.**
- **Conditions were ideal** for release in both sets as RHN were facing the bow
- Both tagged RHN **survived the interaction**, but tags were released after reaching critical depth (1,400 m) after 81 and 103 days, respectively.
- **Fate: One deep dive, one unsure.**

# 3.3 Materials, methods and results

Date	Set	Species	Sex	TL/DW	Tag serial	Released from	Release Condition	Fate	Deployment period (days)
15-Jul-18	33	<i>Rhincodon typus</i>	U	> 10 m	17P0687	Sack	Good	Survivor	81
17-Jul-18	38	<i>Rhincodon typus</i>	U	> 10 m	17P0683	Sack	Good	Survivor	103



## 3.4 Materials, methods and results



(4) Estimate post-release survival of rays (from deck)

- **PAT tags** were to be used **opportunistically**

## 3.4 Materials, methods and results



### (4) Estimate post-release survival of rays (from deck)

- Chilean devil rays (*Mobula tarapacana*)
- All in Free-school sets:
  - **Set #30:** target school was missed so the sack, containing 8-10 RMT, was opened to release the rays.
  - **Set #32:** 1 RMT entangled + 2 RMT brailed. All tagged and released using best practices
  - **Set #34:** 8 RMT brailed, 3 tagged, all released using best practices
- Condition when released: 3 fair, 3 good condition
- Fate: 5 probable mortalities in first 2-11 days window. One survival from fair condition, similar path to one of the released RHN.

Date	Set	Species	Sex	TL/DW	Tag serial	Released from	Release Condition	Fate	Deployment period (days)
15-Jul-18	32	<i>Mobula tarapacana</i>	F	275 cm	17P0533	Entangled	Fair	Mortality	2
15-Jul-18	32	<i>Mobula tarapacana</i>	F	299 cm	17P0534	Brail	Good	Mortality	3
15-Jul-18	32	<i>Mobula tarapacana</i>	M	265 cm	17P0618	Brail	Fair	Mortality	3
16-Jul-18	34	<i>Mobula tarapacana</i>	F	269 cm	16P0060	Brail	Good	Mortality	4
16-Jul-18	34	<i>Mobula tarapacana</i>	M	290 cm	17P0540	Brail	Good	Mortality	11
16-Jul-18	34	<i>Mobula tarapacana</i>	M	300 cm	17P0694	Brail	Fair	Survivor	65



## 4.1 Discussion and conclusions

- ❑ ISSF has been researching ways in which **sharks** could be released before they are brailled onboard, which could have an even greater impact on survival than releasing from deck following best-practices
- ❑ Fishing **sharks** while still free swimming inside the net is relatively easy to do in good weather conditions and 100% of those sharks released survived. Issues: depends on weather conditions and not applicable if large sharks/ free school sets. Need to keep testing crew's ability.
- ❑ Opportunistic tagging of **RHN** confirmed previous results that RHN released using best practices have a high survival rate.
- ❑ Releasing **RMT** from deck following best practices may reduce mortality to a small percentage of the animals brought onboard the vessel, but the physiological impacts of the interaction cause delayed mortality in a larger proportion. Alternative mitigation actions, such as avoiding hot spots or releasing them from the sack or while the net is still open, may be more effective



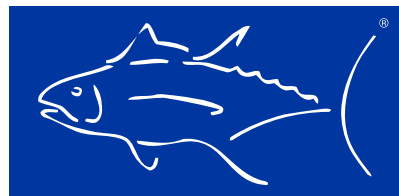
## 4.2 Discussion and conclusions

- ❑ Additional conclusions:
  - ❑ it was observed that while sharks tend to be a more common bycatch in FAD sets than in free school sets, during this cruise sharks were caught in 31 of 37 free school sets, sometimes in large numbers. Also, all RHN and RMT were caught in free school sets.
  - ❑ It would be useful to analyze observer records in order to identify "hot spots" in the eastern Atlantic Ocean
  - ❑ It was also noted that Gabon in July appears to be an important area for feeding and may support several breeding populations of coastal and pelagic teleosts, sharks, rays, turtles and marine mammals.
  - ❑ A better understanding of habitat requirements and times and areas of aggregations of bycatch species is required.

# Acknowledgements



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**Thank You!**