

By-catch reduction in tuna purse seine fisheries with FADs

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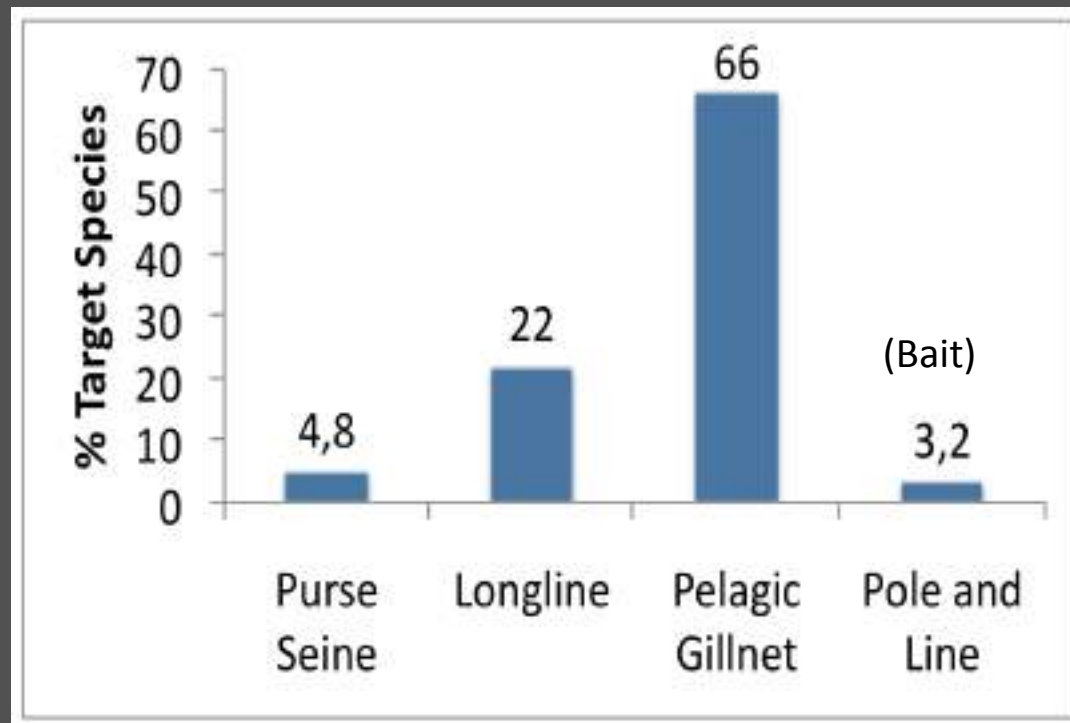
Chair of the ISSF Bycatch Committee

Main projects used to build this presentation:

ISSF Bycatch project – EU FP7 MADE - Orthongel shark and eco-FAD project



Bycatch rates: Comparison of tuna fisheries Kelleher (2005, FAO)



Bycatch as % Target Species (weight)

Bycatch in tuna fisheries

Example on sharks (Murua et al. 2013)



Gillnet: #1 in Indian



Longline: #1 In Western/Eastern Pacific & Atlantic
#2 in Indian



Purse seine: #3 in all oceans (< 5%)



Pole and line (No bycatch)

The tropical tuna fishery and fish aggregating devices (FADs)

60-80% of the catch of purse seiners come from sets on floating objects
40% of the tropical tunas come from purse seine sets made on floating objects



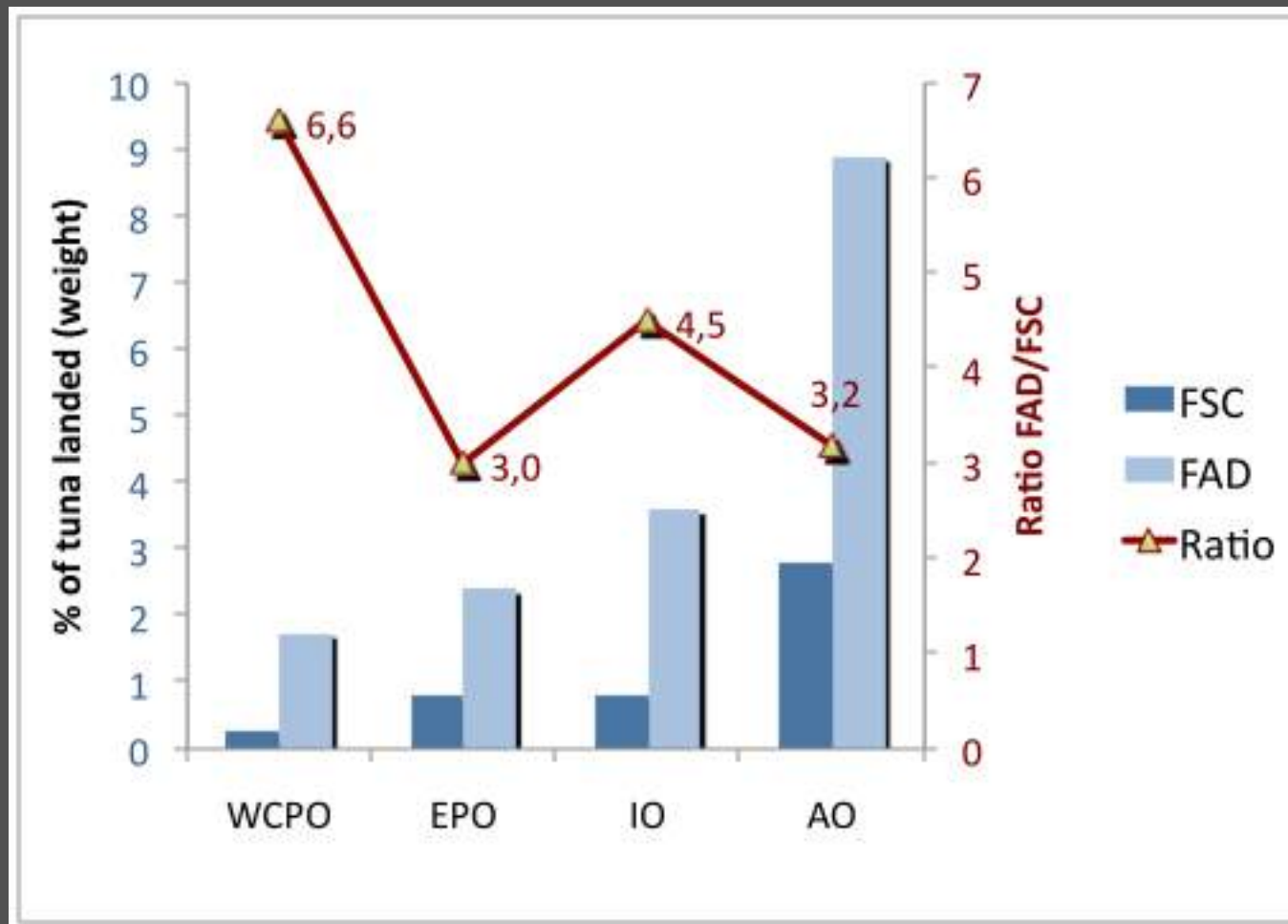
Natural floating objects
(e.g. logs)



Artificial floating objects
(e.g. FADs)

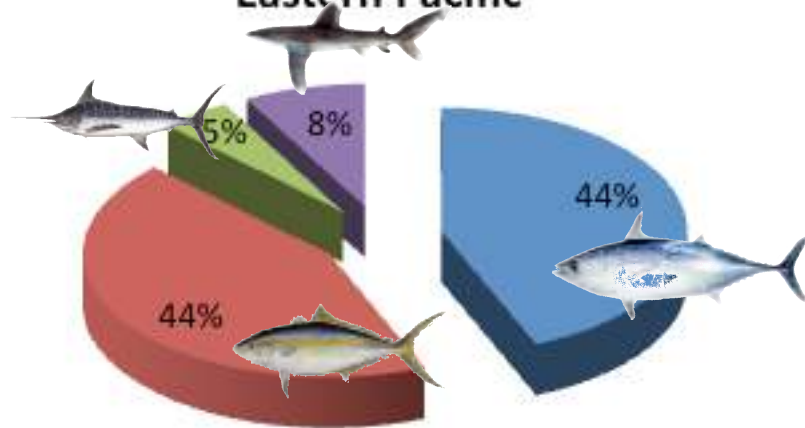


FAD fishing generates 5 times more bycatch than free-swimming school fishing

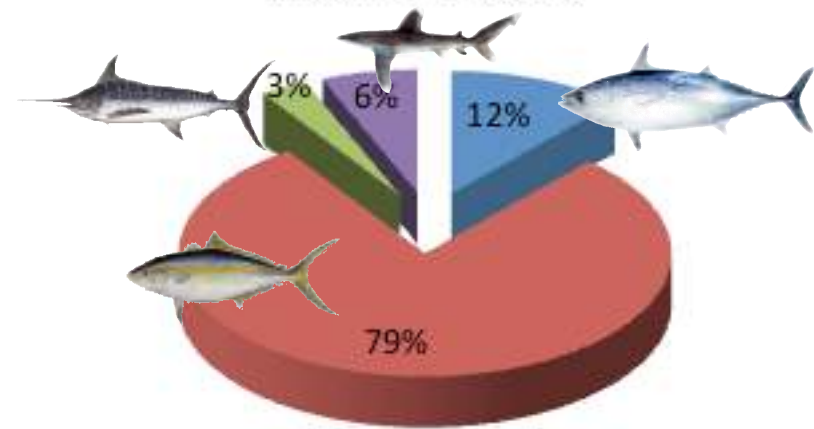


Species composition on FAD sets (≈ 2000-2010)

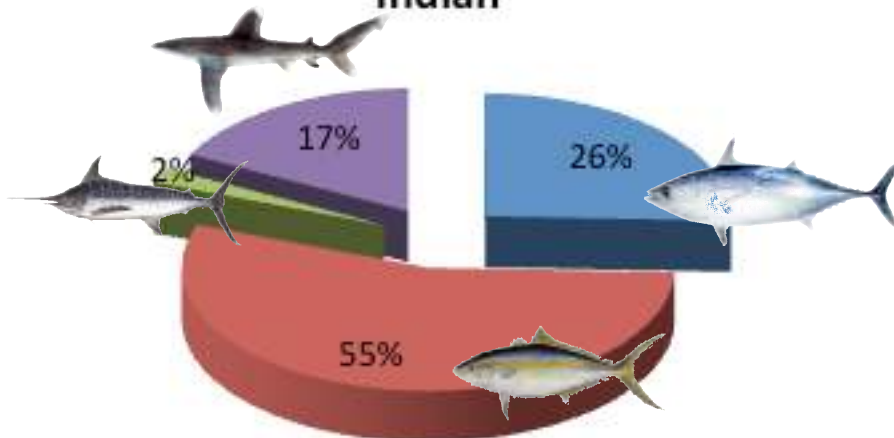
Eastern Pacific



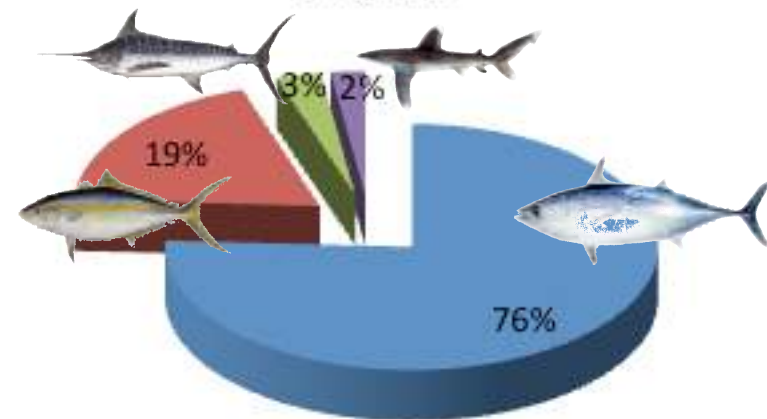
Western Pacific



Indian



Atlantic



Priorities in bycatch reduction in tropical tuna purse seine fishery

Sharks



Small bigeye tuna

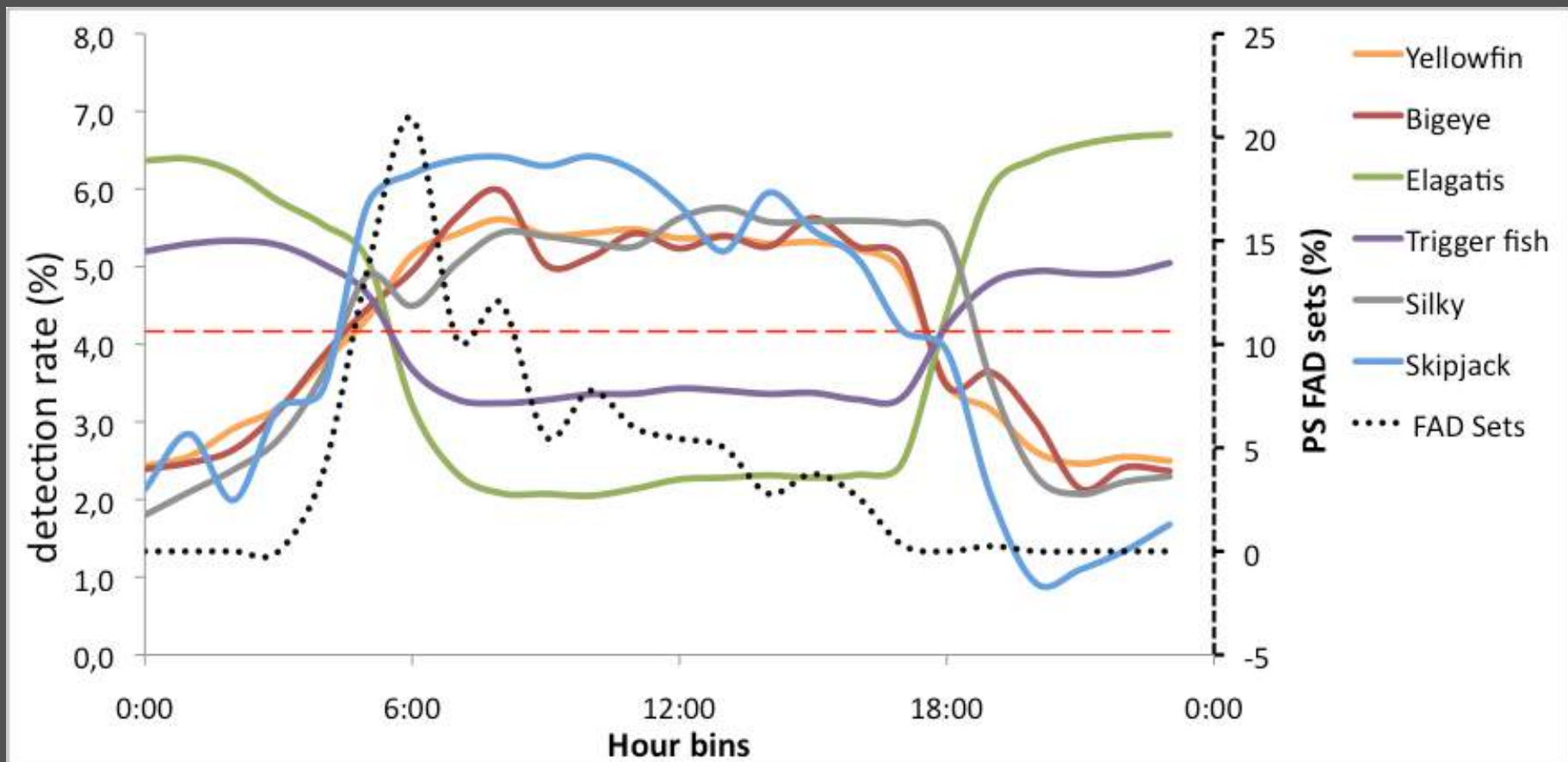


Ecosystem
impacts of FADs



What we have tried and have not shown great results so far

Adjusting time of fishing using behavioral information from acoustic tagging



What we have tried and have not shown great results so far

Attracting sharks away from FADs

FAD (n)	No. of sharks before drift	No. of sharks attracted	Max. distance attracted away from FAD (meters)
1	9	3	500
2	2	1	120
3	3	2	80
4	2	1	80
5	2	2	250



≈ 50%

variability in success of attraction

variability in the distance of attraction

What solutions were found to reduce the mortality of sharks?



#1. A previously unknown source of mortality



Two independent methods have shown the extent of the issue in the Indian Ocean

(Filmlalter et al. 2013 Frontiers in Evol & Env)



Electronic tagging

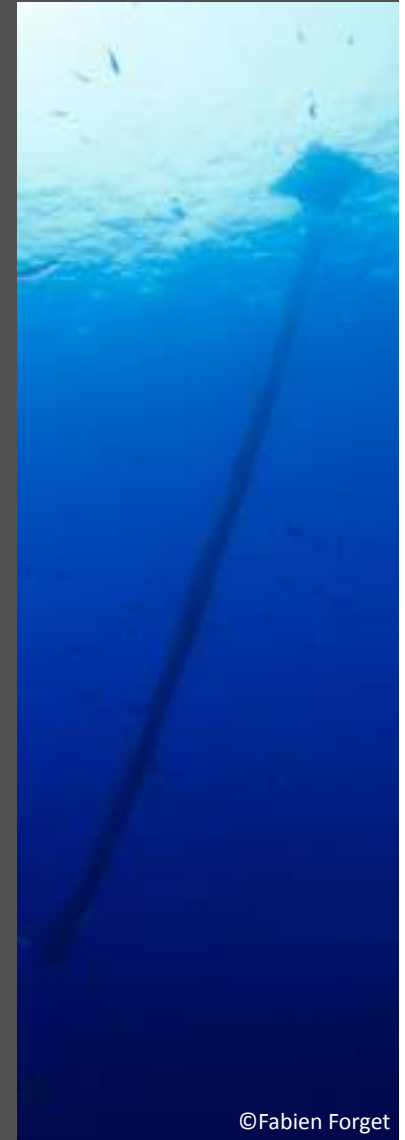


Underwater observations



Getting to the numbers

- Using a small data set, a model and FAD estimates:
- Daily mortality of 480 000 – 960 000 annually
- At a minimum several times more than the fishery (82 000)
- Could be different in other oceans (different types of FADs, different abundances of silky sharks)




Solution

- Clearly, using nets is bad
=> future design of FADs should not have any netting (if possible use of biodegradable materials)

See ISSF recommendations & efforts by some RFMOs

ISSF GUIDE FOR NON-ENTANGLING FADs



The development of specific designs should be left to industry and the expertise of fishermen. However, basic guidelines for non-entangling environmentally friendly FADs are presented below:

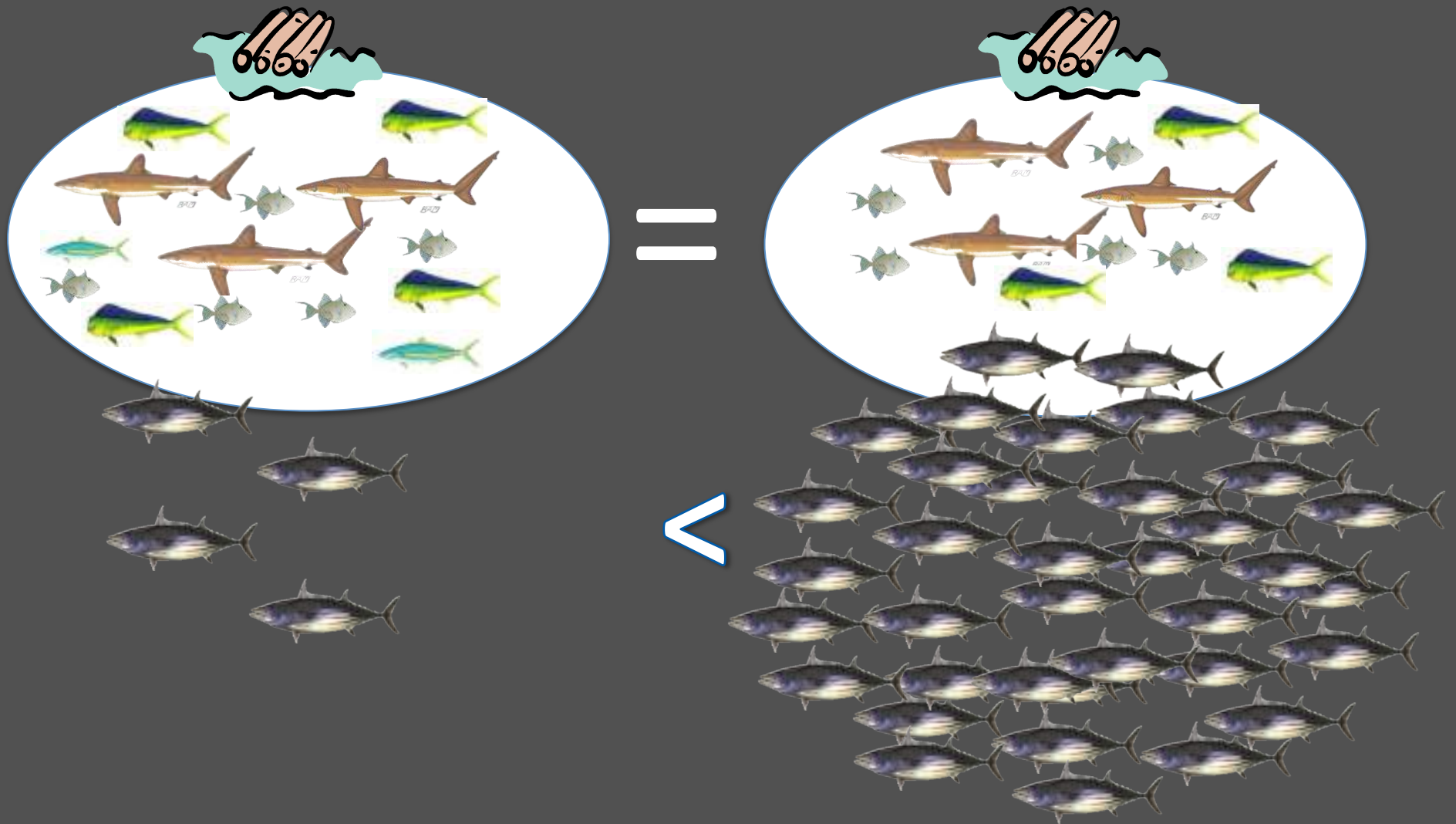
- To reduce entanglement of turtles on the FAD itself, the surface structure should not be covered (Fig. 2.a.) or only covered with non-meshed material (Fig. 2.d, 2.e, 2.g).
- If a sub-surface component is used, it should not be made from netting but from non-meshed materials such as ropes or carvies sheets (Fig. 2.a, 2.d, 2.f).
- To reduce the amount of synthetic marine debris, and to promote environmentally friendly FADs, the use of natural or biodegradable materials should be promoted (Fig. 2.d, 2.e).

BEST PRACTICE RECOMMENDATIONS

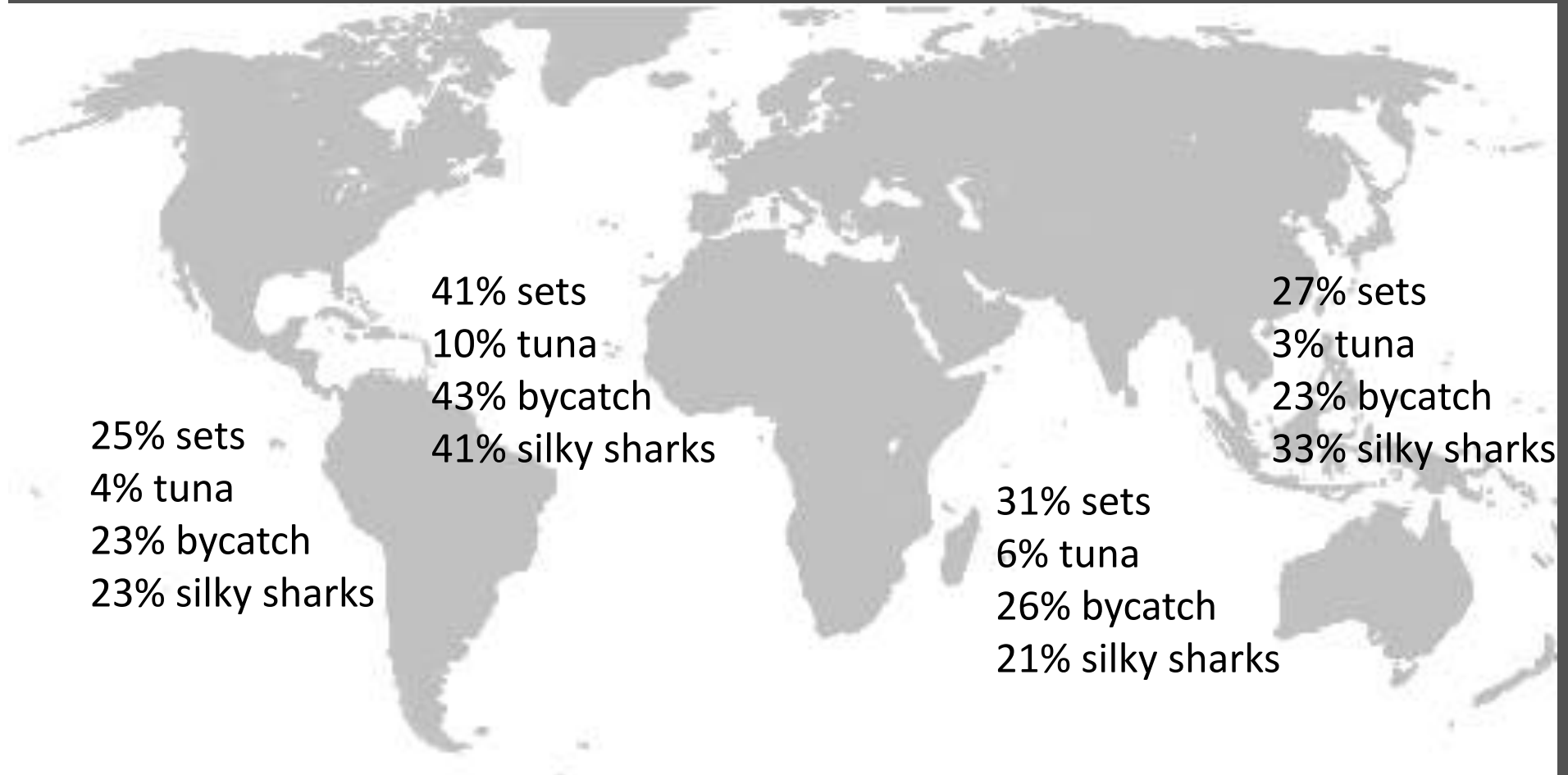


#2. Targetting bigger aggregations

(Dagorn et al. 2012 Can. J. Fish. Aq. Sci.)



Contribution of sets of less than 10 t



#3. Releasing sharks from the deck with good practices

If fishermen do not release sharks from the deck with good practices



Guide of good practices for handling sharks



CAT « Requins »
ORTHONGEL

Good practices to
reduce the
mortality of sharks
and rays caught
incidentally by
tropical tuna purse
seiners.

Polsson F., Vernet A. L.,
Séret B., Dagorn L.

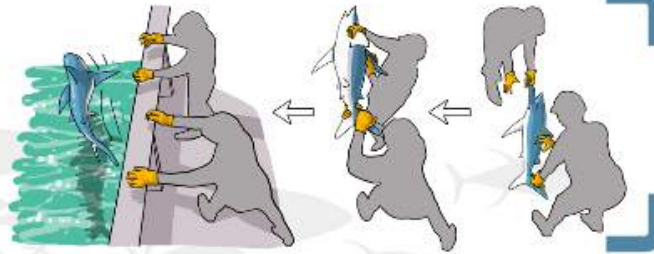
Programs funded by
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FEP – FP7



MEDIUM PELAGIC SHARKS

HOW TO HANDLE AND RELEASE SHARKS

➤ Medium sized fish can be handled by two persons : one crew member holds the dorsal fin and the pectoral fin, keeping well away from the head, and the second crew grabs the tail.



If you are obliged to delay its release:

➤ prevent the animal from battering itself on the deck and surrounding hard objects,
 ➤ place the animal in the shade and water regularly it,
 ➤ use a hose placed in the jaw with a moderate flow of water if you want to delay its release.

HOW TO CALM DOWN A VIGOUROUS SHARK

➤ Cover the shark's eyes with a piece of smooth, wet and dark cloth.
 Never press this against the eyes.



HOW TO PREVENT SHARK BITES

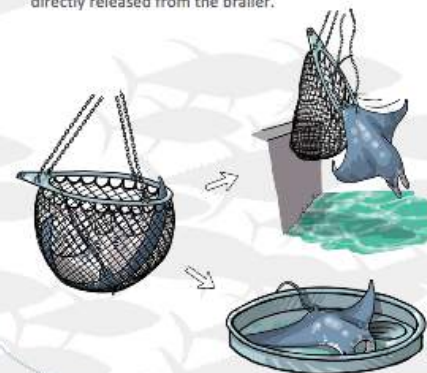
➤ A dead fish (skipjack) or a big stick placed between the jaws prevents it from biting and will allow it to be handled safely.



LARGE ANIMALS

HOW TO RELEASE A LARGE ANIMAL

Very large fish, like large sharks, mantas or moonfish, can be directly released from the brailer.

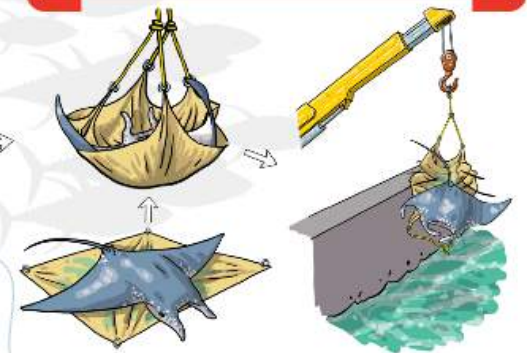


Alternatively, they can be returned to the sea using a piece of net or a piece of plastic canvas that can be lifted by the crane. Before each set, the crew must prepare a piece of net (or a piece of canvas) on the deck to be ready to release large animals.

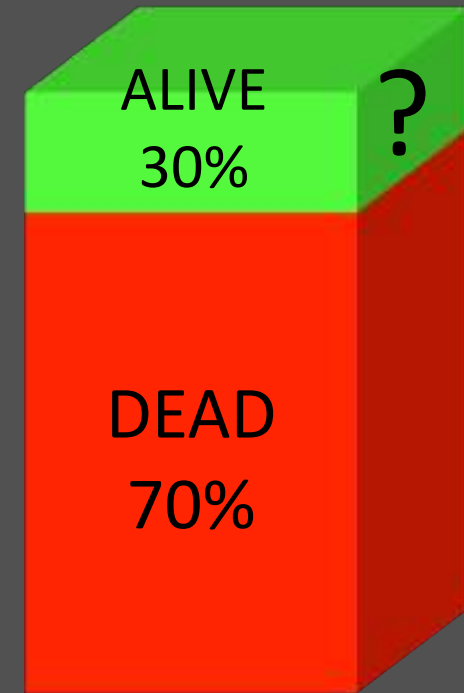


DO NOT:

➤ Do not use bind wire tightly around the animals' body or insert wire into their skin in order to tow or lift them.



Numbers of dead and live sharks on the deck

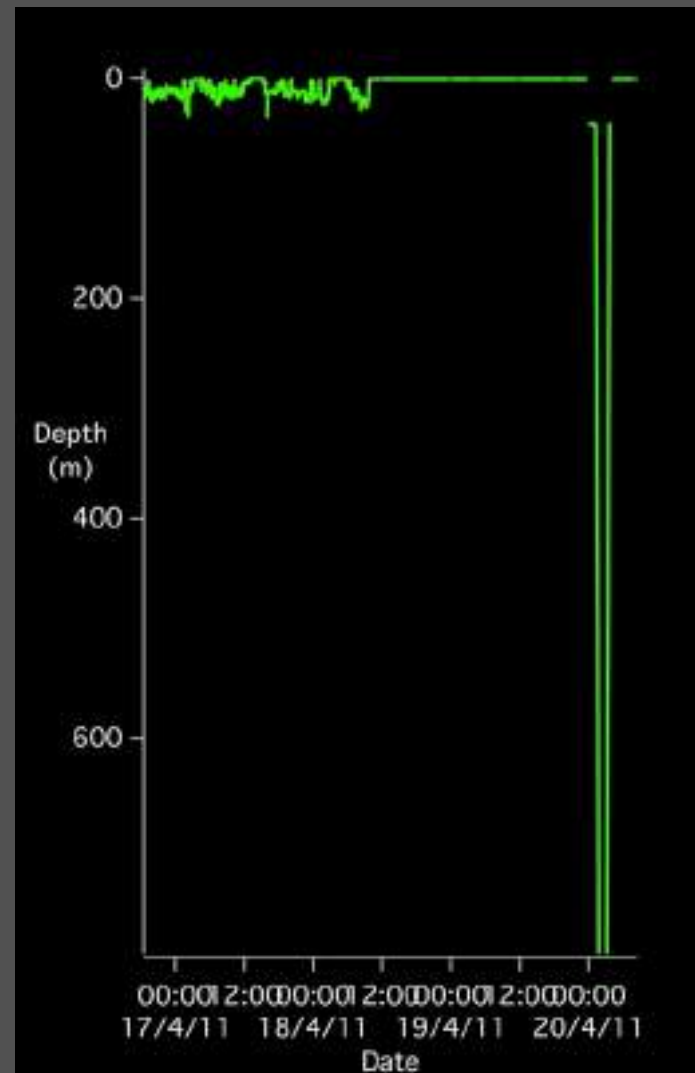


Estimating the survival of released sharks (Indian and Western Pacific)

Tagging (WC MiniPATs)



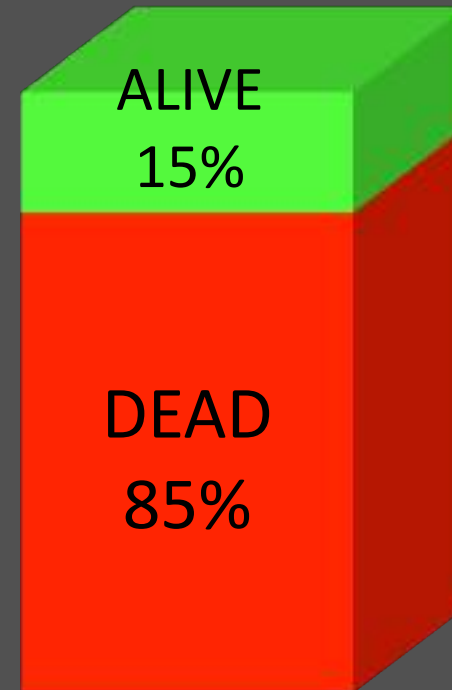
50% die
50% survive



The advantage of adopting good practices



No practice



Good practices

Future research

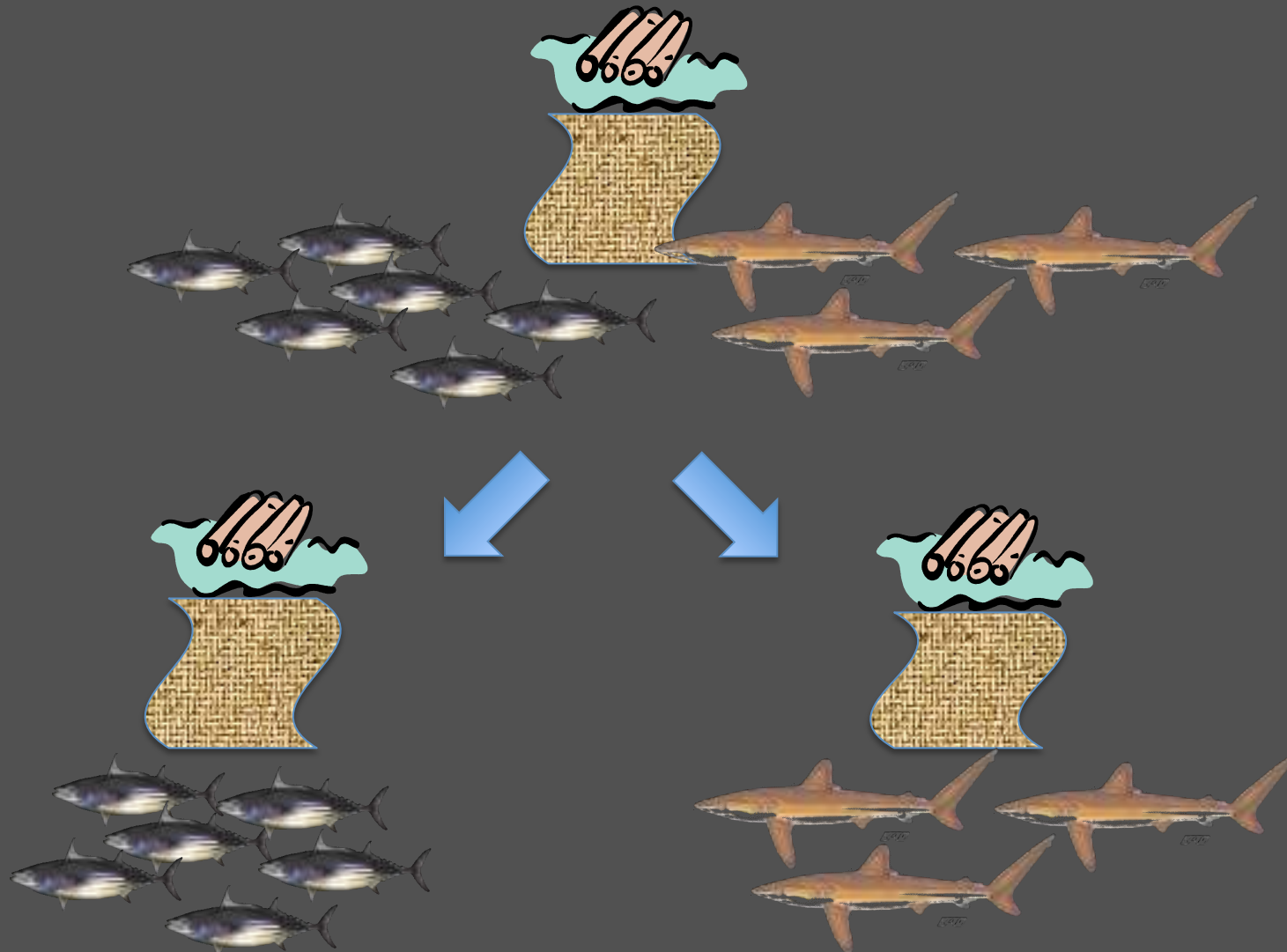
Solutions must be found before sharks are in the sack (last part of the net)



Escape panel



Using competition between attracting devices to segregate species (double FADs)



Reducing the mortality of sharks

- More research is needed to continue reducing the number of sharks killed by purse seine fisheries, but efforts should also be done in other fisheries (or other measures to « help » shark populations?)
- Fishers must understand why it is important to reduce the mortality of sharks and adopt good practices (ISSF skippers' workshops)

Sustainable FAD fisheries

- Monitor the number and type of FADs
- Limit the number of FADs or FAD sets?
- Develop research to better control the fishery-induced mortality of small bigeye tuna
- Develop research to assess the effects of deploying thousands of FADs on the ecology of pelagic species