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# Mechanisms to Mitigate Impacts & Interactions of Purse-seine FAD Fishing

## *IOTC ROS SFO TR17.2.3*

Category: IOTC fisheries impacts on the ecosystems,  
interactions with SSIs and mitigation

*[IOTC ROS SFO TR17]*



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## **This module aims to familiarize Observers with the tuna purse-seine fishery impacts on ecosystems and interactions, including the:**

- Ecological impacts (particularly the impact of FADs) on:
  - tuna stocks;
  - non-target species (including SSIs);
  - marine and coastal habitats; and
  - marine life.
- Possible mechanisms for mitigation of impacts of tuna purse-seine fishing (particularly the impact of FADs) on:
  - target species;
  - species of special interest;
  - marine habitats and life.



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## Critical Aspects Of Evidence

Trainee performance is evaluated against the following agreed IOTC ROS competency standards:

- **Candidate is familiar with the species of special interest (SSI) that interact with IOTC tuna fisheries, most common interactions and strategies to avoid and mitigate such interactions.**

The achieving of these standards is demonstrated by candidate capacity to:

- **Cite SSIs most common interactions with the tuna purse-seine fishery, including FADs.**
- **Outline main mitigation methods used with tuna purse seine fishery.**



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## ECOLOGICAL IMPACTS: **Tuna Stocks**

- a) catching too many tuna that prejudices reproduction (recruitment overfishing);
- b) catching too many small fish (associated with DFADs) and reducing the number that reach maturity;

There is a greater number and variety of bycatch in associated sets than in un-associated sets, including small yellowfin and bigeye tuna, sharks, turtles, billfish, bony fish and cetaceans.

When fishing in DFADs the capture of non targeted small tuna, can represent 15 to 20 percent of a set total catch.



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# ECOLOGICAL IMPACTS: **Non-target Species**

The capture/entanglement of non-target species

- a) retained bycatch (dorado, wahoo, rainbow runner);
- b) incidentally taken bycatch that is returned to the sea (trigger fish, mackerels, sharks, etc.);
- c) incidentally affected bycatch that interacts with fishing equipment in the fishery, but not taken (wale sharks, cetaceans, sea turtles);

PET species can be incidentally affected by this fishery by being caught / entangled on the net or on DFADs.

Other bycatch species are also captured, with the bycatch amount of each species varying widely depending on the region, time of the year, vessel, crew experience, and other factors.

Typically, bycatch in associated sets averages about 5% of the total catch.

Un-associated sets result in less bycatch, ranging on average from 0.5 to 1%.







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# ECOLOGICAL IMPACTS: **Non-target Species**



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## ECOLOGICAL IMPACTS: **Habitats and Life**

- Ghost fishing of marine and coastal life
- Pollution (litter) of marine and coastal habitats

Man-made FADs are often entanglement hazards, especially when constructed with surplus purse seine netting, as is common in the fishery. This webbing, which hangs in panels suspended below the raft to a depth of 15 meters or more, can potentially entangle animals, including sensitive species such as sharks and turtles. This “ghost fishing,” does appear to be a significant source of shark mortality, particularly in the Indian Ocean.

Up to two million of man-made FADs are dumped at sea each year and in most cases are not recovered. They are a legalised, poorly regulated form of marine pollution and a threat to marine species and coral reefs in the Indian Ocean.



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# MECHANISMS TO MITIGATE FISHERY IMPACTS

## Tuna Stocks

- Limiting the deployment of artificial man-made FADs.
- Prohibiting the discards of tuna species caught under FADs (allows for collecting of precise data on catch volumes per species and size during FAD fishing).
- Prohibiting the deployment and fishing on artificial man-made FADs.



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# MECHANISMS TO MITIGATE IMPACT

## Capture & Entanglement of SSIs.

- Interdiction to set purse seine net around large animals (whales, whale sharks, ray mantas).
- Use of the proper techniques to handle and release SSIs and sharks.
- Use of ecological FADs.
- Limit or prohibit the deployment and fishing on any type of artificial man-made FADs.



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# MECHANISMS TO MITIGATE THE IMPACT

## Marine and Coastal Habitats and Life

- Use of ecological and biodegradable FADs
- Limit or prohibit the deployment on any type of artificial man-made FADs





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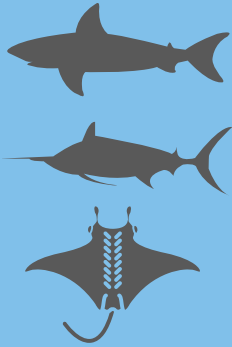

# Summary of Possible Mitigation Measures to Use With Different Bycatch Species

SPECIES	IMPACT	MITIGATION
Marine turtles 	<ul style="list-style-type: none"><li>• entanglement in FADs;</li><li>• encircled by the purse-seine net.</li></ul>	<ul style="list-style-type: none"><li>• use of ecological FADs</li><li>• turtle should be encouraged to swim out of the net</li><li>• a brail or a large dip-net can be used to pick up the turtle from the net</li><li>• usage of the proper techniques to handle and release bycatch species such as turtles.</li></ul>
Cetaceans (various species) 	<ul style="list-style-type: none"><li>• encircled by the purse-seine net.</li></ul>	<ul style="list-style-type: none"><li>• small speed-boats can be used to chase the cetacean(s) out of the net before it is fully closed.</li><li>• a side of the net can be lowered to allow the cetacean(s) to escape</li><li>• small explosive devices can be used to chase the animals out of the net before it's fully closed.</li></ul>







SPECIES	IMPACT	MITIGATION
<p>Sharks, rays, marlins and other large fish</p> 	<ul style="list-style-type: none"><li>• entanglement in FAD;</li><li>• encircled by the purse-seine net;</li></ul>	<ul style="list-style-type: none"><li>• use of ecological FADs;</li><li>• a brail can be used to pick large individuals from the net and to attempt to release them directly, by tipping one edge of the brailer, into the ocean;</li><li>• usage of the proper techniques to handle and release bycatch species, such as Sharks, rays, marlins and other large fish</li></ul>
<p>Whale sharks and whales</p> 	<ul style="list-style-type: none"><li>• encircled by the purse-seine net;</li></ul>	<ul style="list-style-type: none"><li>• interdiction of setting a purse seine net around the animal if sighted prior to the start of the set;</li><li>• usage of the proper techniques to handle and release bycatch species, such as Whale sharks and whales.</li></ul>





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# IOTC RESOLUTIONS TO MITIGATE FADs IMPACTS

- Despite the clear benefits of man-made DFADs to the industrial tuna purse-seine fishing industry, their use is associated with several potential negative impacts, including the catch of small tunas, bycatch of vulnerable non-target species, modification of tuna habitat, and potential damage to coastal habitats.
- Concern has also been raised about the impact of FADs on the incidental mortality of sea turtles and sharks through entanglement, and emphasis is being placed on the use of environmentally friendly materials in FAD construction (MRAG, 2017).
- IOTC has recognised the increasing use of man-made DFADs in IOTC fisheries, notably for tropical tunas, and has approved several resolutions to assess their impact on target and bycatch species, marine & coastal habitats and life, as well as resolutions to limit their deployment.



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- **RESOLUTION 18/04 ON BIOFAD EXPERIMENTAL PROJECT**
  - supports the Biodegradable FAD (BIOFAD) project, for the collection of scientific data on biodegradable FADs, with the objective of reducing the impact and the amount of synthetic marine debris of the use of non-biodegradable FAD in the ecosystem.
- **RESOLUTION 15/09 ON A FISH AGGREGATING DEVICES (FADS) WORKING GROUP**
  - establishes an ad hoc working group on FADs, drifting and anchored, to assess the consequences of the increasing number and technological developments of FADs in tuna fisheries and their ecosystems, in order to inform and advise on future FAD-related management options.



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## RESOLUTION 15/09 ON A FAD WORKING GROUP - **ANNEX 1 (paragraph 1)**

Objectives of the ad hoc working group on FADs :

- To collect and compile information about past and present numbers of buoys and FADs, changes in FAD-related technology and activities of supply vessels;
- To review the requirements of collection of data on FADs to assess the necessity for revision;
- To assess the effect of FAD's density and spatial distribution on the behaviour, distribution and species composition of the tuna schools;
- To assess the developments in FAD technology with regards to:
  - changes in catchability due to technological improvement;
  - using FAD and buoys marking and identification as a tool for monitoring, tracking and control of FADs;
  - reducing FAD's ecological impacts through improved design, such as non-entangling FADs and biodegradable material.
- To identify management options, including the regulation of deployment limits and characteristics of FADs, and activities of support vessels.



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- **RESOLUTION 19/02 PROCEDURES ON A FISH AGGREGATING DEVICES (FADS) MANAGEMENT PLAN**

- requires the use of instrumented buoys on all DFADs and prohibits the use of any other buoys, such as radio buoys;
- sets the maximum number of operational buoys followed by any purse seine vessel at 300 at any one time;
- sets the number of instrumented buoys acquired annually for each purse seine vessel at no more than 500;
- requires vessels to use non-entangling designs and materials in the construction of FADs;
- encourages vessels to use biodegradable FADs;
- requires that instrumented buoy attached to a DFAD contain a physical, unique reference number marking (ID provided by the manufacturer of the instrumented buoy) and the vessel unique IOTC registration number clearly visible.



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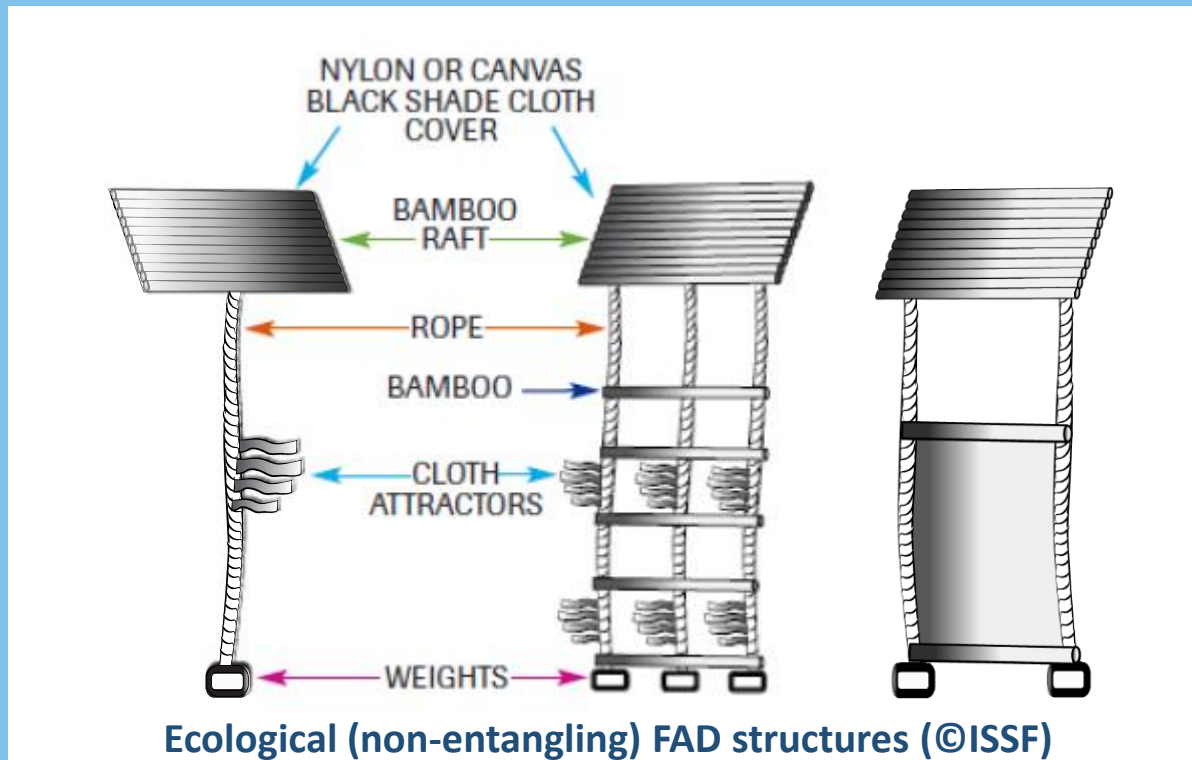
## **RESOLUTION 19/02: ANNEX III - Data Collection for DFADs**

- a) For each activity on a DFAD, whether followed by a set or not, the CPC is to report the following information:
- i. Vessel (name and registration number)
  - ii. Position ( Latitude and Longitude in degrees and minutes)
  - iii. Date (as DD/MM/YYYY, day/month/year)
  - iv. DFAD identifier (DFAD or beacon ID)
  - v. DFAD type (drifting natural FAD, drifting artificial FAD),
  - vi. drifting artificial FAD design characteristics
    - Dimension and material of the floating part and of the underwater structure
  - vii. Type of the activity, (visit deployment, hauling, retrieving, loss, intervention to service electronic equipment).
- b) If the visit is followed by a set, the results of the set in terms of catch and bycatch, whether retained or discarded dead or alive.



## RESOLUTION 19/02: ANNEX V - Principles for Design & Deployment of FADs

1. The surface structure of the FAD shall not be covered, or only covered with non-meshed material
2. If a sub-surface component is used, it shall not be made from netting but from non-meshed materials such as ropes or canvas sheets.





# Non-ecological, non-biodegradable FADs

1. FAD raft made on non-biodegradable materials and covered with large mesh net (normally rests of purse-seine fishing nets made of nylon).
2. FAD tail made from non-biodegradable large mesh net (normally rests of purse-seine fishing nets made of nylon).





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# Non-ecological, non-biodegradable FADs



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# Ecological FADs

Raft →

- Made of ecological materials
- Free of meshed materials



2 possibilities:

- No coverage
- Covered with ecological material (biodegradable fabric sheets, )







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# Ecological FADs

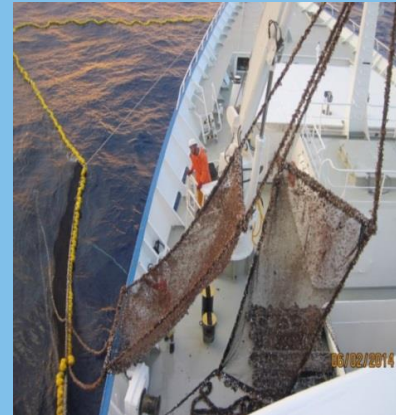
Tail →

Must be free of  
meshed materials



2 possibilities:

- *Biodegradable cotton ropes*
- *Biodegradable canvas sheets*





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# ANY QUESTIONS?

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