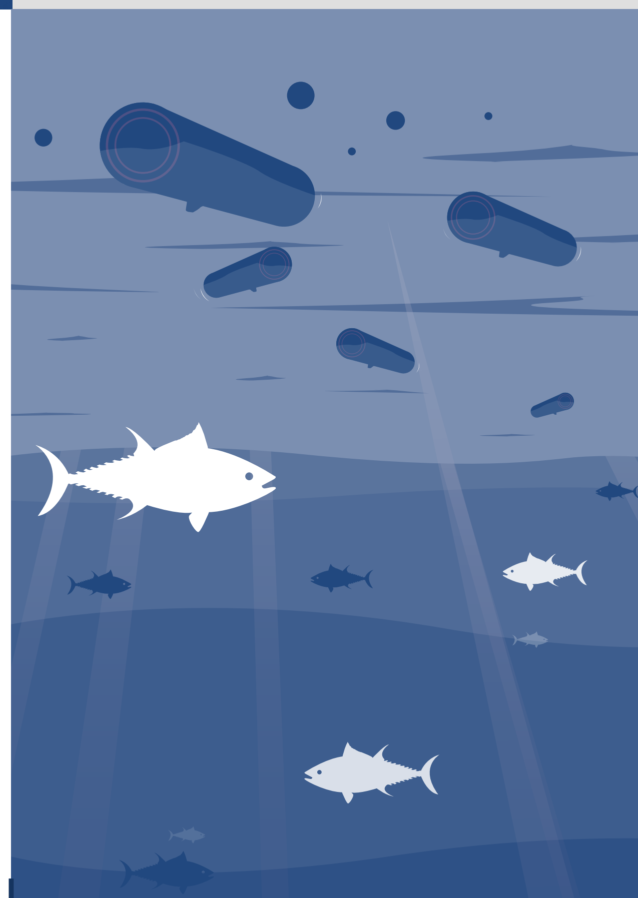
MANFAD
FAD MANAGEMENT TOOL

ECOLOGICAL ISSUES

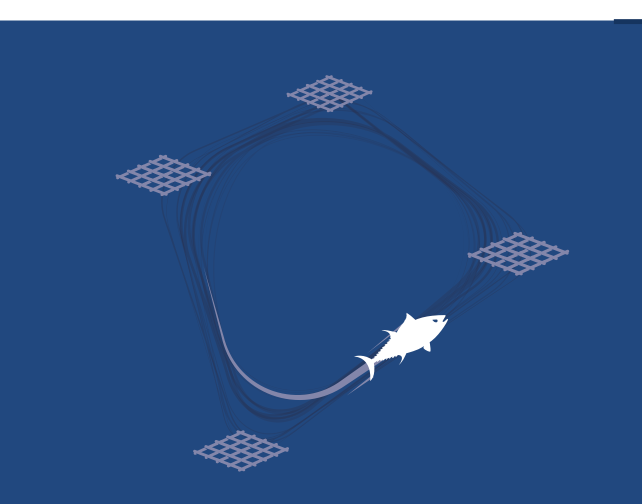


Sometimes animals use features of the environment to assess the quality of a habitat, which is beneficial as long as these indicators remain strongly correlated with the true richness of the habitat.
Some human-induced habitat changes can alter this relationship such that these indicators are no longer correlated with habitat richness.
The continuous use of these cues, which are now misleading, could jeopardize their growth, survival, or reproduction.
Such situations correspond to an ecological trap.

Tuna species have always associated with logs or other plant debris drifting on the surface of the oceans.
By deploying artificial FADs, fishers ultimately modify the habitat of tuna by increasing the number of floating objects.
Does this modification lead tuna to go to poorer areas (following FADs), with negative effects on their fitness, growth, or reproduction?

Deepening our knowledge on the associative behaviour of tunas and its effects on their biology is necessary to predict the consequences of an increase in the number of floating objects on the ecology of tuna species.

The aim is to understand whether tuna remain trapped in a network of FADs, or on the contrary leave it, when the environment is unfavourable to them (reducing their physiological condition).



MANFAD
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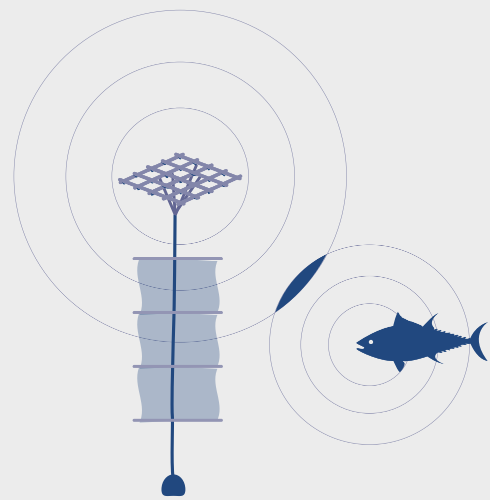
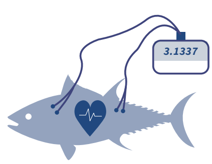
OUR ACTIONS

ACTIONS DONE FOR THIS ISSUE

1. BEHAVIOUR

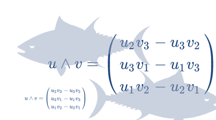
Measurements of how much time tuna spent around a drifting FAD and the lag between two associations (when tuna is in a free school) will be made by equipping tuna with acoustic tags (via surgery) and by equipping the drifting FAD in the same area with acoustic receivers capable of transmitting their data by satellite. While tuna residence times around drifting FADs have previously been measured, travel times between two neighbouring FADs have never been measured due to the difficulty of instrumenting drifting FADs from the same network, contrary to what has been done for anchored FADs.
A model describing tuna behaviour will be developed from these data to assess the effects of different FAD densities on tuna associative dynamics, including the possible fragmentation of tuna schools.





2. PHYSIOLOGY

Tunas are known to generally have empty stomachs and to be leaner when associated with floating objects than when swimming in free schools.
Measurements of an indicator of tuna condition (the relative amount of intracellular and extracellular water measured from electrical bio-impedance) will be made on captive tunas, which will be subjected to fasting and feeding phases of variable durations. These alternating feeding regimes will simulate the phases of association with floating objects and free schools. Understanding how the condition indicator evolves in a controlled environment will serve as baseline to interpret the condition measurements carried out on wild-caught tuna around floating objects or in free schools.



3. INTEGRATED MODEL

A model integrating both behavioural and physiological knowledge will be developed to build scenarios describing the evolution of tuna condition indicators as function of FAD density. The goal is to study three hypotheses:
a) tuna species associate with FADs when their condition indicator is high,
b) tuna associate with FADs when their condition indicator is low,
c) tuna associate with FADs regardless of their condition indicator status.
Particularly, this model will help infer whether certain "threshold" values of FAD densities generate negative effects on the behaviour and physiology of tropical tunas.