

Bio-economic modelling of Fishing Agregation Devices (FADs) and management issues

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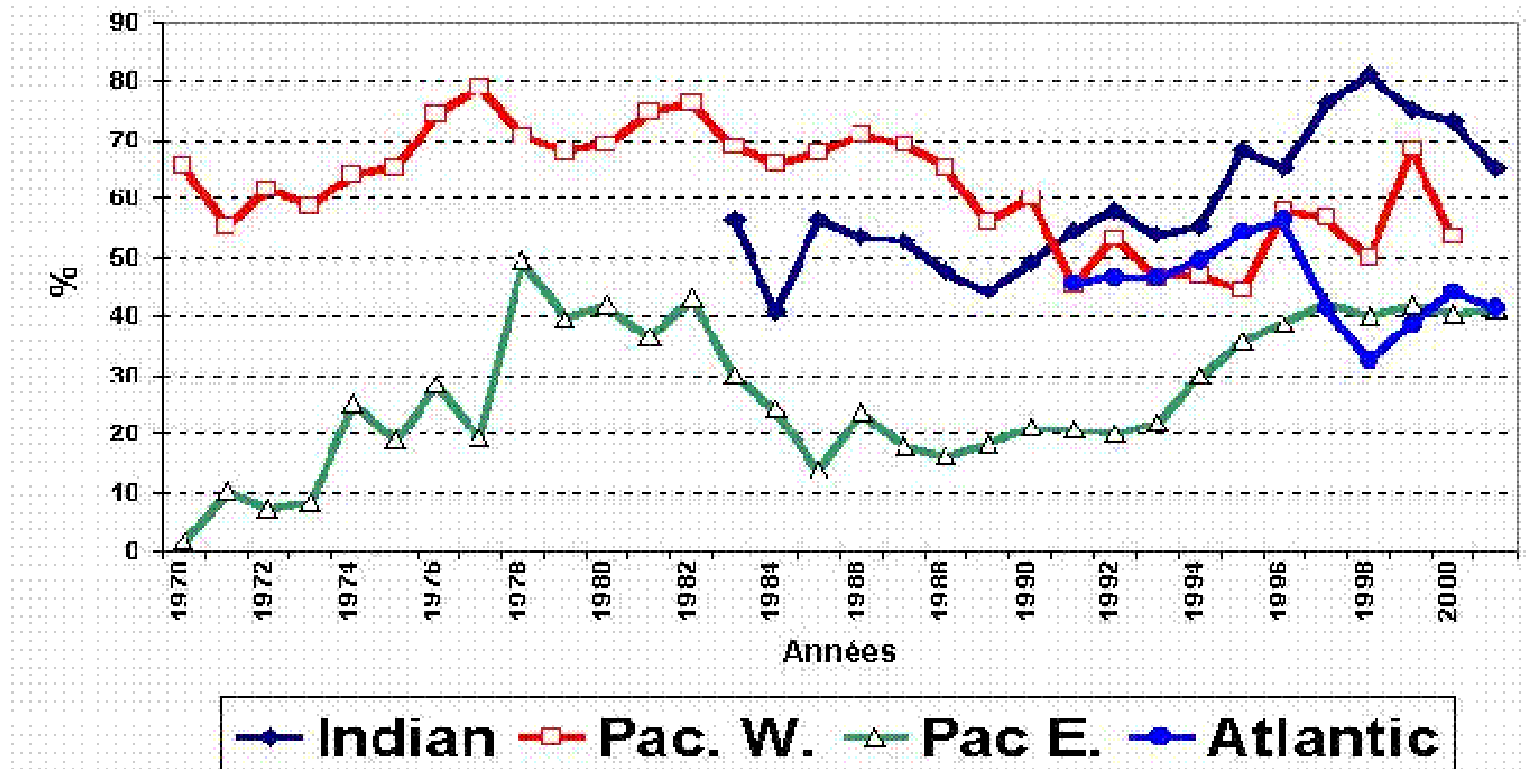
** Ifremer – UMR AMURE*

*** Ifremer – Lesser Antilles fisheries unit*

**** University of Brest – UMR AMURE*

1. Context

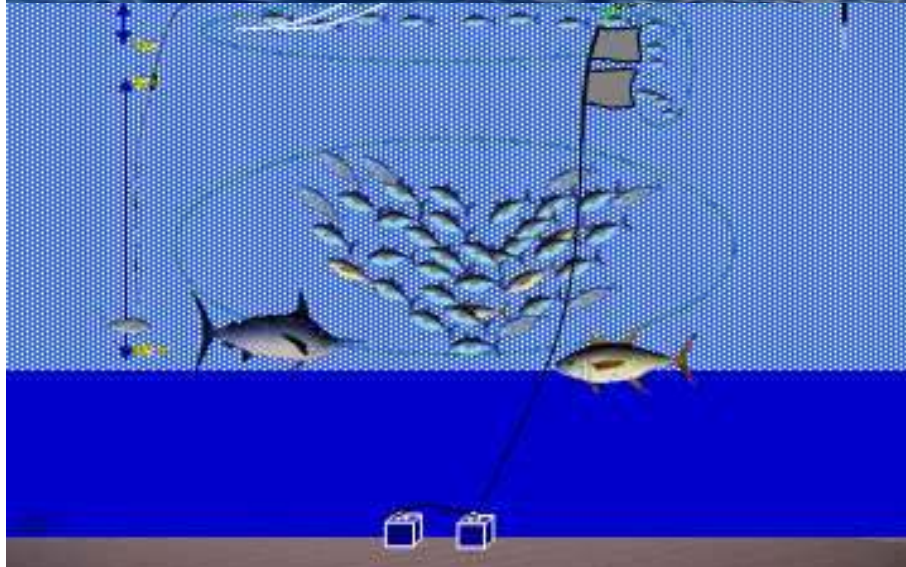
➔ More than 50% worldwide tuna catches under FADs (Fonteneau et al. 2000)



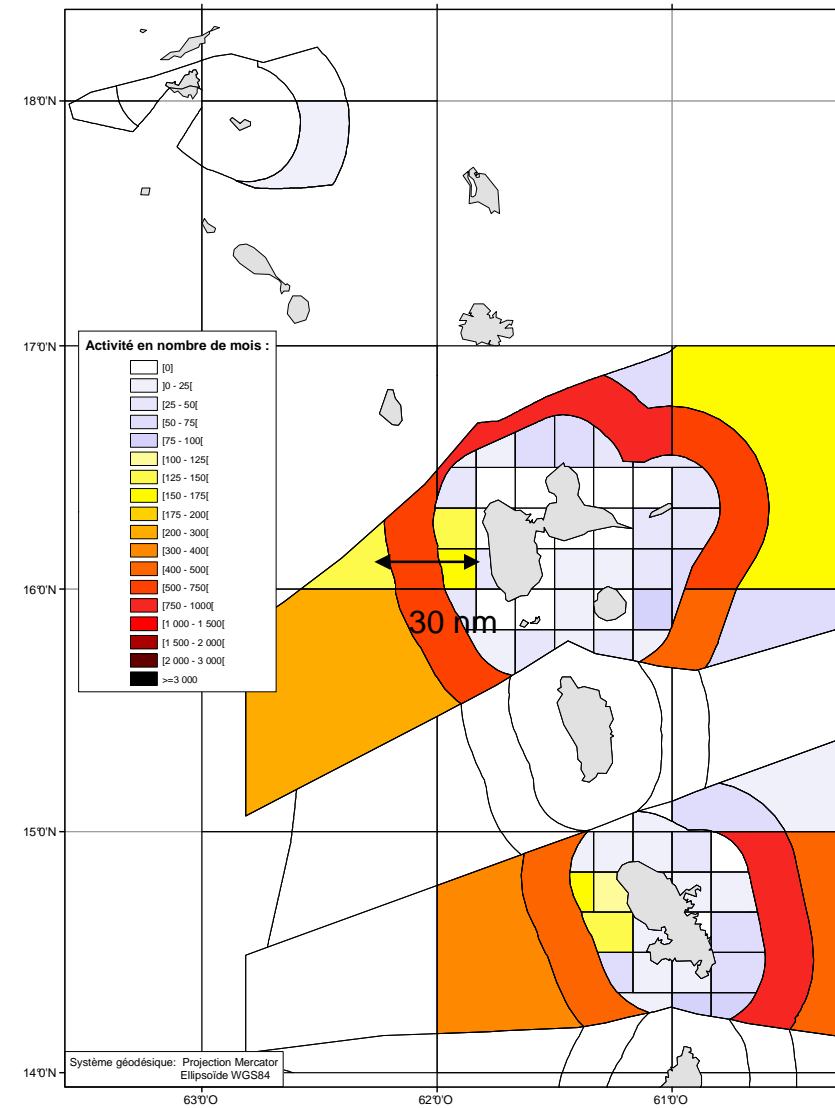
**LARGE (capital intensive)
purse seiners using
DRIFTING man-made FADs
in OFFSHORE AREAS**



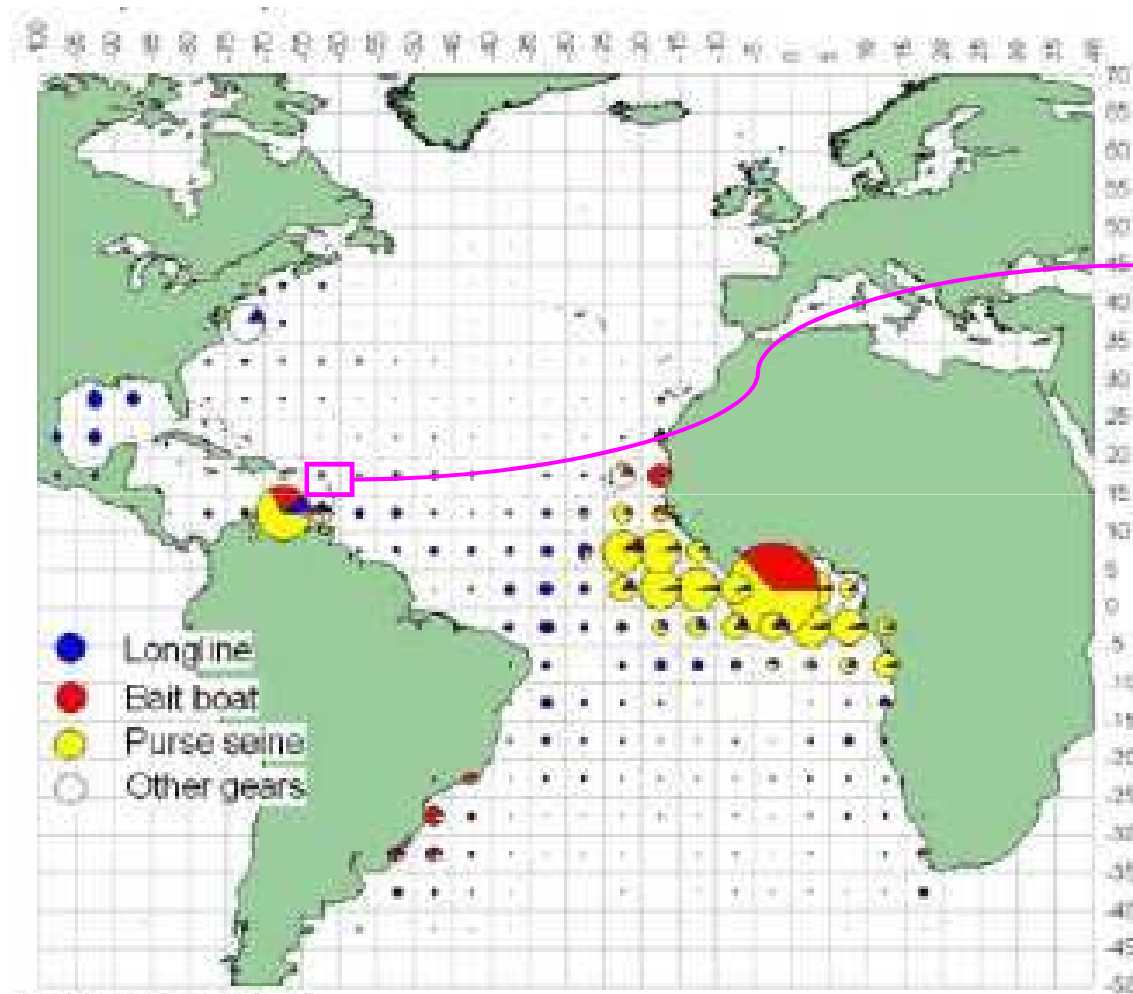
MOORED COASTAL FADs operated by **SMALL SCALE FLEETS**



Activité de pêche 2006 dans les Antilles françaises : DCP Lignes et Palangres (L..)



Geographical distribution of yellowfin catch by major gears



f. YFT (2000-2006)

Contribution to total fishing mortality is low

⇒ Lesser Antilles as
« resource takers »

2. A simple model of FADs-Vessels interactions

a) FAD interactions

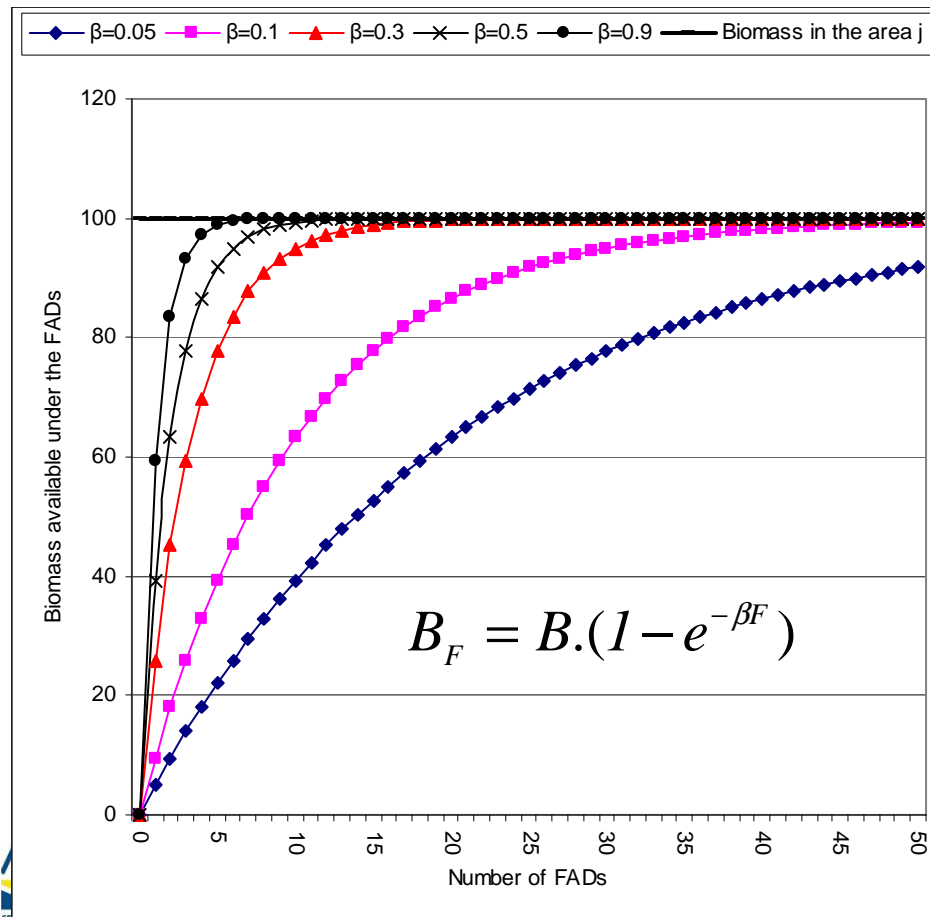
An area i (size=1)

B : Biomass available in the area for a period t

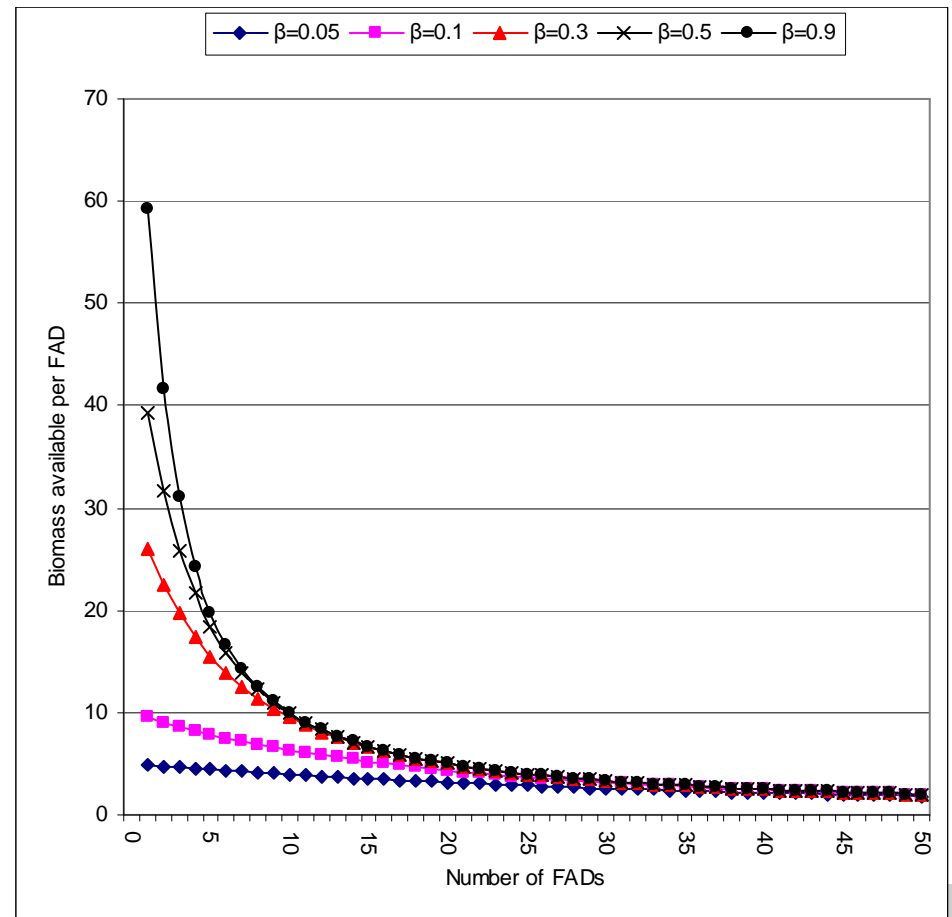
F : Number of FADs in the area

β : Agregation capacity / attractivity of FADs

Biomass under FADs vs Number of FADs



Biomass per FAD vs Number of FADs



b) Vessels interactions → Catch function under FADs

K : Number of vessels in the area → K/F :
number of vessels per FADs

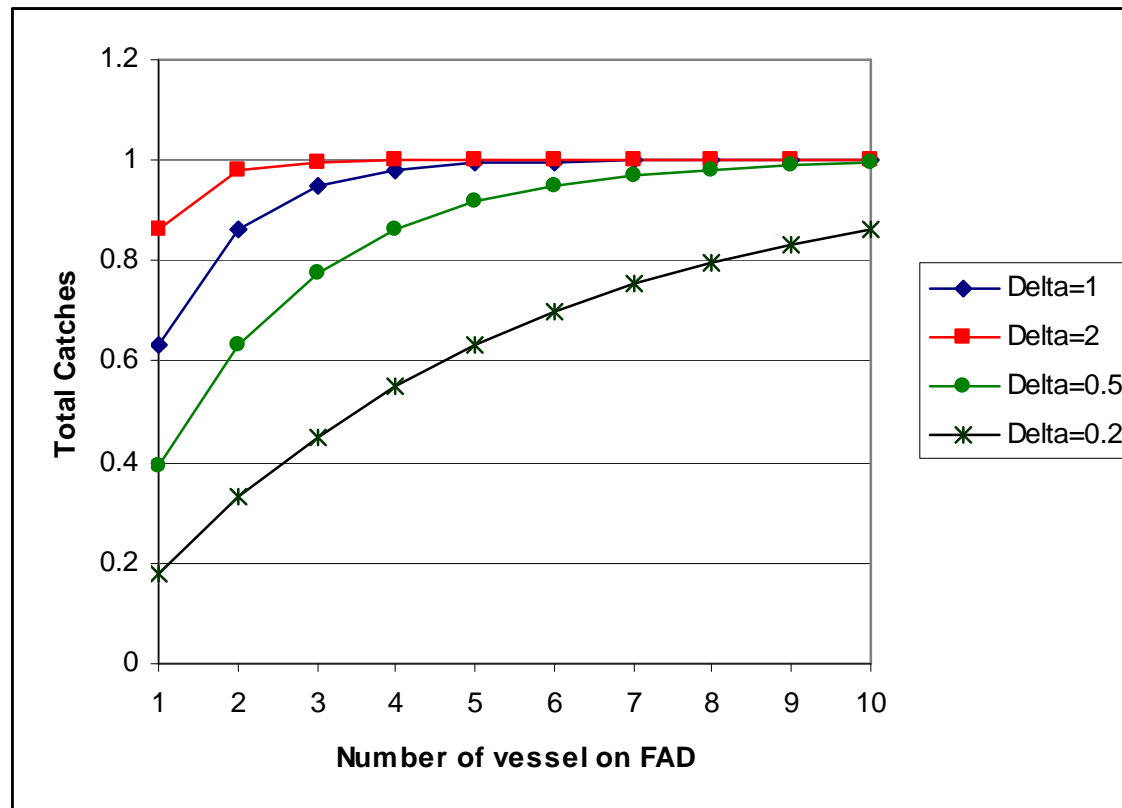
q_m : Catchability coefficient

δ_m : Index of interaction around FAD which
depend on fishing techniques/targeted species

☞ Evidence of interactions

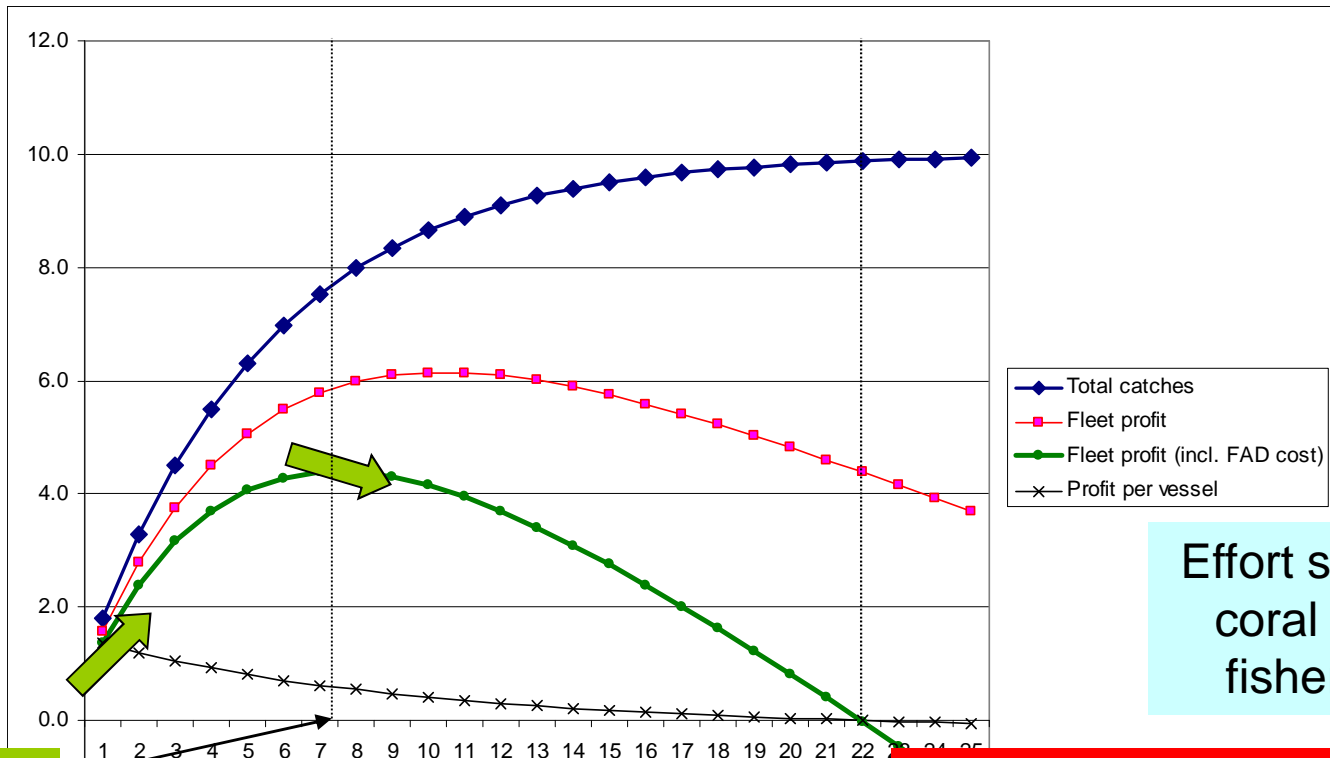
- Dolphinfish in Guadeloupe
- Drifting longlines (Lesser Antilles)
- Purse seiners (?)

Total Catches per FAD vs number of vessels per FADs



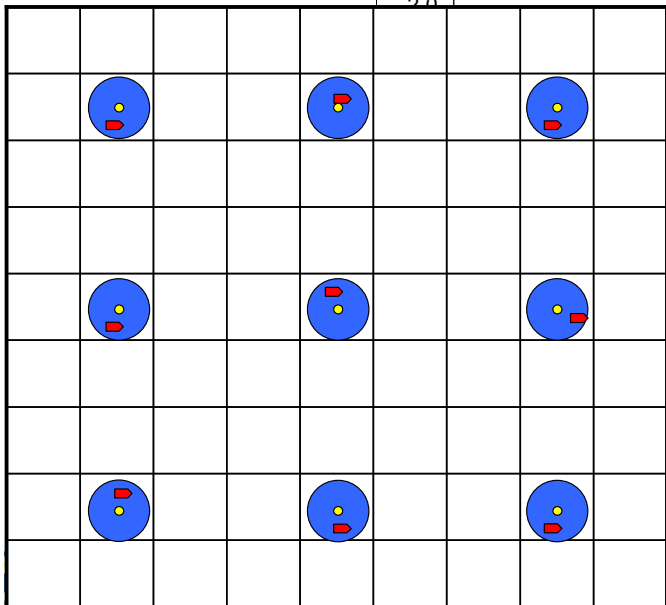
3. Implications for fisheries management

1. Open access
2. TURFs (Spatial allocation)
3. Collective regulated FADs






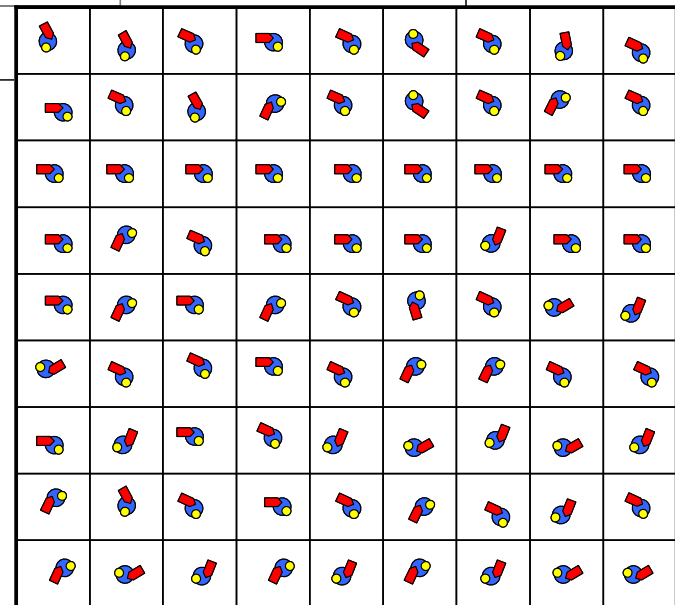
2. TURF

1. Open Access Equilibrium

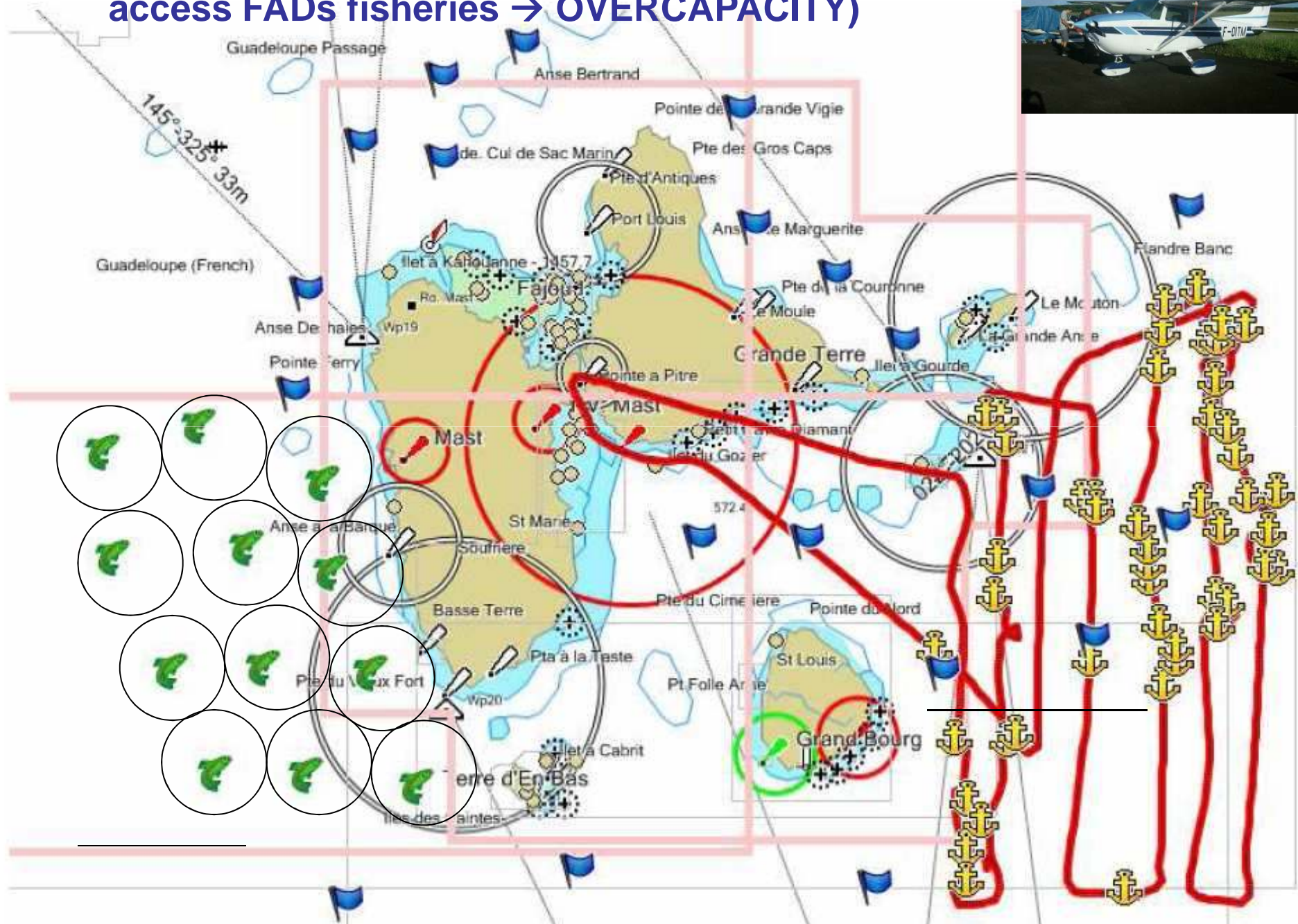


Number of FADs

-  Biomass
-  FAD
-  Vessel



Aerial survey of the FADs density in Guadeloupe (open access FADs fisheries → OVERCAPACITY)

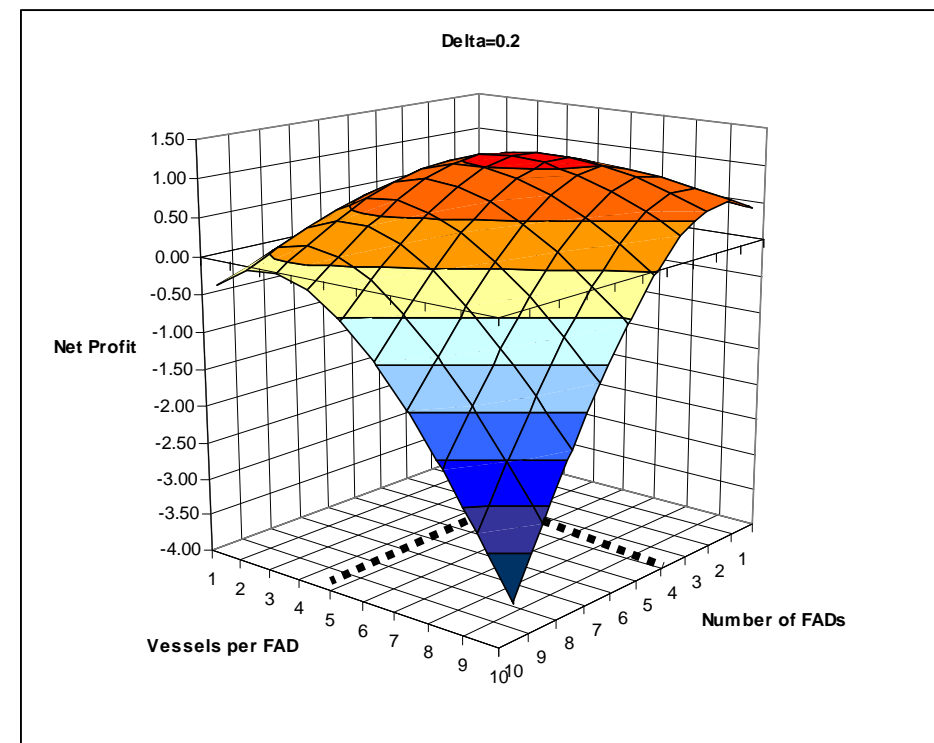
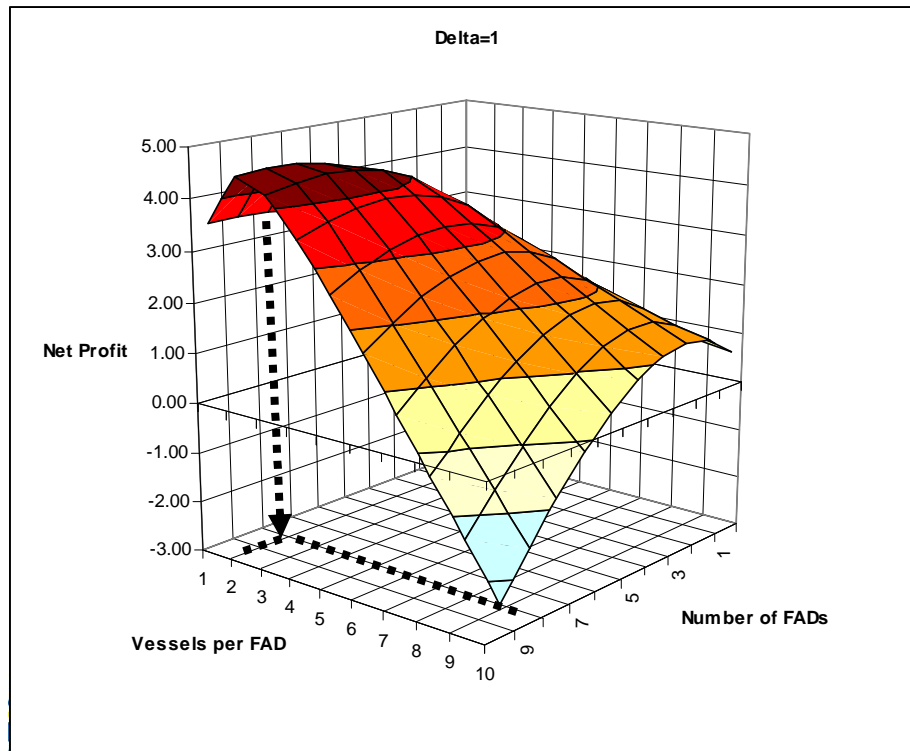


3. Collective set of FADs (organized network)

Optimal number of FADS and Vessels per FAD given different levels of interaction

Given a number of vessel, what is the best number of FADs given FAD unit cost ?

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4. Conclusion

FADs regulation required including access regulation (individual fishing permits, ...)

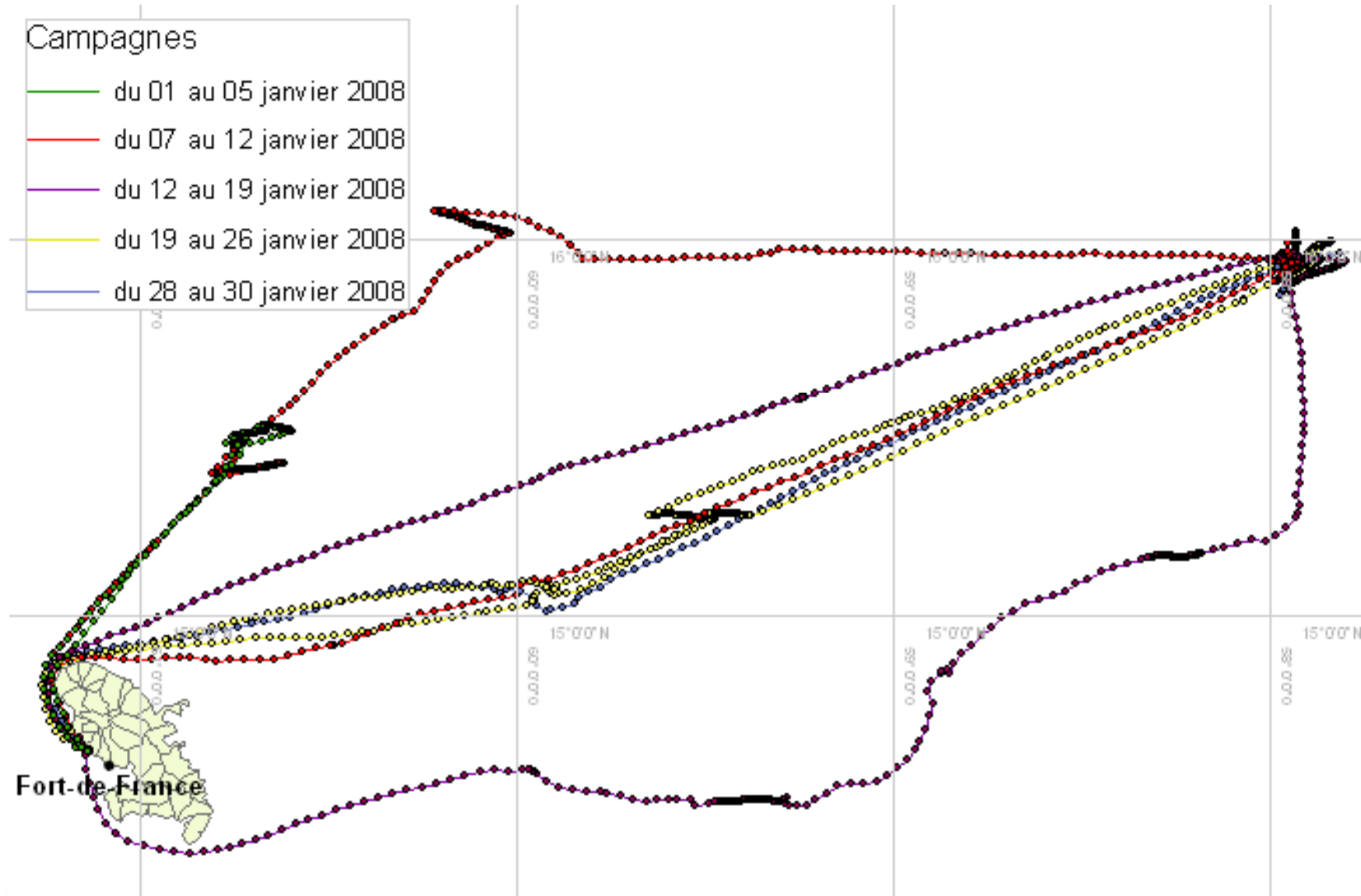
On going / future work on :

Fish and Fishermen dynamics around FADs and between FADs

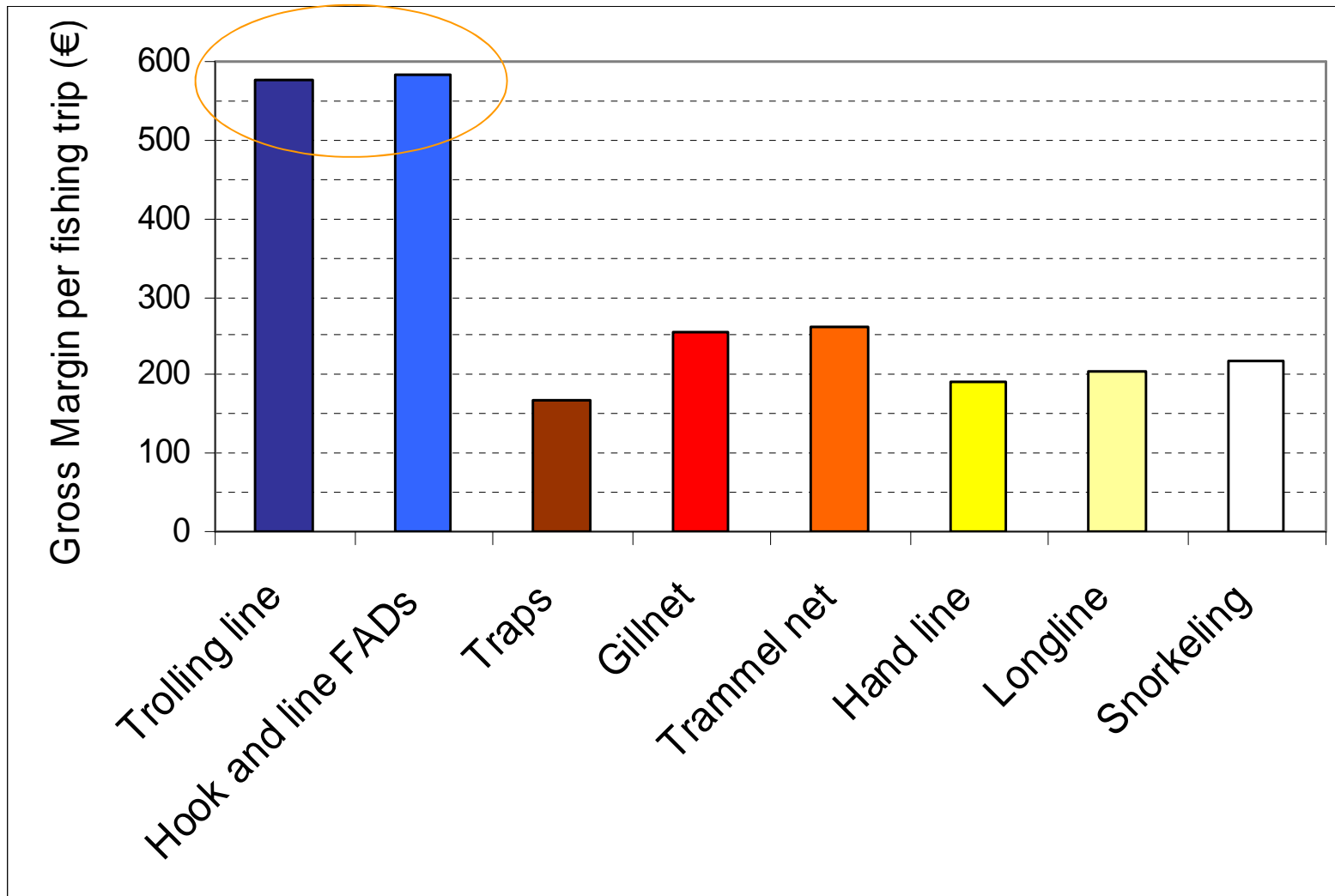
Interactions between FADs fisheries and coral reef fisheries

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✓ Analysis of fishing strategies through GPS tracking



Current 2008 average gross margin per gear type (€/trip)



Large pelagic species

Coral-reef ecosystem species

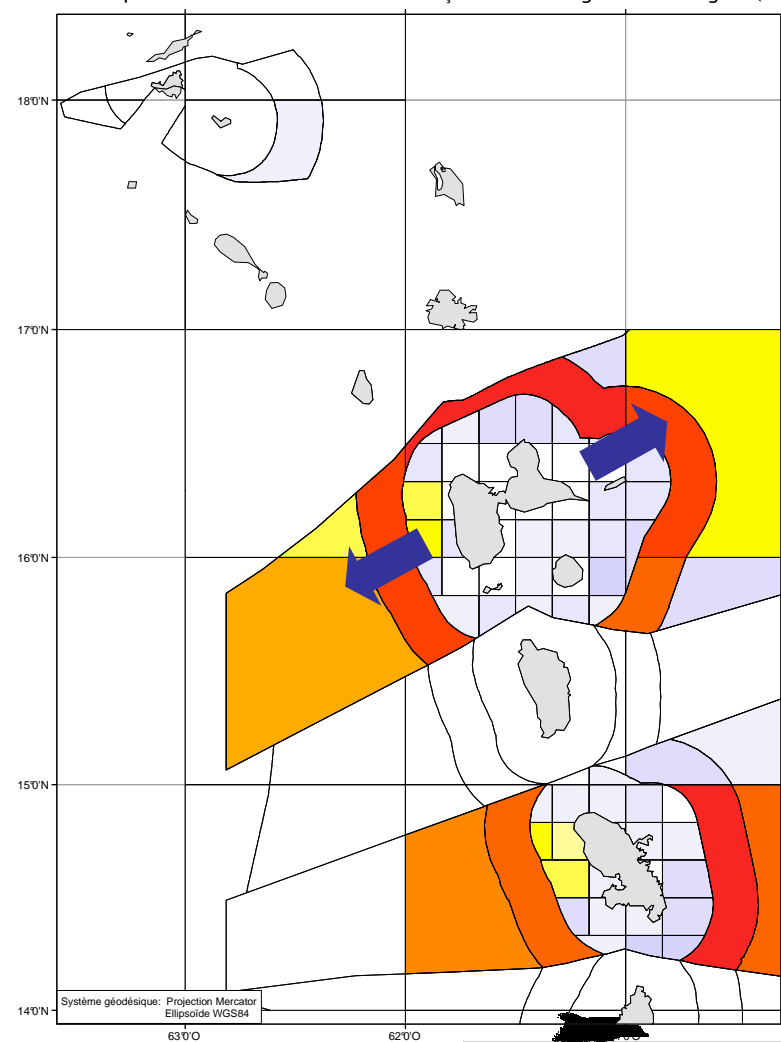
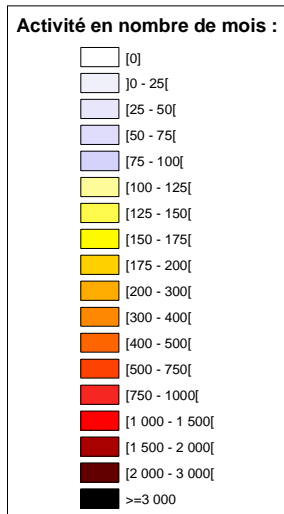
Répartition spatiale de l'activité (en nombre de mois métiers)

✓ Casier

✓ DCP

Activité de pêche 2006 dans les Antilles françaises : casier (FPO)

Activité de pêche 2006 dans les Antilles françaises : DCP Lignes et Palangres (L.)



✓ Allocation of effort between coral reef fisheries and pelagic (FADs) fisheries



