

20th meeting of LDAC

Working Group 1 - Highly Migratory Stocks and Tuna RFMOs

6 April 2017, Brussels

EU initiatives on FAD research

JOSU SANTIAGO

AZTI. Tuna Research Area

EU initiatives on FAD research

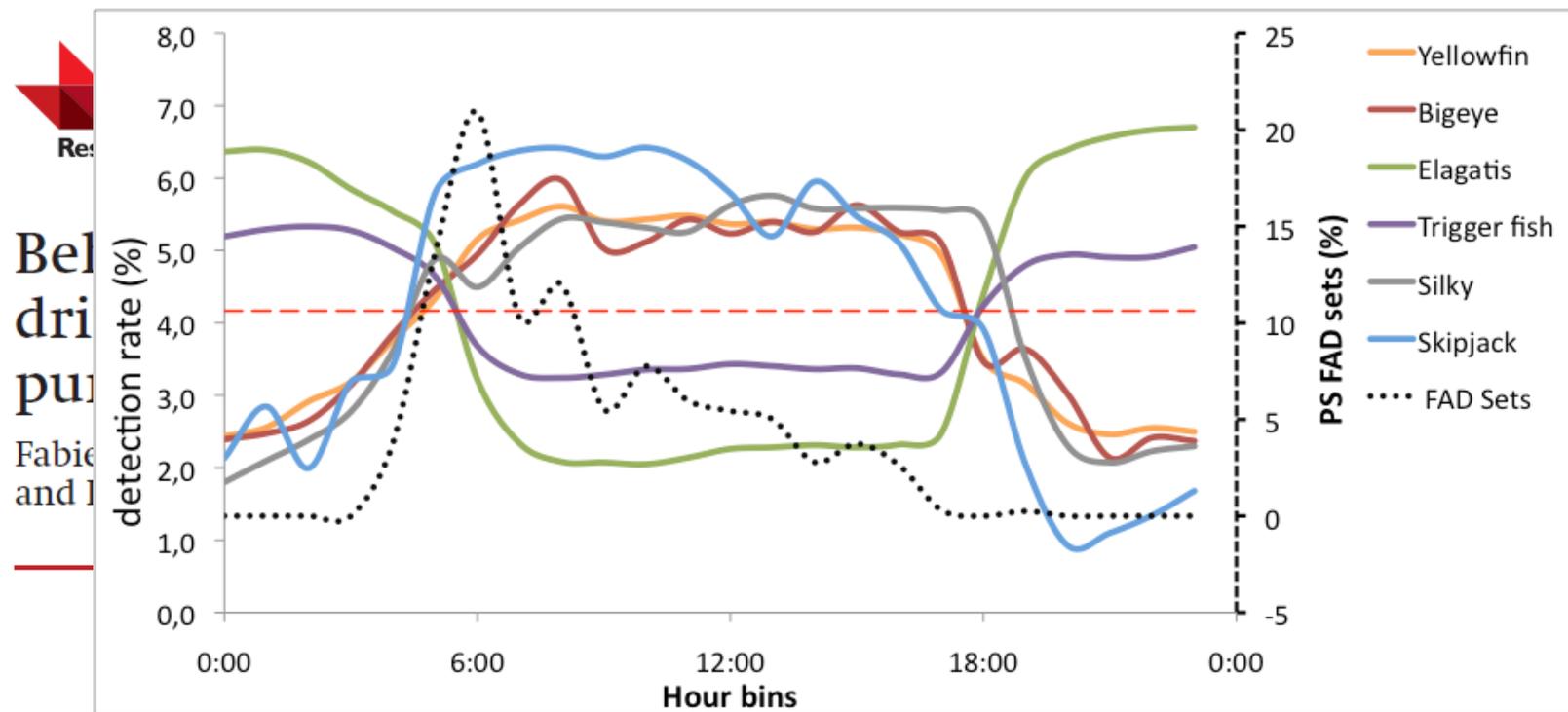
Current Research Areas

- Non-target species → By-catch reduction
- Target species (small sizes)-> reduction
- Post-release survivorship (whale shark, silky shark)
- Monitoring and Management of FADs
- Fishing effort, strategy and technology to improve CPUE
- Population assessments
- FAD Fishery exploitation effects on:
 - Habitat and Biodiversity
 - Biomass
 - Ecology, Biology, Behavior and Movement, including Ecological Trap.
- Minimize impact of FAD fishing

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Non-Target species / BC reduction

- Tagging of FAD species to investigate specific vulnerability to fishing



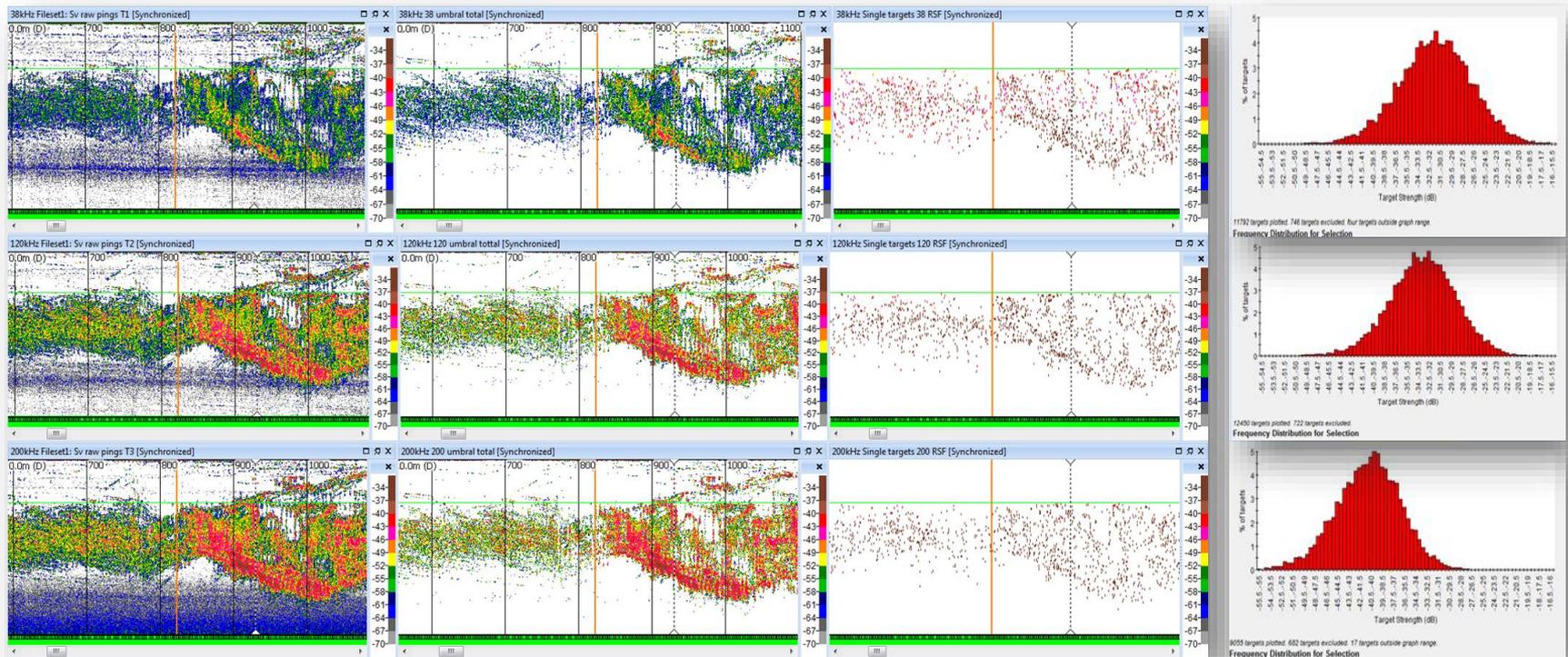
(Forget et al 2015)

EU initiatives on FAD research



Non-Target species / BC reduction

- Acoustic discrimination of tuna species (in collaboration with ISSF)



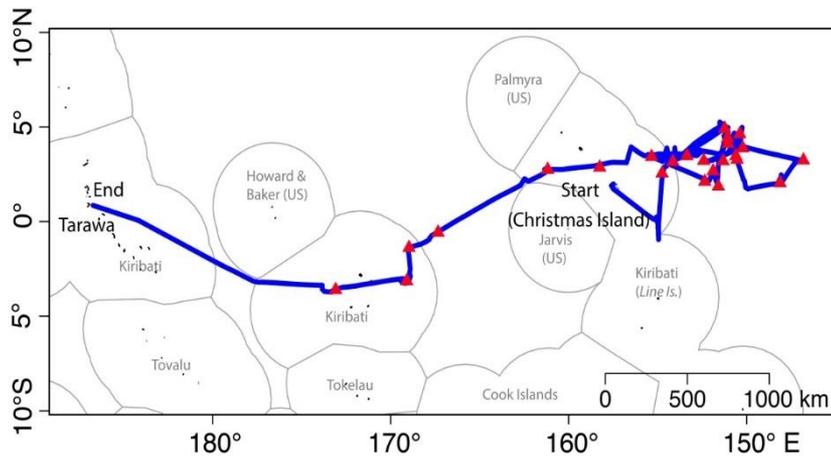
1- Raw Echogram → 2- Plancton Filter → 3- Individual targets(TS) → 4- In situ TS

EU initiatives on FAD research

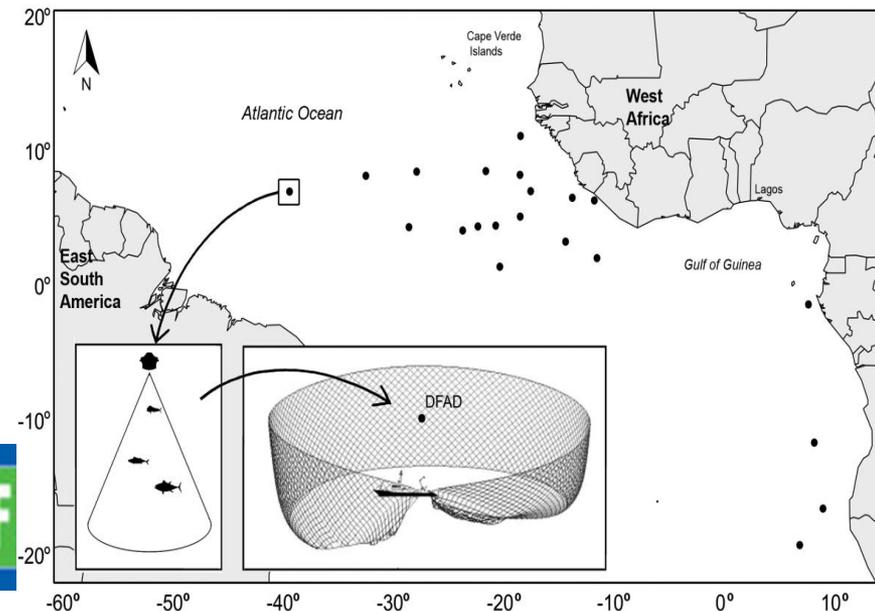
Non-Target species / BC reduction

- Acoustic discrimination of tuna species (in collaboration with ISSF)
Research cruises on-board purse seiners

Central Pacific Ocean



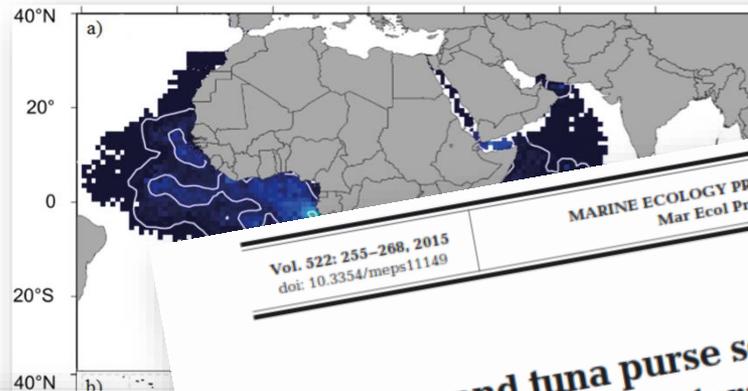
Atlantic Ocean



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Non-Target species / BC reduction

- Observer programs : collection of by-catch information



Vol. 522: 255–268, 2015
doi: 10.3354/meps11149

MARINE ECOLOGY PROGRESS SERIES
Mar Ecol Prog Ser

Published March 2

Cetaceans and tuna purse seine fisheries in the Atlantic and Indian Oceans: interactions but few mortalities

Lauriane Escalle^{1,2,*}, Anna Capietto^{1,2}, Pierre Chavance², Laurent Dubroca², Alicia Delgado De Molina³, Hilario Murua⁴, Daniel Gaertner², Evgeny Romanov⁵, Jérôme Spitz⁶, Jeremy J. Kiszka⁷, Laurent Floch², Alain Damiano², Bastien Merigot¹

Biological Conservation 174 (2014) 147–151

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/bioco



Short communication

Mortality of marine megafauna induced by fisheries: Insights from the whale shark, the world's largest fish

Anna Capietto^{a,b,1}, Lauriane Escalle^{a,b,1,*}, Pierre Chavance^b, Laurent Dubroca^b, Hilario Murua^d, Laurent Floch^b, Alain Damiano^b, David Rowat^e, Bastien Merigot^f

Marine turtle interaction with purse-seine fishery in the Atlantic and Indian oceans: Lessons for management

Jérôme Bourjea^{a,*,1}, Sandra Clermont^{a,b,c}, Alicia Delgado^d, Hilario Murua^e, Jon Ruiz^e, Stéphane Ciccione^b, Pierre Chavance^{f,*}

EU initiatives on FAD research

Non-Target species / BC reduction

- Observer programs : collection of by-catch information



Figure 1.- Whale shark tagging and tagging/pop-up location of the MiniPAT.

ICCAT-SCRS/2014/180

Investigating the post-release survivorship of whale sharks encircled by European purse seiners: first insight from electronic tagging

by

H. Murua¹, I. Fralle¹, I. Arregi¹, A. Delgado de Molina², J. Santiago³, H. Arrizabalaga¹, G. Merino¹, and J. Ariz²

EU initiatives on FAD research

Non-Target species / BC reduction

- Observer programs : collection of by-catch information



795

RAPID COMMUNICATION

Mortality rate of silky sharks (*Carcharhinus falciformis*) caught in the tropical tuna purse seine fishery in the Indian Ocean

François Poisson, John David Filmalter, Anne-Lise Vernet, and Laurent Dagorn

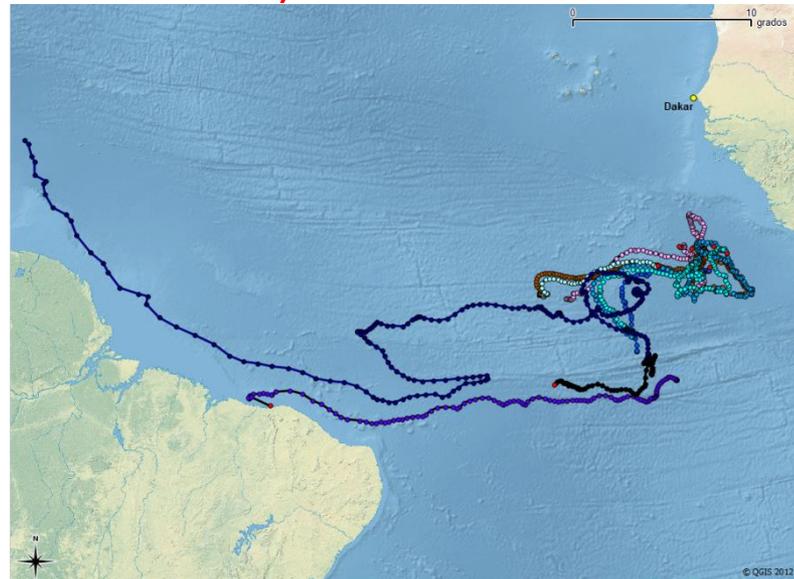
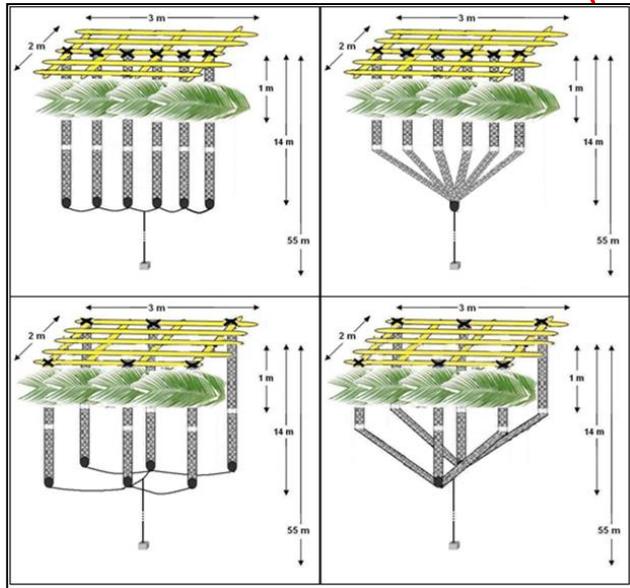
72-85%
(Poisson et al, 2014)



EU initiatives on FAD research

Non-Target species / BC reduction

- **NON-ENTANGLING FADs (ECOFAD PROJECT)**



Design and test, in the Atlantic Ocean, an alternative DFAD to prevent the entanglement of sea turtles and sharks, being as much as biodegradable as possible and as efficient in aggregating fish as the traditional one.

EU initiatives on FAD research

Non-Target species / BC reduction

- NON-ENTANGLING FADs (NETMO 2013)

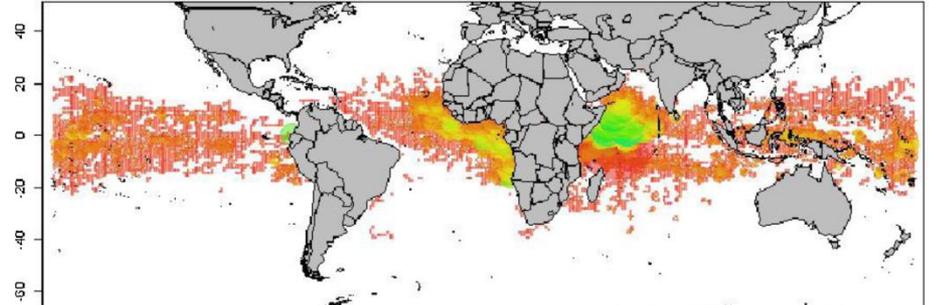
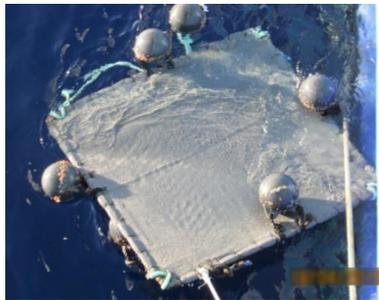


New designs of non-entangling and biodegradable FADs.

EU initiatives on FAD research

Cooperation with Industry

- Good Fishing Practices
- Use of non-entangling FADs
- Release operations for BC
- etc.



SCIENTIFIC COMMITTEE
ELEVENTH REGULAR SESSION
Pohnpei, Federated States of Micronesia
5-13 August 2015

System of verification of the code of good practices on board ANABAC and OPAGAC tuna purse seiners
and preliminary results for the Atlantic Ocean

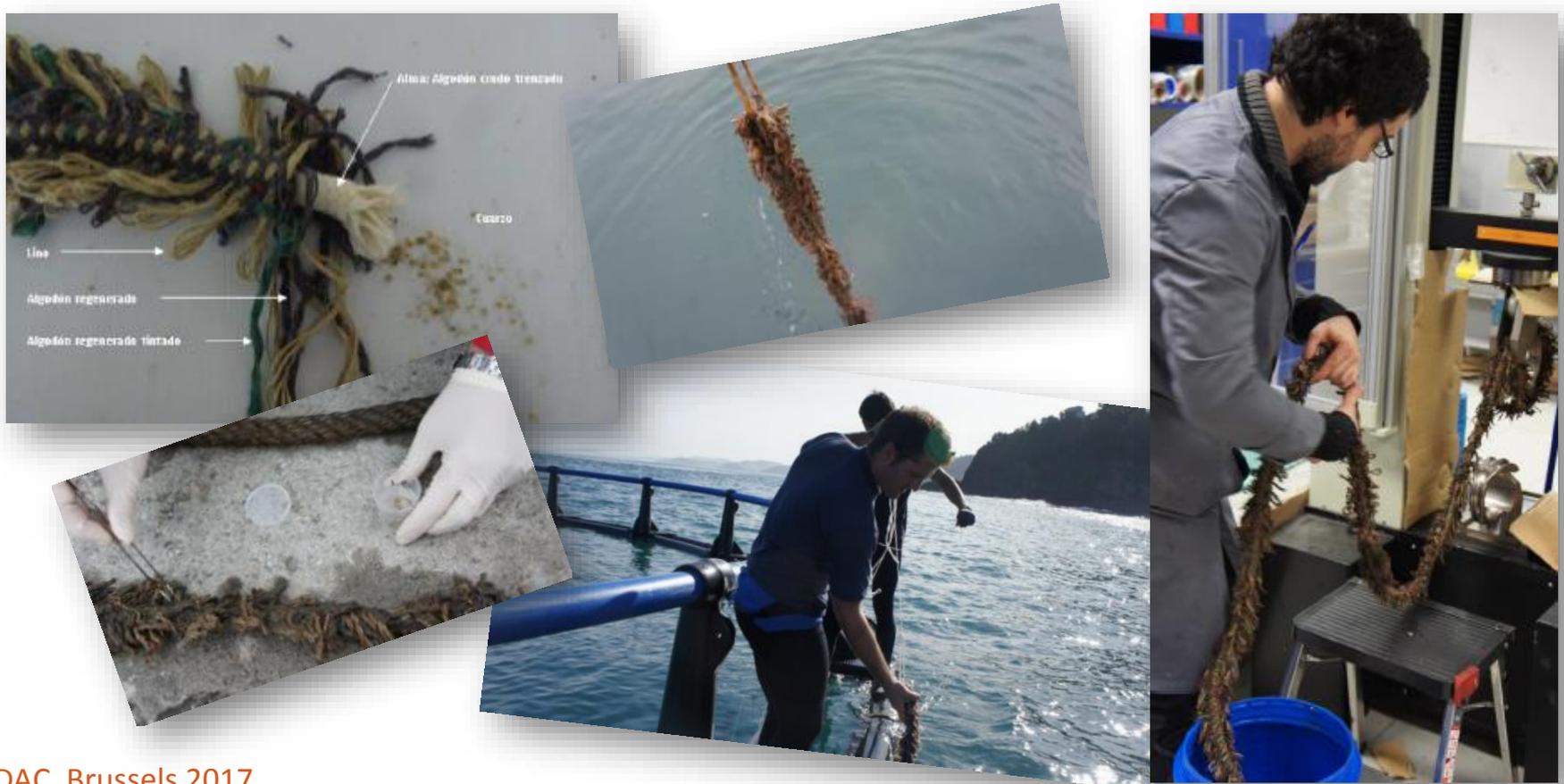
WCPFC – SC11-2015/ EB-IP-11

Nicolas Goñi¹, Jon Ruiz², Hilario Murua¹, Josu Santiago², Iñigo Krug², Begoña Sotillo de Olano³, Alberto González de Zarate⁴, Gala Moreno¹, Jefferson Murua²

EU initiatives on FAD research

Cooperation with Industry

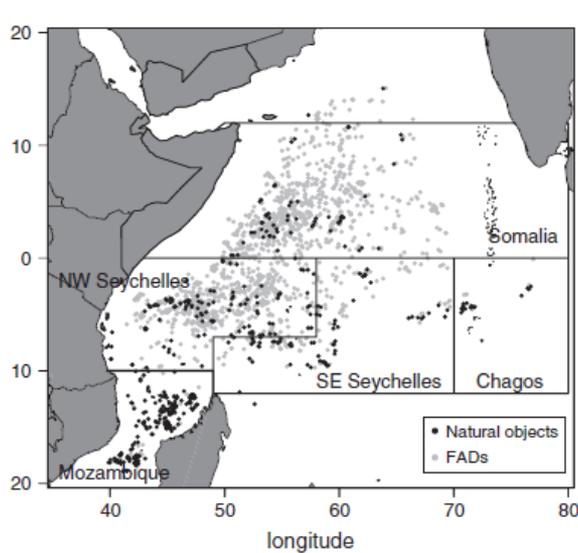
- Development of Biodegradable FADs



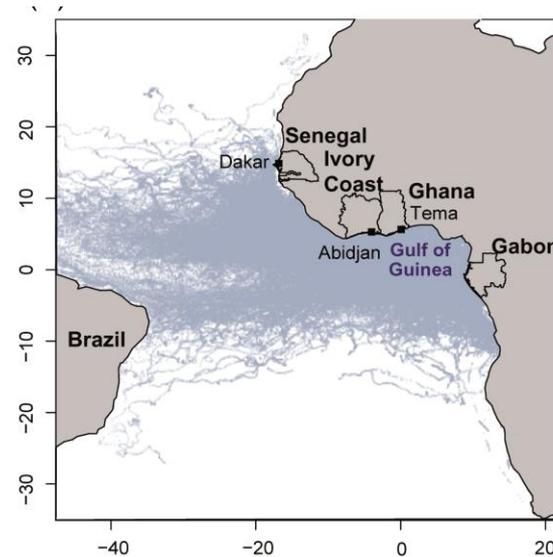
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Monitoring and Management of FADs

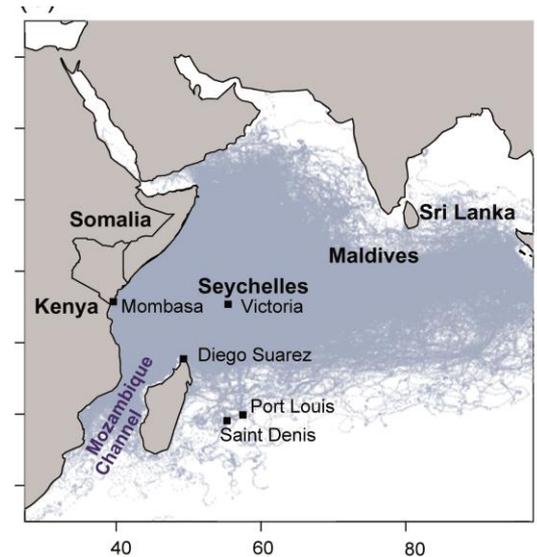
- FAD densities, trajectories



(Dagorn et al. 2013)



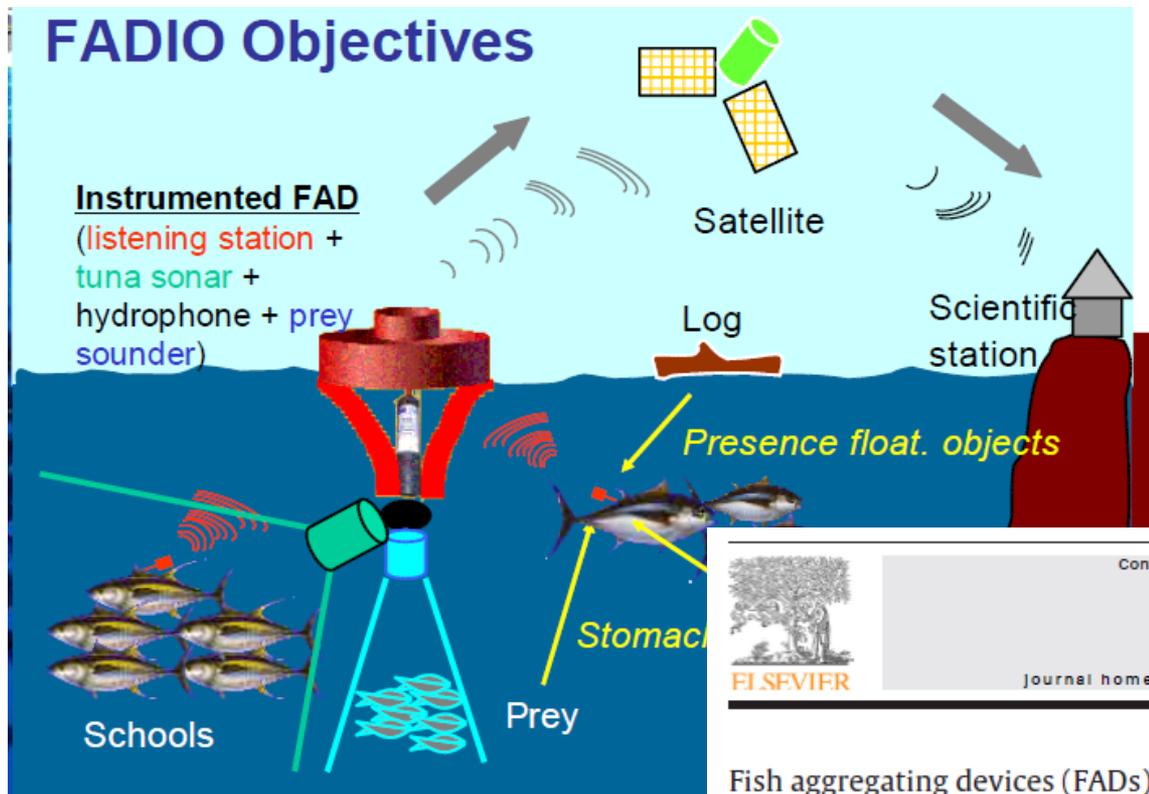
(Maufroy et al. 2015)



EU initiatives on FAD research

Monitoring and Management of FADs

- FADs as scientific platforms (FADIO)



Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

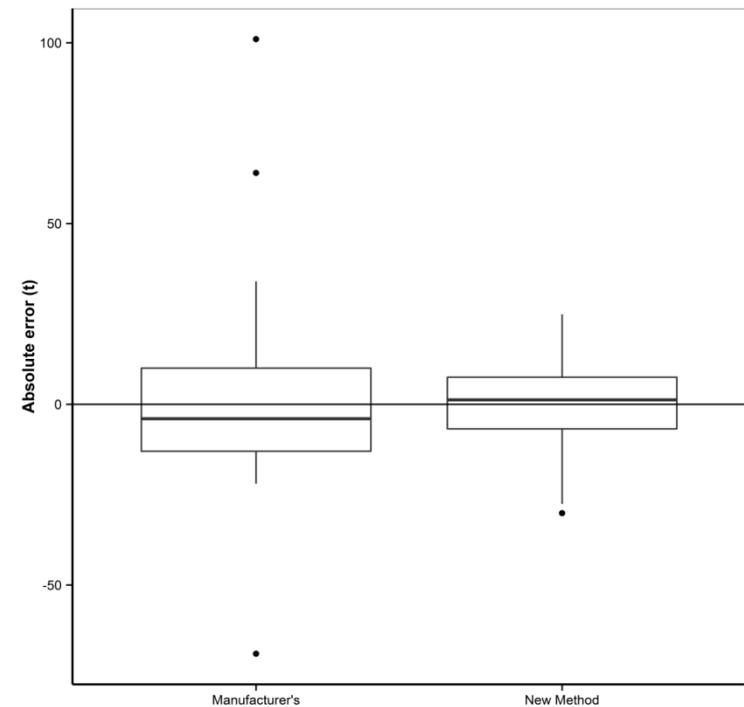
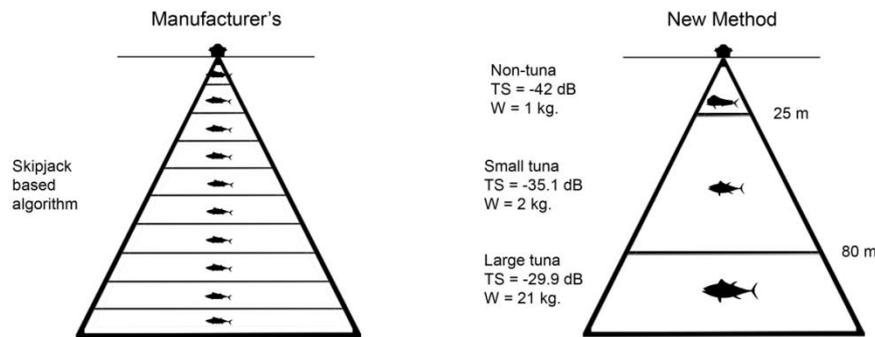


Fish aggregating devices (FADs) as scientific platforms

G. Moreno^{a,b,*}, L. Dagorn^c, M. Capello^c, J. Lopez^{b,e}, J. Filmlalter^{a,d}, F. Forget^{a,c}, I. Sancristobal^b, K. Holland^f

Population assessments

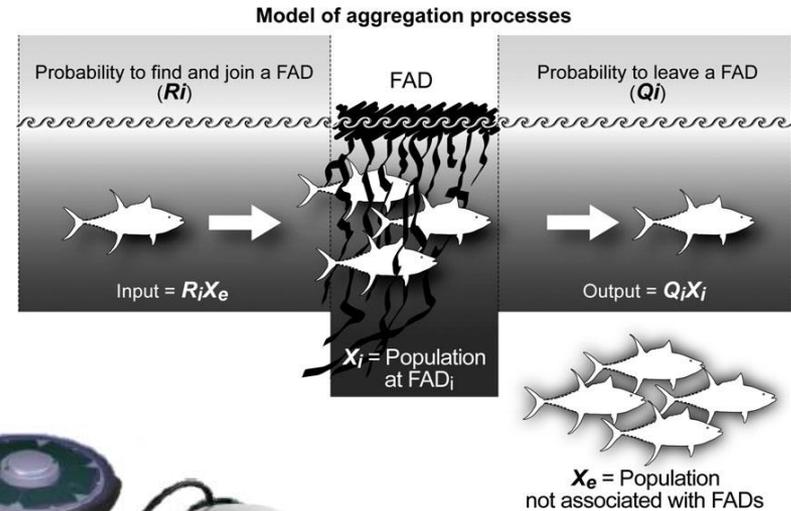
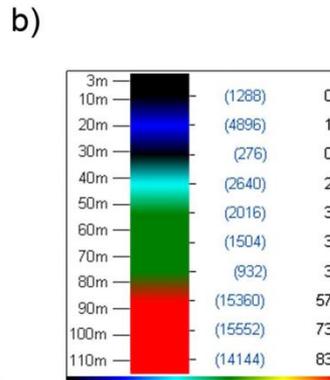
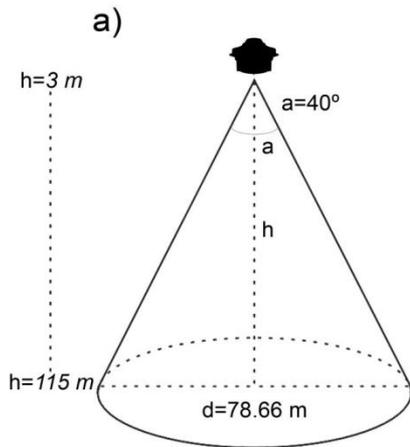
- ES Buoy assessment and methodology development for scientific use



(Lopez et al., 2017)

Population assessments

- Fishery independent abundance index from ES Buoys



(Lopez et al., accepted)

TUNABAI



(Sempo et al., 2013)

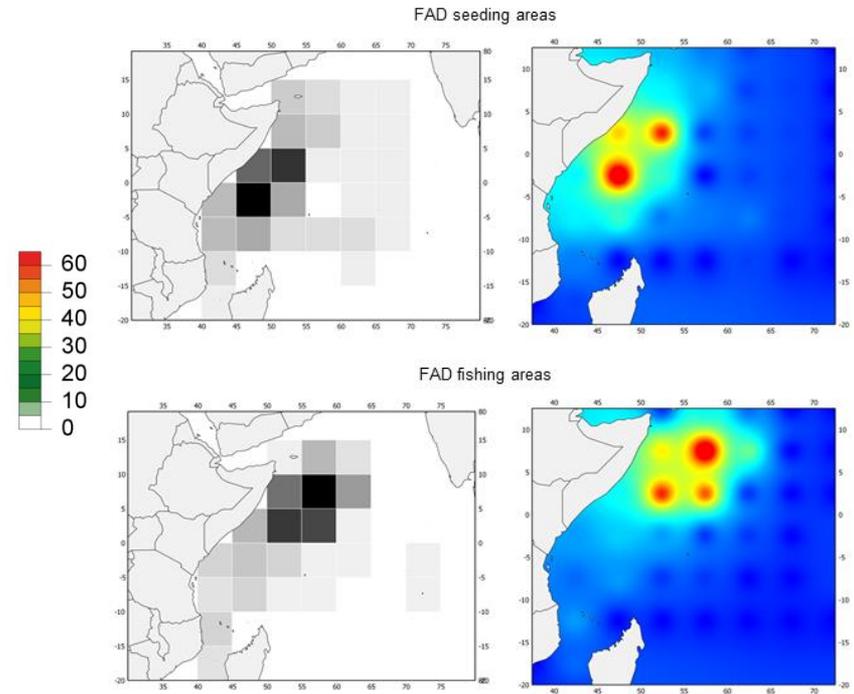
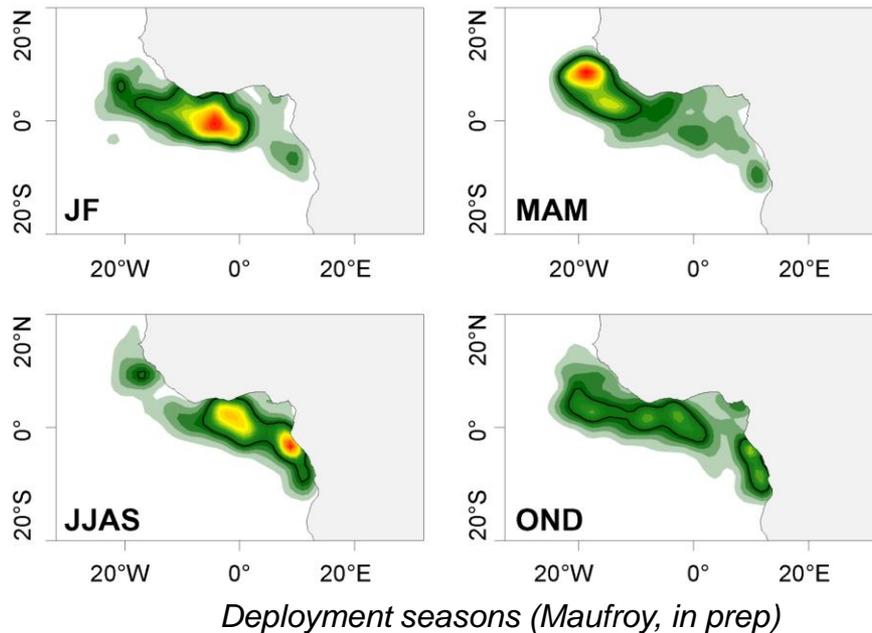
$$BAI_t = \varphi \cdot B_t$$

(Santiago et al., 2016)



CPUE Improvement

- Fishing strategy: seeding strategy, seasonality, etc.



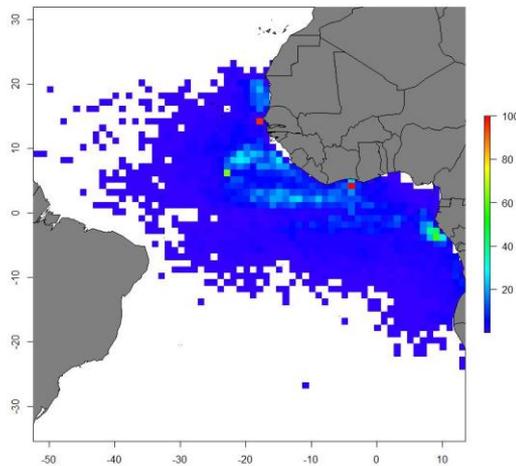
Deployment and fishing areas (Lopez, in prep)



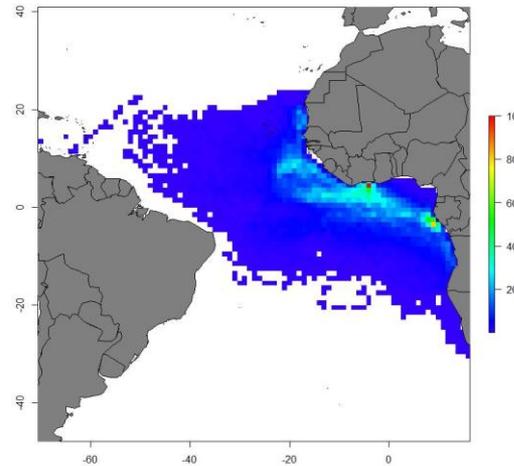
CPUE Improvement

- Fishing strategy: Activity of Spanish Fleet from VMS

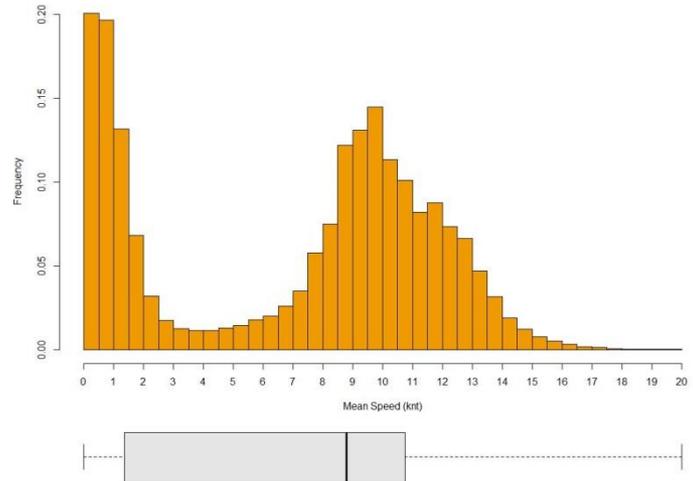
Fishing effort 2007-2014



Searching/Cruising 2007-2014



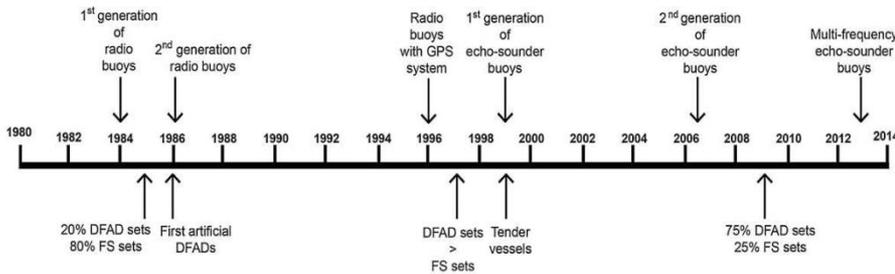
Speed of vessels in AO



(Lopez et al., in prep)

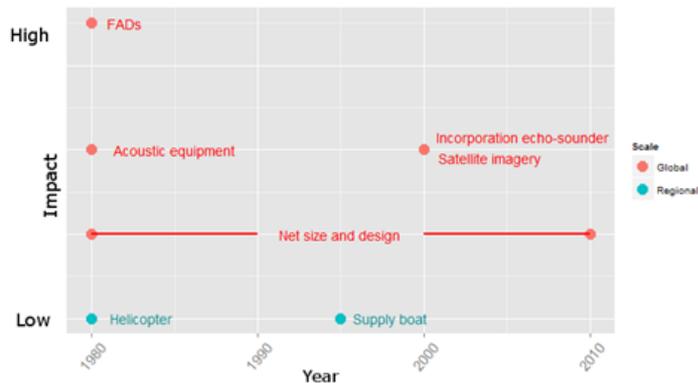
CPUE Improvement

- Evolution of Fishing Technology



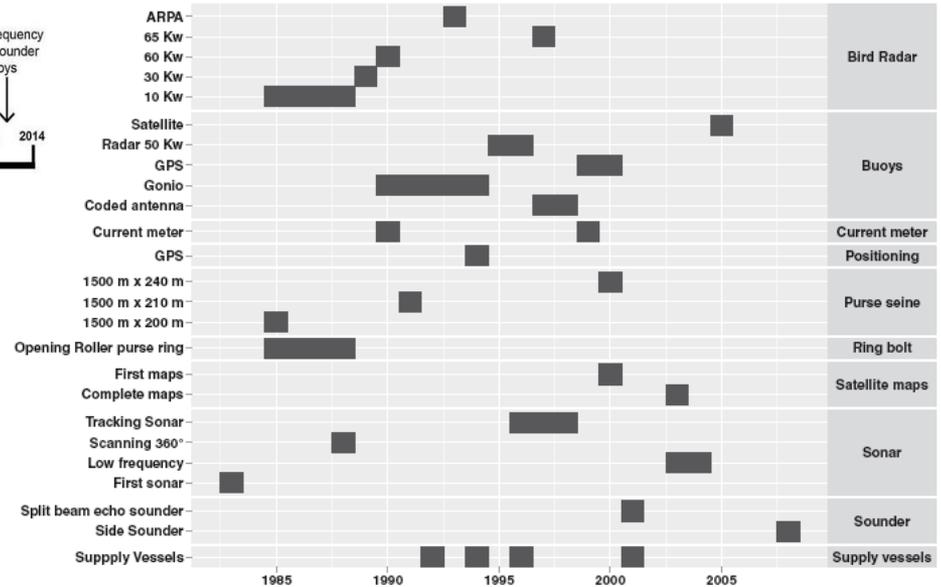
(Lopez et al., 2014)

Technological advances over time



(Lopez et al., 2015)

(Torres-Irineo et al., 2014)



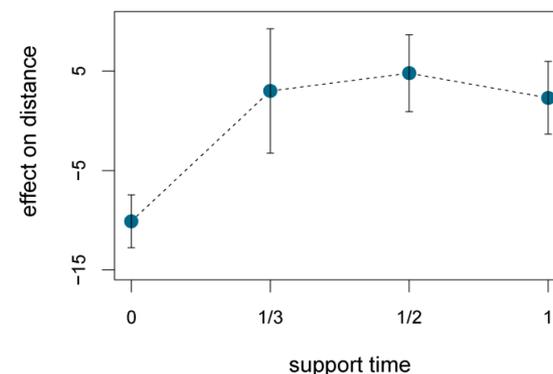
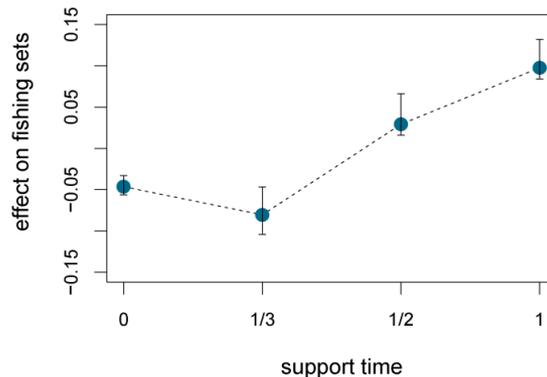
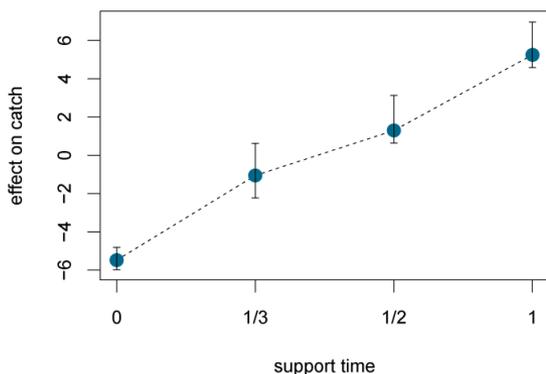
Received: 21 & 25 October 2015

IOTC-2015-WPTT17-32 Rev_1

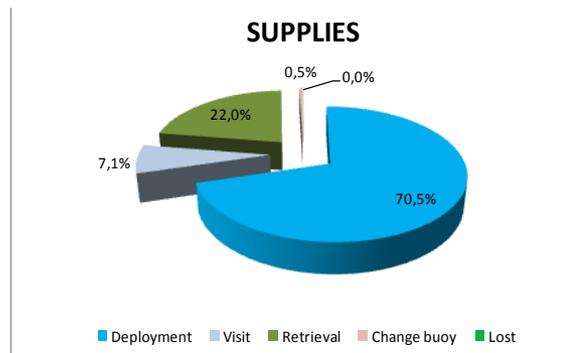
Technological and fisher's evolution on fishing tactics and strategies on FADs vs. non-associated fisheries

CPUE Improvement

- Supply vessel effect and activity



Effects of the support vessel effect in the Indian Ocean (Maufroy et al, 2015)

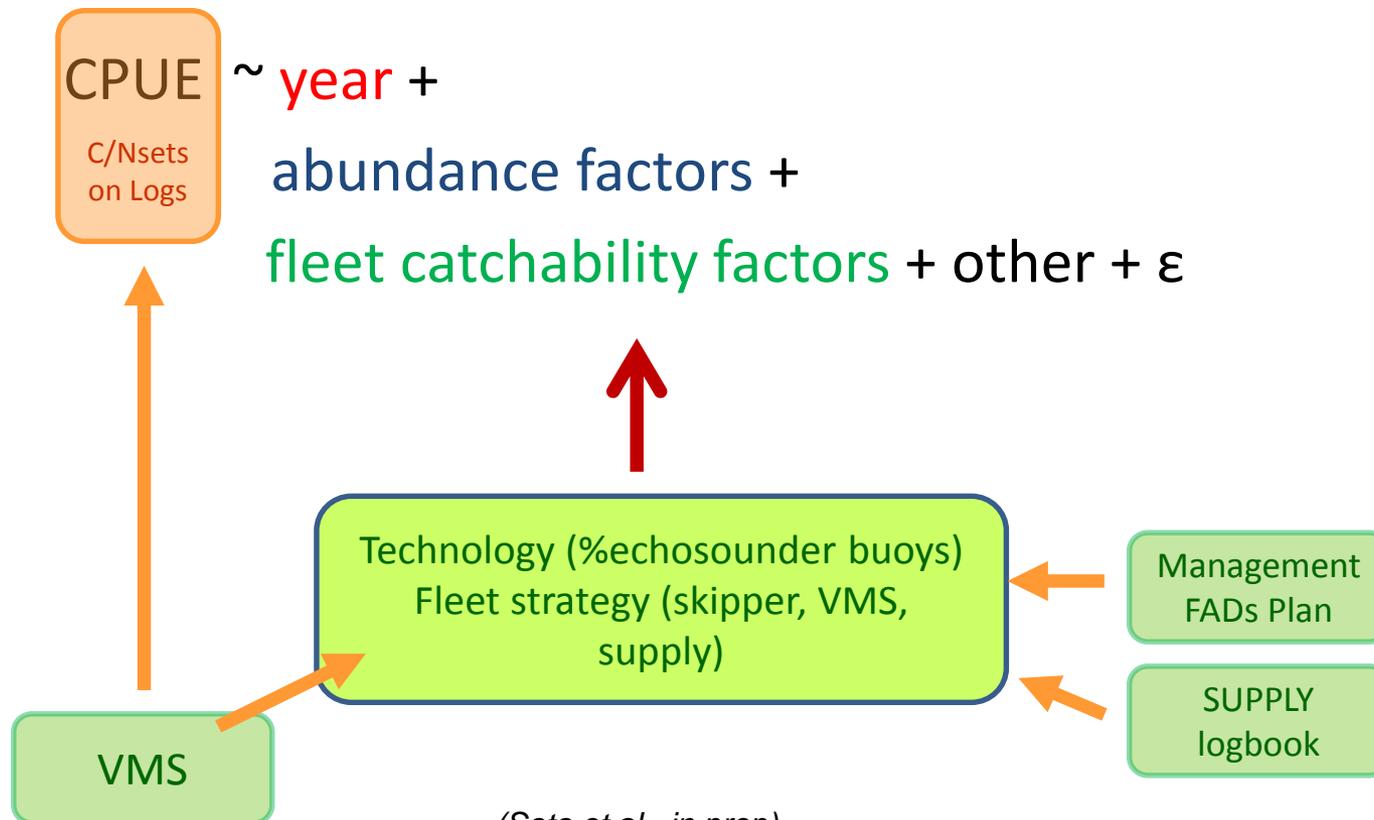


(Sotillo et al., in prep)



CPUE Improvement

- Introduction of technology and fishing strategy factors in the CPUE



(Soto et al., in prep)



Biology - Habitat - Biodiversity

- Habitat modelling: bycatch hotspots (Silky shark)
- Biodiversity
- Effect on biology and reproduction



ARTICLE

Comparison of condition factors of skipjack tuna (*Katsuwonus pelamis*) associated or not with floating objects in an area known to be naturally enriched with logs

Marianne Robert, Laurent Dagorn, Nathalie Bodin, Fabrice Pernet, Eve-Julie Arsenault-Pernet, and Jean Louis Deneubourg



Contents lists available at ScienceDirect

Fisheries Research

Journal homepage: www.elsevier.com/locate/fishres

Mar Biol (2017) 164:44
DOI 10.1007/s00227-017-3075-3

ORIGINAL PAPER

Accumul
yellowfi
Iker Zudai

Biodiversity in th
ecosystem in the

N. Lezama-Ochoa¹ · H. Murua¹
J. Ruiz¹ · P. Chavance² · A. ...
A. Caballero¹ · I. Sancristo¹

Diel behaviour of tuna and non-tuna species at drifting fish aggregating devices (DFADs) in the Western Indian Ocean, determined by fishers' echo-sounder buoys

Jon Lopez¹ · Gala Moreno^{1,2} · Leire Ibaibarriaga³ · Laurent Dagorn⁴

Western Indian Ocean

Iker Zudaire^{1,2,3} · Hilario Murua² · M
Frédéric Ménard⁴ · Emmanuel Chasso

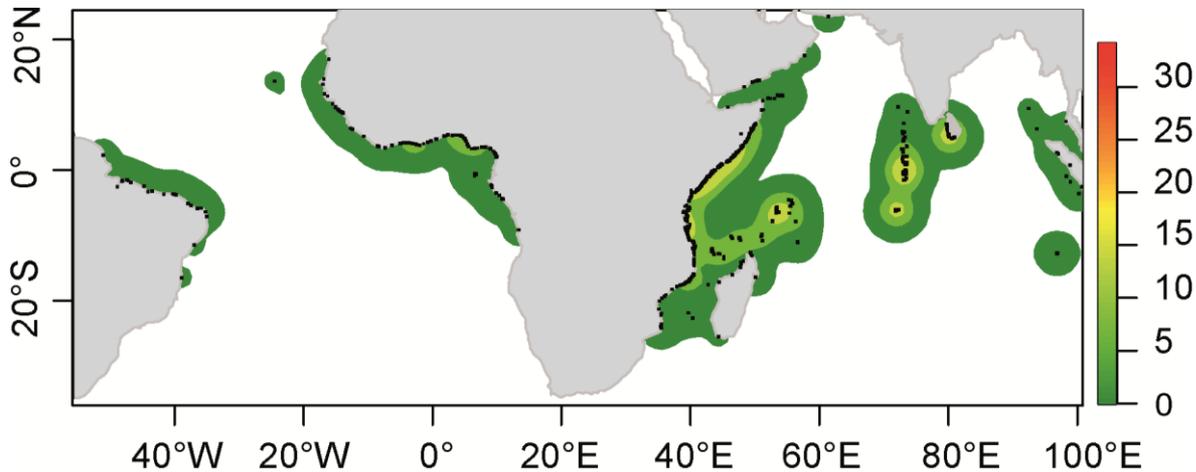
Fecundity ...
Western Indian O
Iker Zudaire^{2,4} · Hilario Murua², ...
Alicia Delgado-Molina⁵ · ... Goñi² · Michel Potier³ · ...
...udin⁵

Reproductive potential of Yellowfin Tuna (*Thunnus albacares*) in the western ...
Ocean



... tuna (*Thunnus albacares*) in the
... ria Korta³, Haritz Arrizabalaga³, Juan Jose Areso³,
... in the

FAD beaching



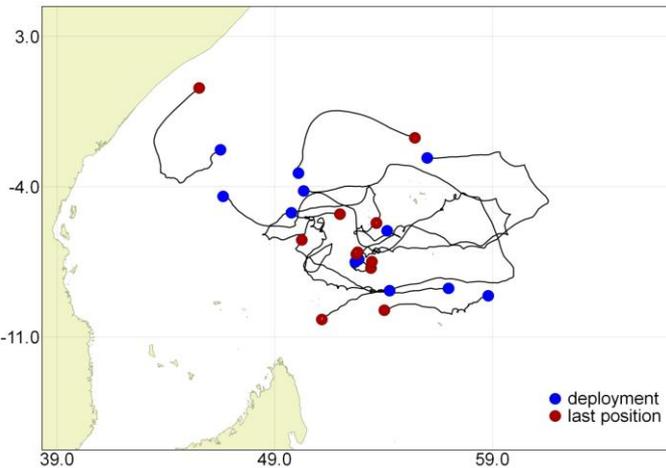
Beached dFADs of the French PS fleet (2007-2011, Maufroy et al. 2015)



Beached dFAD (Balderson and Martin 2015)

- FADs drifting outside fishing grounds
→ lost, abandoned, sunk, beached
- Polluting materials: nylon, polyethylen, metal, plastics, electronic components (buoys)
- Destruction ~ time at sea

FAD beaching



Detection of beaching events (adapted from Maufroy 2015)

Support vessel

Tests of biodegradable FADs

- Current management: limitation of FAD use (ICCAT + IOTC)
- Required data / potential solutions:
 - 💧 Information on FAD positions → “FAD watch” / FAD recovery
 - 💧 Biodegradable FADs

EU initiatives on FAD research

IATTC

Testing of non-entangling and biodegradable Fish Aggregating Devices (FADs)

Summary: To support the priority research by the Scientific Staff on the effectiveness of various materials and designs of non-entangling and biodegradable FADs

Duration: 15 months (Jul 2015-Aug 2016)

Budget: 225,000 € (EU: 180,000 €)

Phase 2 starting in 2017 !!!

EU initiatives on FAD research

WCPFC

Development of potential measures to reduce interactions with bigeye tuna in the purse seine fishery in the Western and Central Pacific Ocean

Summary: Analytical work integrating a range of purse seine data in order to support WCPFC consideration of potential management measures to reduce the impact of the purse seine fishery on bigeye tuna.

Duration: 18 months (Oct 2015-Aug 2017)

Budget: 250,000 € (EU: 200,000 €)

EU initiatives on FAD research

WCPFC

Minimising interactions with bigeye tuna using non-entangling shallow draft FADs

Summary: Science-Industry collaboration to trial the performance of non-entangling shallow draft (NESD) drifting fish aggregating devices (DFADs) to minimise interactions with bigeye tuna.

Duration: 18 months (2017?)

Budget: 250,000 € (EU: 200,000 €)

Pending of the results of a similar initiative in the EPO

