



EU initiatives on FAD research

WCPFC WG FADs, Bali 2015

Hilario Murua
Jon Lopez
Josu Santiago

EU initiatives on FAD research

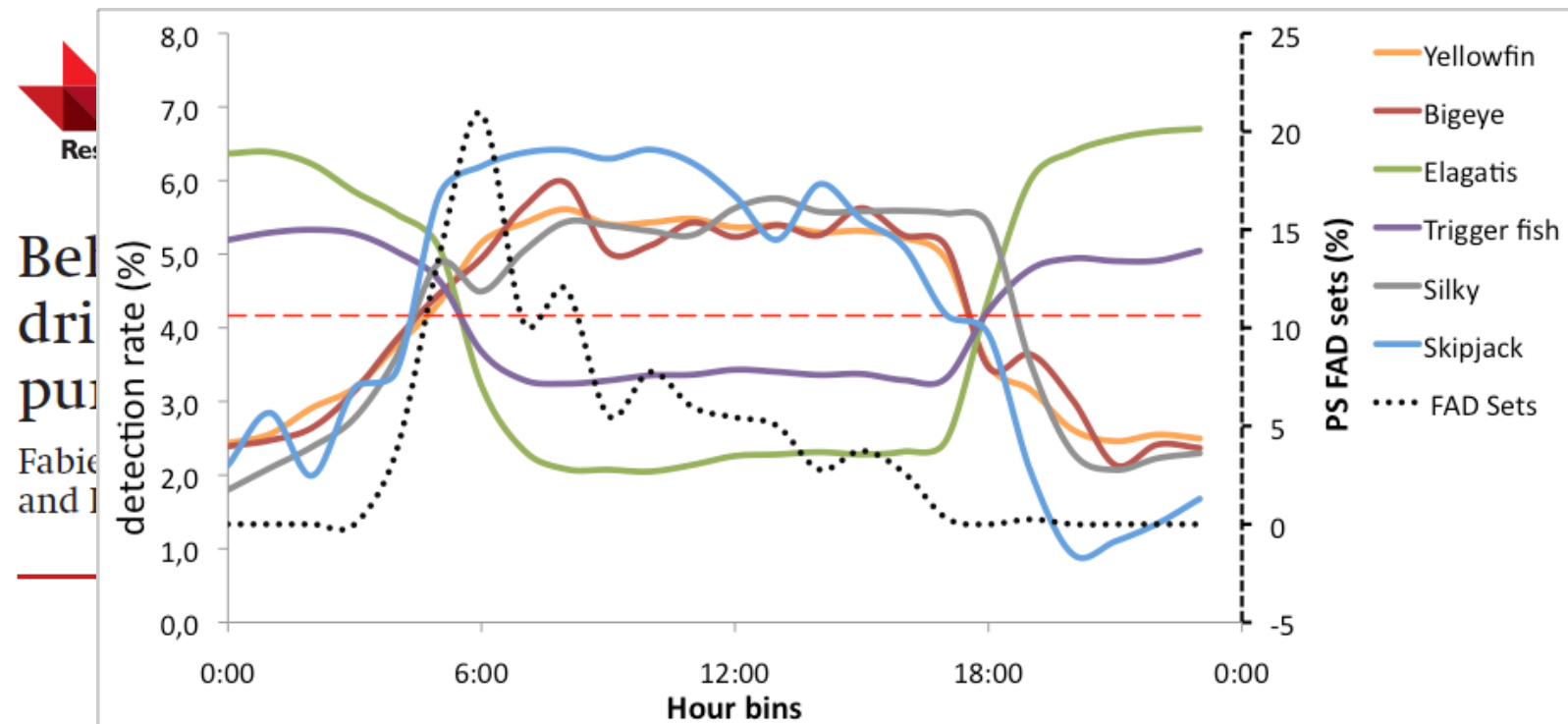
Current Research Areas

- 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
- New indices of abundance
- FAD Fishery exploitation effects on:
 - Habitat and Biodiversity
 - Ecology, Biology, Behavior and Movement, including Ecological Trap.
- Cooperation with Industry

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Non-Target species / BC reduction

- Tagging of FAD species to investigate specific vulnerability to fishing



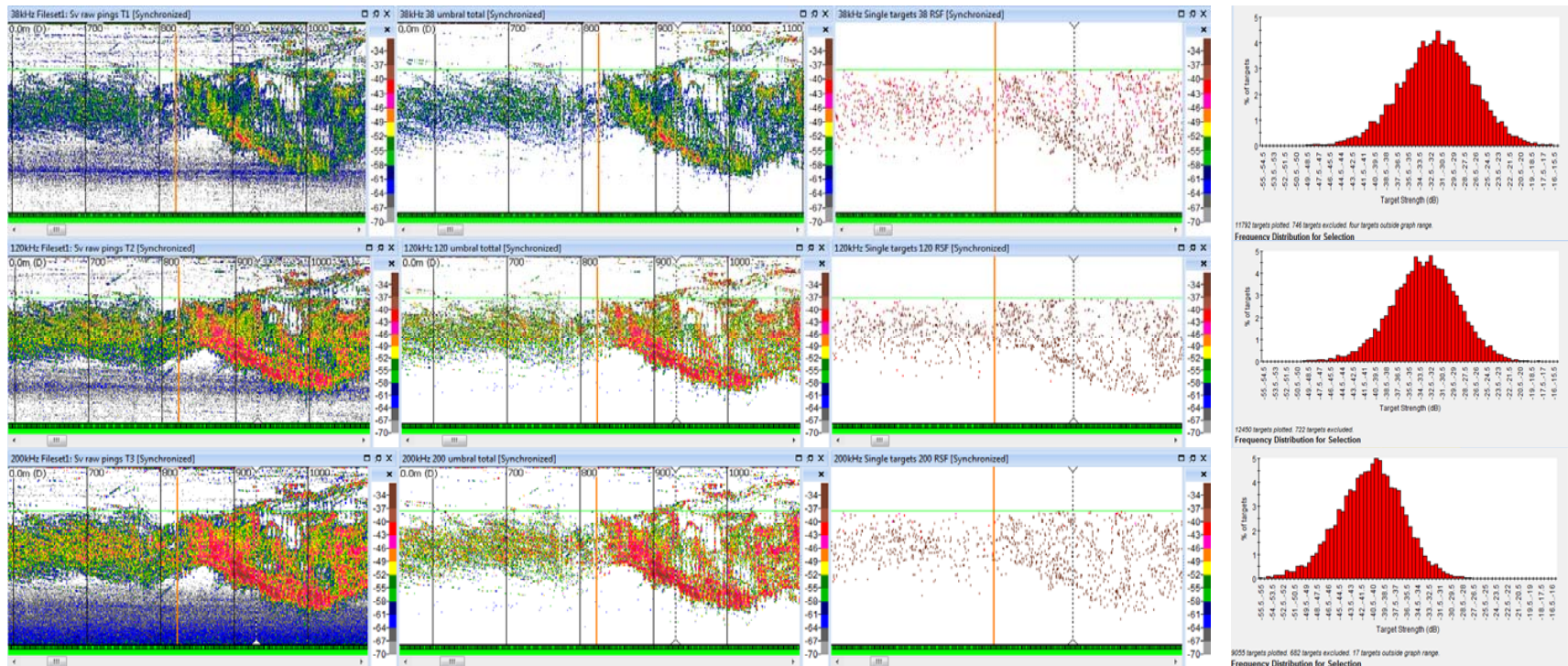
(Forget et al 2015)

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Non-Target species / BC reduction



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

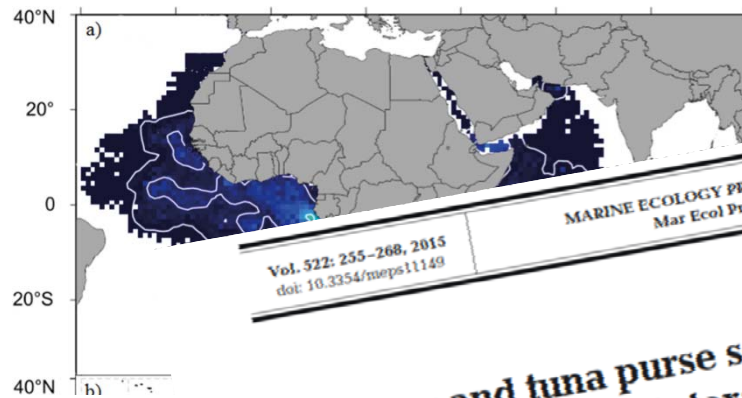


1- Raw Echogram → 2- Plancton Filter → 3- Individual targets(TS) → 4- In situ TS

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Non-Target species / BC reduction

- Observer programs : collection of by-catch information



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

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MARINE ECOLOGY PROGRESS SERIES
Mar Ecol Prog Ser

Published March 2

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doi: 10.3354/meps11149

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

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

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

Jérôme Bourjea^{a,*}, 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

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Non-Target species / BC reduction

- Observer programs : collection of by-catch information



RAPID COMMUNICATION

795

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

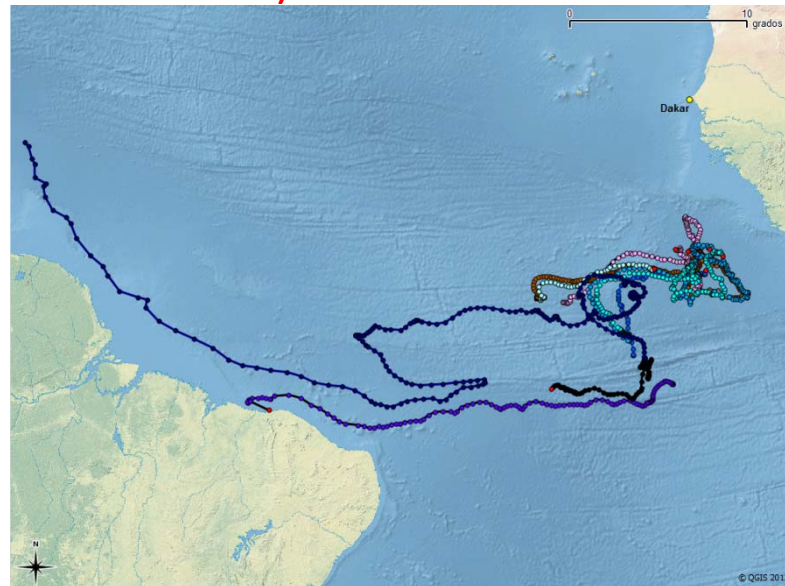
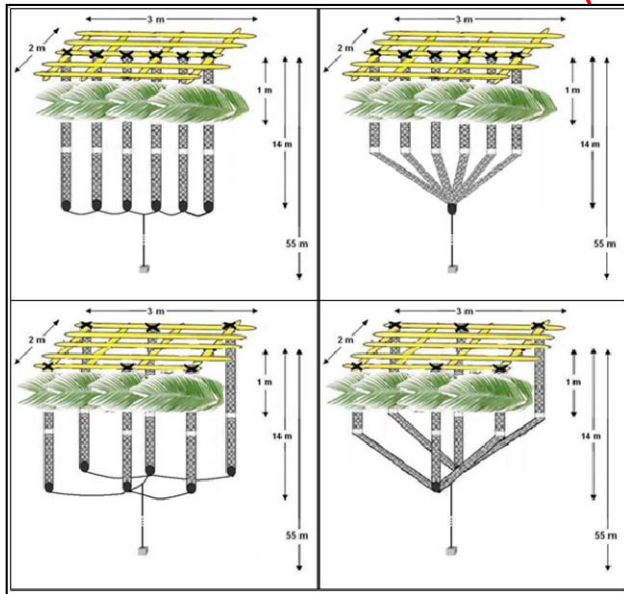
72-85%
(Poisson et al, 2014)



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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.

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Non-Target species / BC reduction

- NON-ENTANGLING FADs (NETMO 2013)

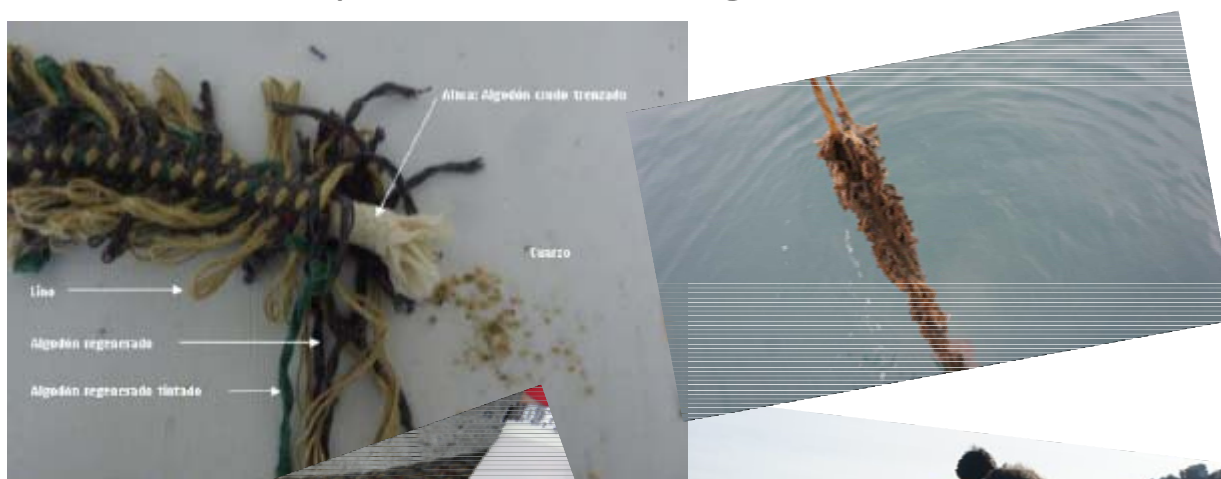


New designs of non-entangling and biodegradable FADs.

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Cooperation with Industry

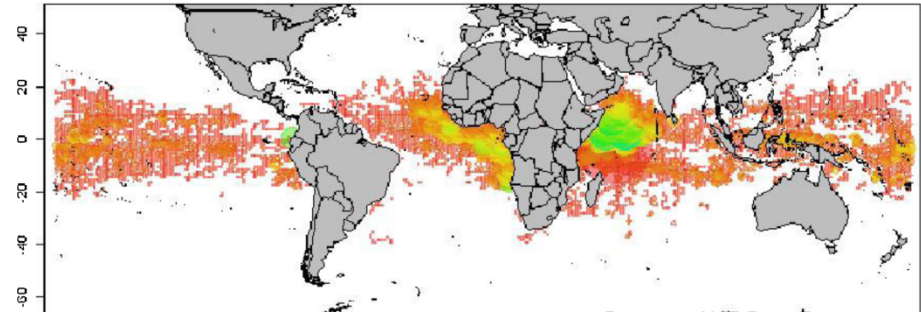
- Development of Biodegradable FADs



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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

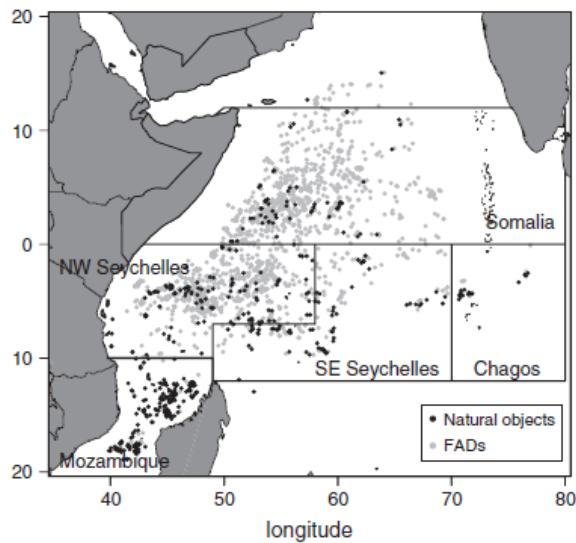
WCPFC – SC11-2015/ EB-IP-11

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

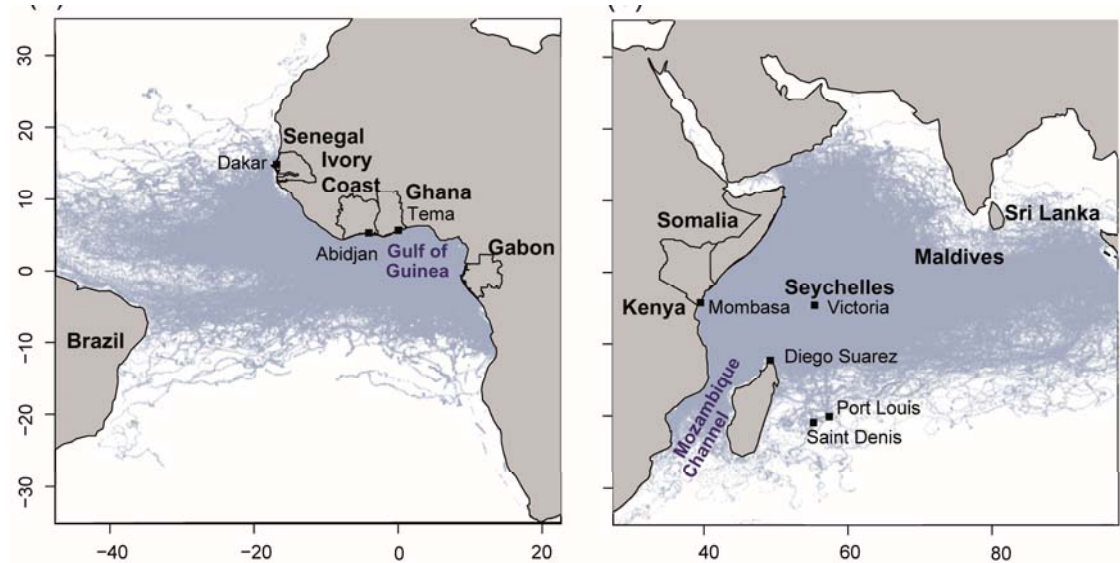
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Monitoring and Management of FADs

- FAD densities, trajectories



(Dagorn et al. 2013)

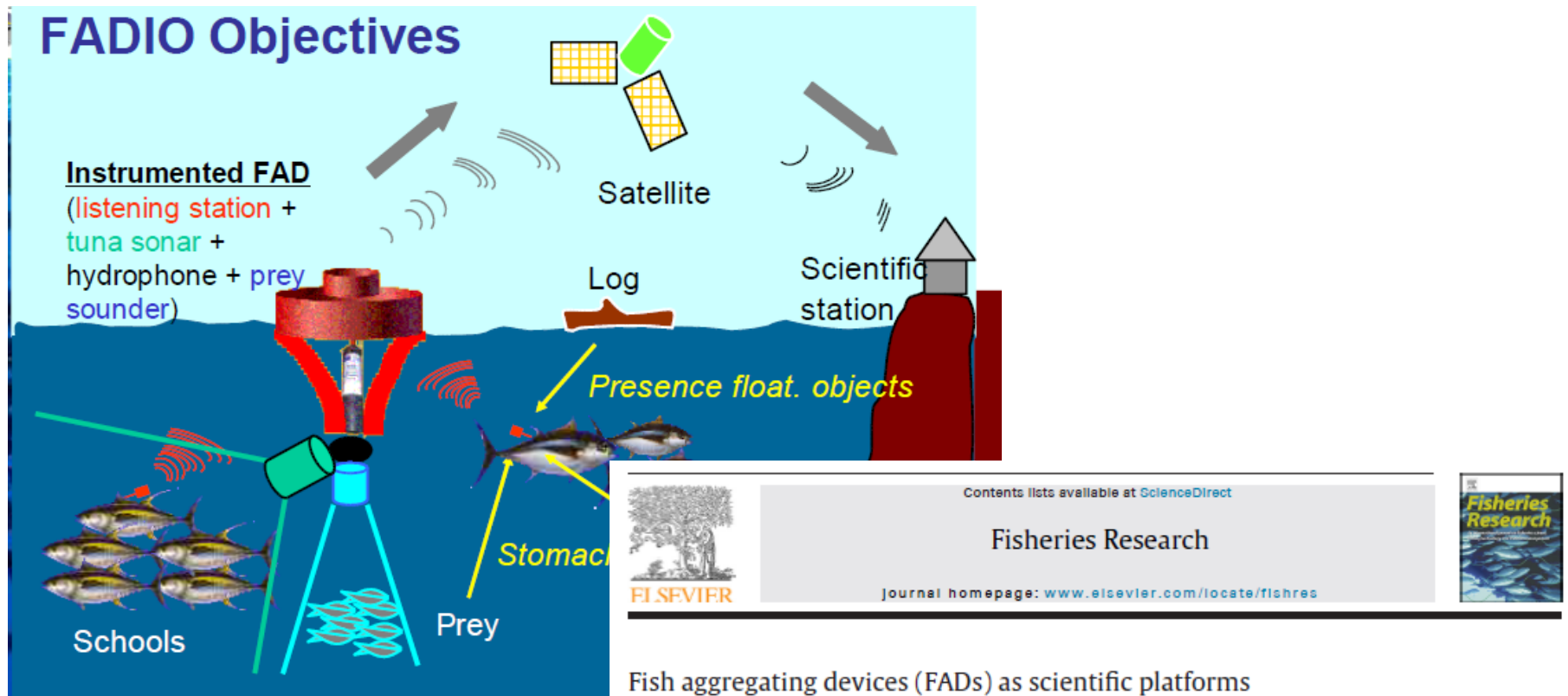


(Maufroy et al. 2015)

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Monitoring and Management of FADs

- FADs as scientific platforms (FADIO)



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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

(Moreno et al. 2015)

EU initiatives on FAD research

CECOFAD



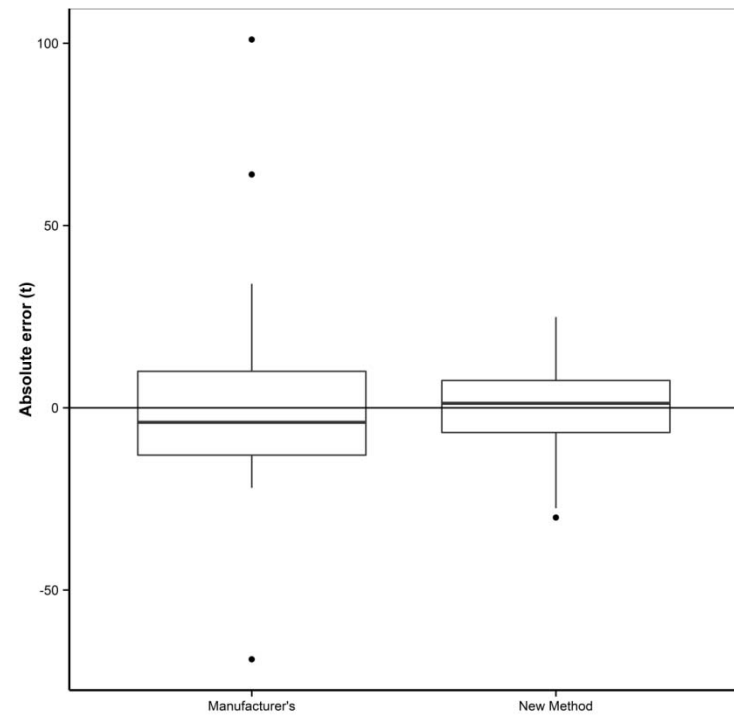
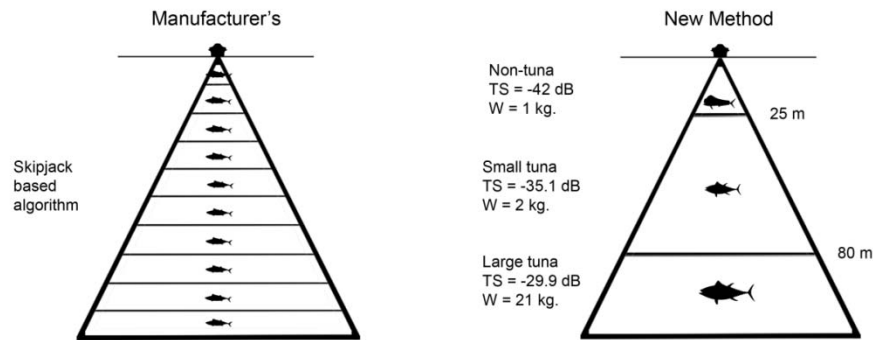
Project
funded by the
EUROPEAN UNION

- 1) to define a **unit of fishing effort** for purse-seiners using FADs that accounts for different factors influencing catchability
- 2) to **standardize catch-per-unit-effort series** of the EU purse seine fleet, for juveniles and adults of the three tropical tuna species and
- 3) to provide information on **catch composition around FADs** and estimate **impacts on other marine organisms** (e.g. by-catch of sharks, rays, turtles).



Indices of abundance

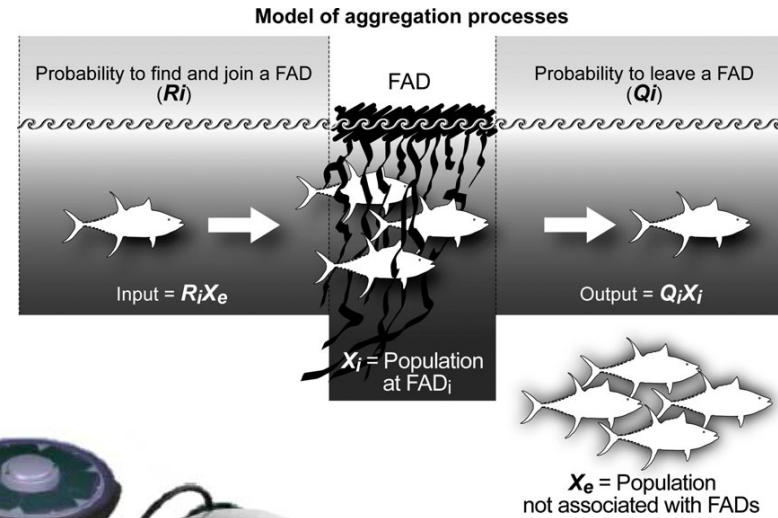
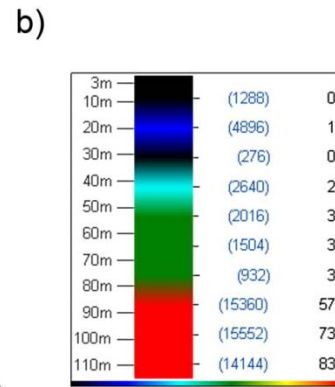
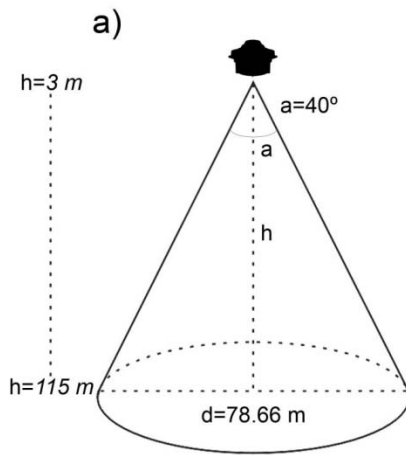
- ES Buoy assessment and methodology development for scientific use



(Lopez et al., accepted)

Indices of abundance

- Fishery independent abundance index from ES Buoys



(Lopez et al., accepted)

TunaBAI



(Sempo et al., 2013)

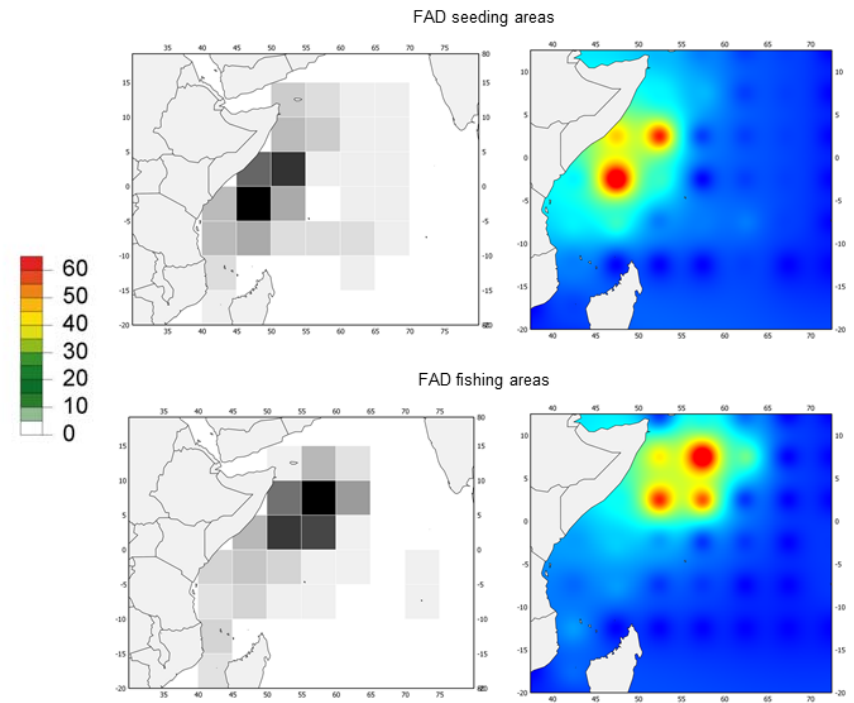
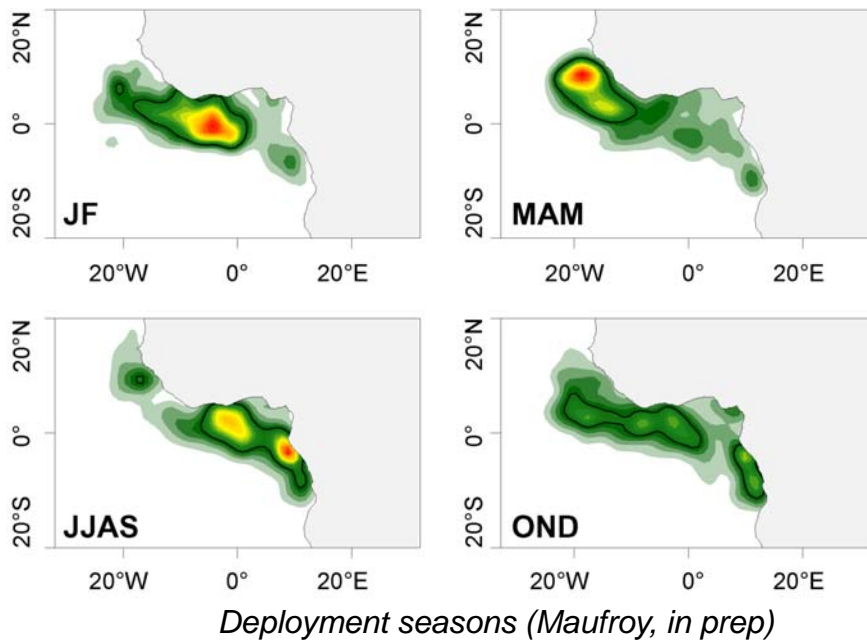
$$BAI_t = \varphi \cdot B_t$$

(Santiago et al., 2015)



CPUE Improvement

- Fishing strategy: seeding strategy, seasonality, etc.



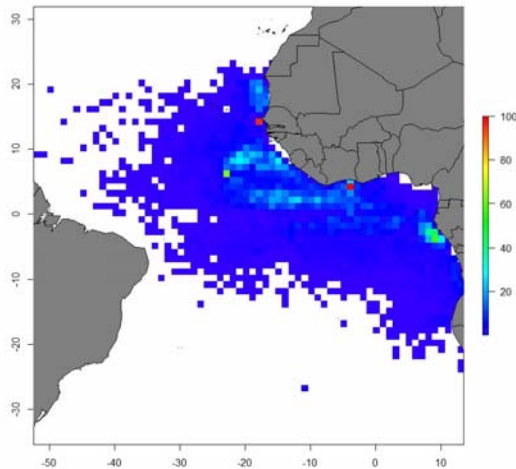
Deployment and fishing areas (Lopez, in prep)



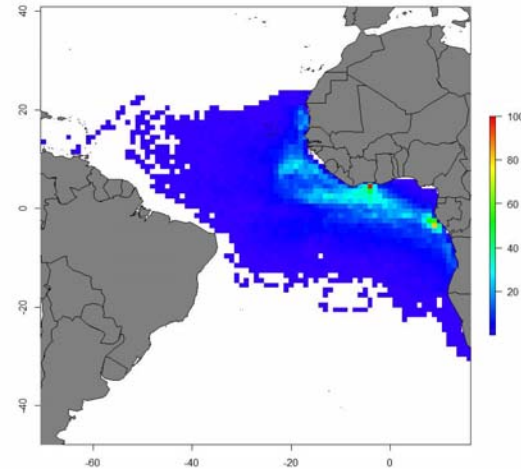
CPUE Improvement

- Fishing strategy: Activity of Spanish Fleet from VMS

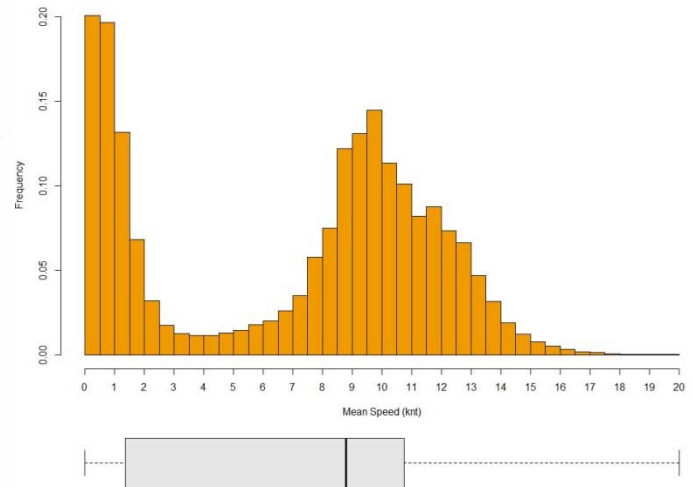
Fishing effort 2007-2014



Searching/Cruising 2007-2014



Speed of vessels in AO



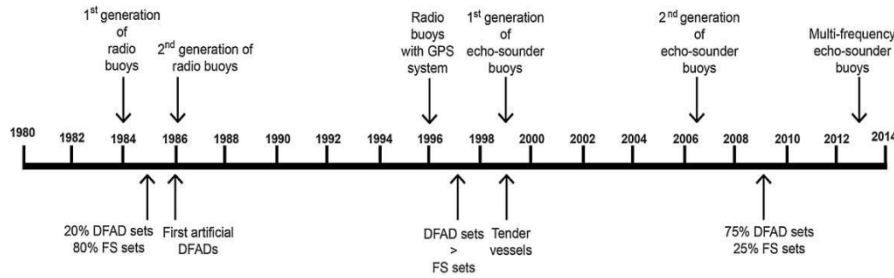
(Lopez et al., in prep)



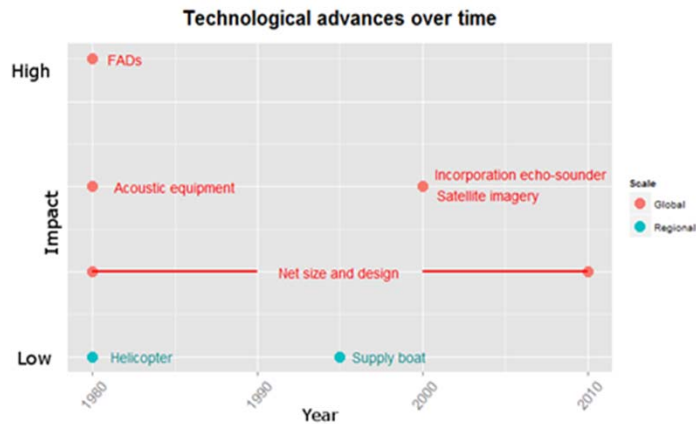
CPUE Improvement

- Evolution of Fishing Technology

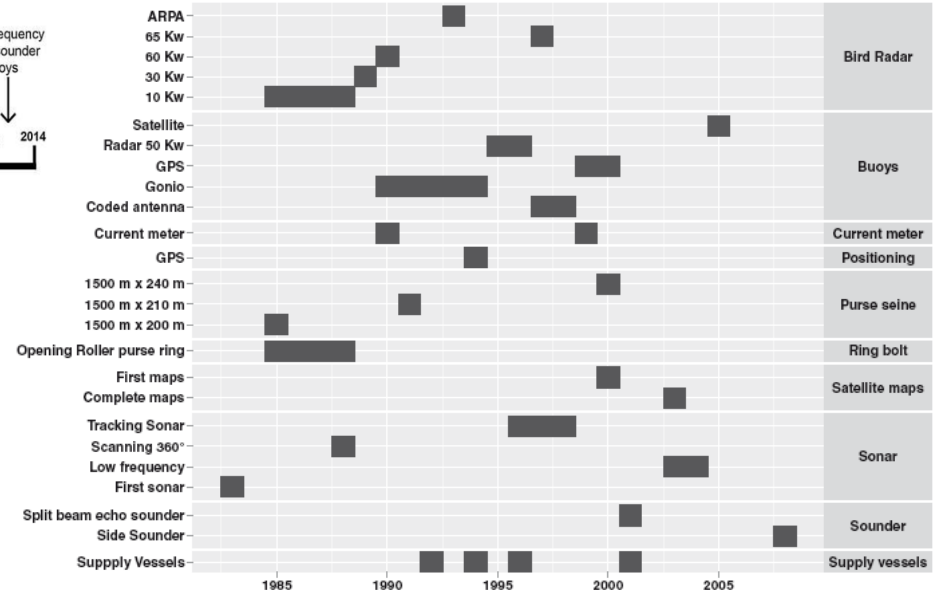
(Torres-Irineo et al., 2014)



(Lopez et al., 2014)



(Lopez et al., 2015)



Received: 21 & 25 October 2015

IOTC-2015-WPTT17-32 Rev_1

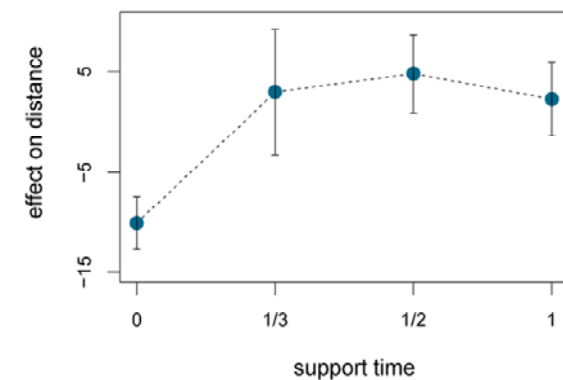
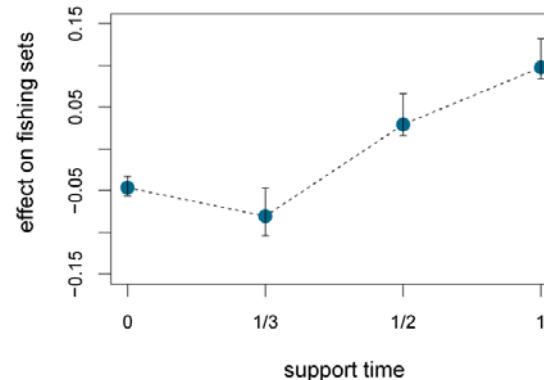
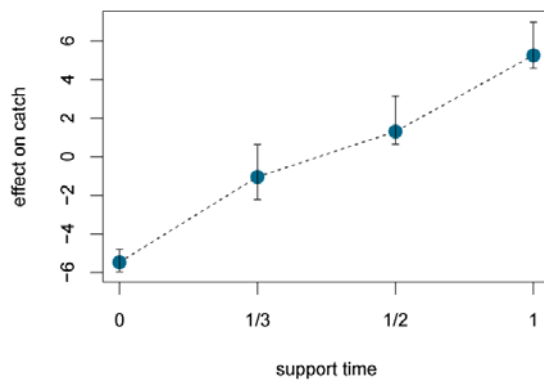
Technological and fisher's evolution on fishing tactics and strategies on FADs vs. non-associated fisheries

Jon Lopez¹, Igaratza Fraile¹, Jefferson Murua², Josu Santiago², Gorka Merino¹, and Hilario Murua¹



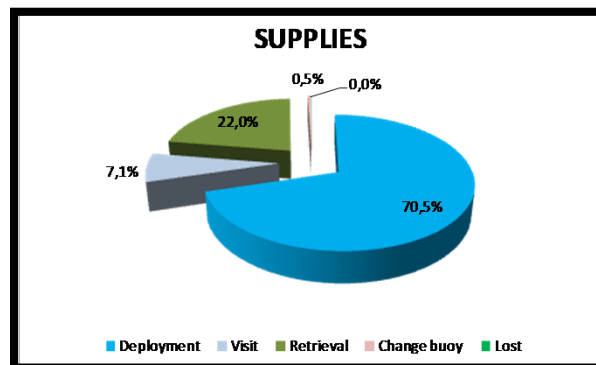
CPUE Improvement

- Supply vessel effect and activity



Catch per day	Fishing sets per day	Distance per day
+44.6%	+20.0%	+4.5%

(Mauffroy et al., in prep)

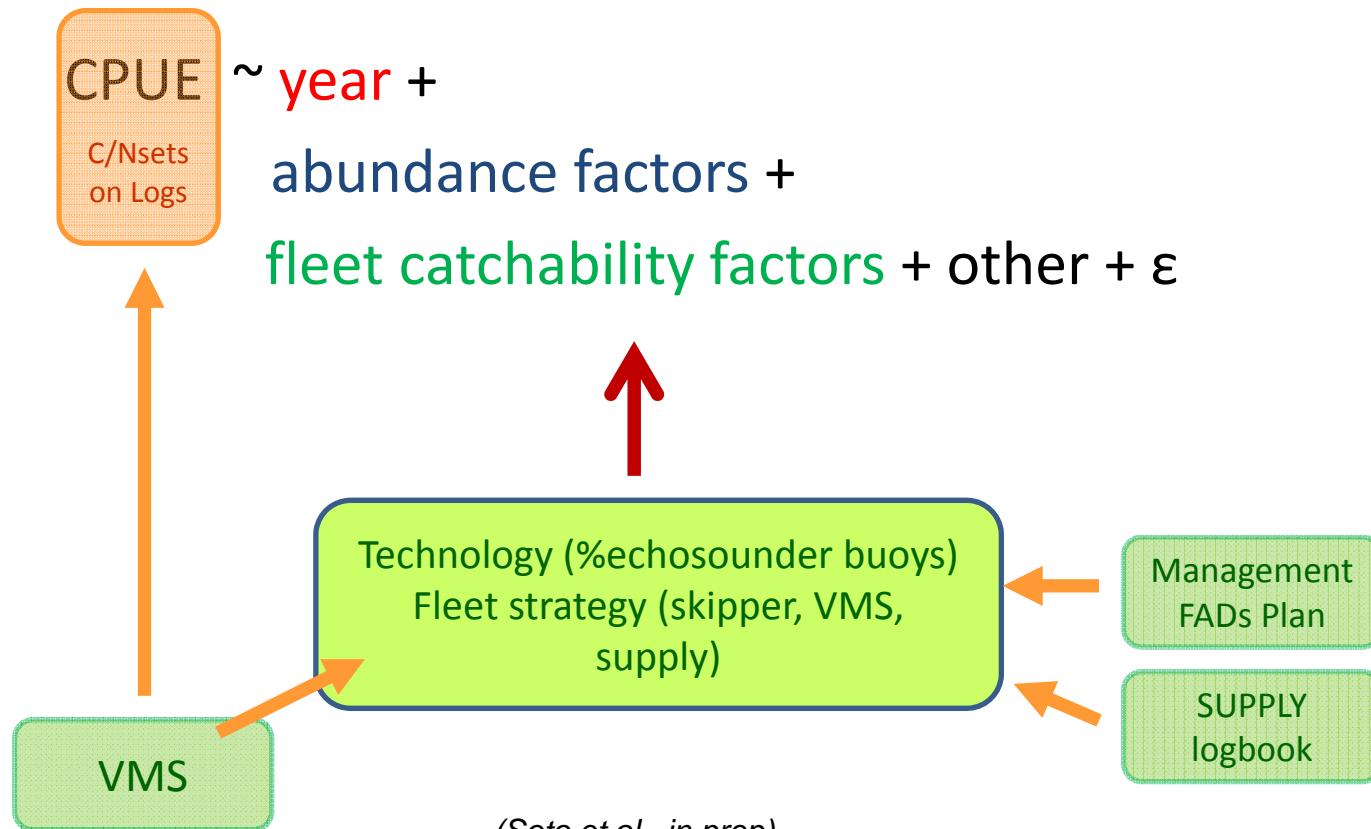


(Sotillo et al., in prep)



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

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

Iker Zudaire (contact author)
 Hilario Murua¹
 Maitane Grande²

Accumulation and mobilization of lipids in relation to reproduction of yellowfin tuna (*Thunnus albacares*) in the Western Indian Ocean

Iker Zudaire^{a,4}, Hilario Murua^a, Maitane Grande^a, Fabrice Pernet^c, Nathalie Bodin^b

DOI 10.1007/s00227-015-2763-0

ORIGINAL PAPER

Variations in the diet and development of female yellowfin tuna (*Thunnus albacares*) in the Western Indian Ocean

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



Fecundity regulation strategy of the yellowfin tuna (*Thunnus albacares*) in the Western Indian Ocean
 Iker Zudaire^{a,4}, Hilario Murua^a, Maitane Grande^a, Maria Korta^a, Haritz Arrizabalaga^a, Juan Jose Areso^b, Alicia Delgado-Molina^c, Iker Goñi² · Michel Potier³ · Nathalie Bodin⁵

Biodivers Conserv
 DOI 10.1007/s10531-015-0951-3
 ORIGINAL PAPER

Biodiversity in the ecosystem in the

N. Lezama-Ochoa¹ · H. Murua¹ · G. Chaves
 J. Ruiz¹ · P. Chavance² · A. Delgado de Molina
 A. Caballero¹ · I. Sancristobal¹

EU initiatives on FAD research

IATTC

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

Summary: To support the priority research by the IATTC 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 €)

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 (2016?)

Budget: 480,000 € (EU: 400,000 €)

Pending of the results of a similar initiative in the EPO

EU initiatives on FAD research

WCPFC

Post release of sharks and rays from longline and purse seine vessels

Summary: Estimation of the post-release survival rates of shark species and rays captured by purse-seine and longline fisheries in the WCPO

Duration: 18 months (2016)

Budget: 480,000 € (EU: 400,000 €)

