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¹ Document will be a draft until it was approved by the coordinator

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³ The initials of the revising individual in capital letters



Deliverable D4.1

MPO for each case study

28/02/2018



Executive Summary

This report is the detailed description of the current state of affairs in each FarFish case study (CS). It also addresses potential improvements by suggesting case study specific objectives. The MPO will be a significant chapter in the management plan invitation to be sent to the operators, after the dialogue process including authorities and operators. MPO describes the current status in the fishery in question and is the background for the development of the MP1 (the tailor-made good practice recommendation).

MPOs focus on the current state of affairs, the main problems faced and form the basis for the suggested case study (CS) objectives. In advance of the project meeting in November 2017, a common template was designed to collect and compile data from the different CSs. Most of the CS leaders were present at the meeting and provided useful information. After some minor revisions of the template, the MPOs were prepared in collaboration with the CS leaders and FarFish partners. The MPOs include suggestions for Responsive Fisheries Management System (RFMS) agencies (authorities, operators) and comprehensive contact information for relevant stakeholders. Further, the MPO compile the available information on the current state of the fisheries, geographical and biological boundaries, management, assessment, preliminary value chain information, the identified challenges, the suggested CS objectives and potential improvements made by FarFish. The potential for improvement using new or existing approaches/tools are suggested for all CSs, although preliminary as a thorough examination of data availability and quality is required.

In two CSs with sustainable fisheries partnership agreements (SFPA), where several species are targeted by different fleets, the development of a CS specific MPO covering all the target species was considered unattainable. Consequently the CS leaders asked to prioritize which fishery to address in the MPO based on their challenges. Hence, the MPOs focus on the following fisheries in the CS; mixed fishery in the South East Atlantic (FAO 47), mixed fishery in the South West Atlantic (FAO 41), the tuna fishery in Cape Verde (SFPA), the black hake fishery in Senegal (SFPA), the shrimp fishery in Mauritania (SFPA) and the tuna fishery in Seychelles (SFPA). The identified challenges in these fisheries and the suggested CS objectives are relevant for the upcoming identification of indicators and outcome targets (OT), which is the next step in the RFMS process.

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Abbreviations & concepts/definitions

ACOPESCA	Competent Authority for Fishery Products, Cabo Verde
ADAPI	Association of Portuguese Industrial Fishing-boat Owners, Portugal
AIS	Automatic Identification System
AMP	Maritime and Port Agency, Cape Verde
ANAMAR	National Association of Ship Owners of Fresh Fruit Freezer Vessels
ANFACO-CECOPESCA	National Association of Fish and Seafood Canning Manufactures (Representing EU fishing and processing sector)
APESC	Cape Verde Fisheries Association
ARVI	Cooperativa de Armadores de Pesca del Puerto de Vigo
AZTI	Fundación AZTI – AZTI Fundazioa
BCC	The Benguela Current Commission is a multi-sectoral inter-governmental, initiative of Angola, Namibia and South Africa
BSP	Bayesian Surplus Production model
CAFS	Chinese Academy of Fishery Sciences, governmental scientific institution of Chinese Ministry of Agriculture (MoA). The institution plays an influential role in Chinese national fisheries science and management policy.
CECAF	Committee for the Eastern Central Atlantic Fisheries
CECAF-SC	Committee for the Eastern Central Atlantic Fisheries Scientific Committee
CMM	Conservation and management measures
CMR	Corten Marine Research
COMAHFAT	Ministerial Conference on Fisheries Cooperation
COSMAR	Operations Centre for Maritime Safety, Cape Verde
CPUE	Catch per Unit Effort
CS	Case Study
CSRP	Sub-Regional Fisheries Commission
CTMFM	Joint Argentinean-Uruguay Technical Commission of the Maritime Front (managing hake stock since 1975)
DARE	Directory of Fisheries Management in Mauritania
DFADs	Drifting Fish aggregating devices
DG MARE	Directorate-General Maritime Affairs and Fisheries, EC
DG MARE	This Commission department is responsible for EU policy on maritime affairs and fisheries
DGRM	General Directorate for Marine Resources, National Fisheries Authority, Cape Verde
DNEM	Directorate National of Maritime Economy, Cape Verde
DPI	The management of industrial fishing, is responsible for granting licenses and monitoring of access rights payments, Mauritania
DPM	Maritime Fisheries Directorate
ECOWAS	Economic Community of West African States

EEZ	Exclusive Economic Zone
EJF	Environmental Justice Foundation
EMS	Electronic monitoring system
ERS	Electronic Recording Systems
FAD	Fish aggregating device
FAO	The Food and Agriculture Organization of the United Nations
FarFish RG	FarFish Reference Group
FICZ	Falkland Islands Interim Conservation and Management Zone
FIG	Falkland Islands Government
FIP	Fisheries Improvement Project
FOCZ	Falkland Islands Outer Conservation Zone
FPAOI	The Federation of Artisanal Fishers of the Indian Ocean, Seychelles
GCM	Coast Guard
HCR	Harvesting Control Rule
HSBG	High Seas Bottom Gear
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Exploration of the Sea
IEO	Instituto Español De Oceanografía
IFREMER	French Research Institute for Exploitation of the Sea
IMR	Institute of Marine Research
IMROP	Mauritanian Institute for Oceanographic Research and Fisheries (responsible for the approval of licenses and fishing vessels)
INDP	National institute for Fisheries Development, Cape Verde
INDS	National fisheries Institute, Cape Verde
INE	Instituto Nacional de Estatística, Cape Verde
INIDEP	The National Institute of Fisheries Research and Development in Argentina
INPESCA	Cía Internacional de Pesca y Derivados, S.A., Seychelles
IOT	Indian Ocean Tuna, a branch of Union Thai
IOTC	The Indian Ocean Tuna Commission
IOTC WGFADS	IOTC Working group on Fish aggregating devices
IRD	Institute for Research and Development
ISRA	Institut Sénégalais de Recherches Agricoles
ISSF	International seafood sustainability foundation
IUU	Illegal, unreported and unregulated fishing
LDAC	Long Distance Advisory council, EU fisheries body representing stakeholders of both fishing sector and other groups of interest
LJFL	Lower-jaw fork length by age three, swordfish assessment
LJFL	Lower-jaw fork length by age three, swordfish assessment
LPS	The Sectoral Policy Letter, reference framework of the MPEM
MCS	Monitoring, Control and Surveillance
MFMP	National Fisheries Management Plan

MFMR	Ministry of Fisheries and Marine Resources, Namibia
MPEM	Department of Fisheries and Maritime Economy, Mauritania
MPEM	Ministry of Fisheries and Maritime Economy, Senegal
MSY	Maximum sustainable Yield
OCEANA	International organization focused solely on ocean conservation, NGO
OFCF	Overseas Fishery Cooperation Foundation, Japanese NGO
ONISPA	Office National d'Inspection des produits de la peche et aquaculture
OPAGAC	Organisation of associated producers of large tuna freezer vessels, representing the purse seine fleet
OPRPOMAR	Organization of Fresh Fish Producers of the Port and Ría de Marín, Spain
OPRPOMAR	Organization of Fresh Fish Producers of the Port and Ría de Marín, Spain
ORTHONGEL	French organisation of producers of frozen and deep-frozen tropical tuna
OT	Outcome Target
RBM	Results Based Management
RFMO	Regional Fisheries Management Organization
RFMS	Responsive Fisheries Management System
RSFP	Regional Fisheries Surveillance Project
SAMPER	France-based company primarily engaged in the catching and processing of several species of fish and specifically Tuna
SC SEAFO	Scientific Committee SEAFO
SEAFO	South East Atlantic Fisheries Organisation
SFA	Seychelles fishing Authority
SFPA	EU Sustainable Fisheries Partnership Agreements
SIGQ	Serviços de Inspeção e Garantia de Qualidade cpcp, Cape Verde
SIOTI	The Sustainable Indian Ocean Tuna Initiative
SMARTFISH	Regional fisheries programme managed by the Indian Ocean Commission, funded by the European Union and co-implemented by the Food and Agriculture Organization of the United Nations. IOC SmartFish
SMSP	Seychelles Marine Spatial Planning
TAC	Total Allowable Catch
TL	Total length
UNK area	Unknown area
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WWF	Worldwide fund for nature
RFMS	RFMS is a fisheries management approach developed within the EcoFishMan project. The RFMS is an adaptive management system that is results-based and ecosystem-based. The RFMS attempts to reduce micromanagement by involving stakeholders and increase the degree of co-management.
OT	Outcome target (OT) is a specific and measurable performance goals defined for a fishery on the basis of agreed and appropriately authorized general goals, standards and principles, as defined by the authorities based

	on the policy objectives. The OT is the indicator value that the management actions aim to stay above or below e.g. $F < F_{msy}$
Authority	Organizational entity enacting authority in pursuit of the management objectives decided for a fishery e.g. a coastal state or the European Commission.
Operator	Organizational unit with delegated authority to develop management plans and oversee or conduct fishing operations within the standards decided by a management authority

1 Introduction

The MPO is the first stage in the development of the responsive management plan and provides case study specifications relevant for the development of Management Plans (MP). The development of MP is based on the Responsible Fisheries Management System (RFMS) approach [1] which was developed in the EcoFishMan project, incorporates Ecosystem Approach (EA) to Fisheries [2] and is founded on Results Based Management (RBM) of fisheries [3]. MPO describes the current status in the fishery in question and is the background for the development of the MP1 and has been developed in the pre dialoge proses. The objectives suggested for the MP1 are open for discussion in the first step of the MP1 development in 2018. In FarFish, a bottom up approach is applied in the development of the RFMS [2], where stakeholders (authorities, operators, scientists, etc.) were approached at the proposal stage which entailed the participation of several stakeholders as partners or Reference group members in the project. The MPO will serve as background material when defining the outcome targets (OT) (Figure 1.1), which is the next step in the RFMS process, and is therefore an attachment to the MP1 invitation [2].

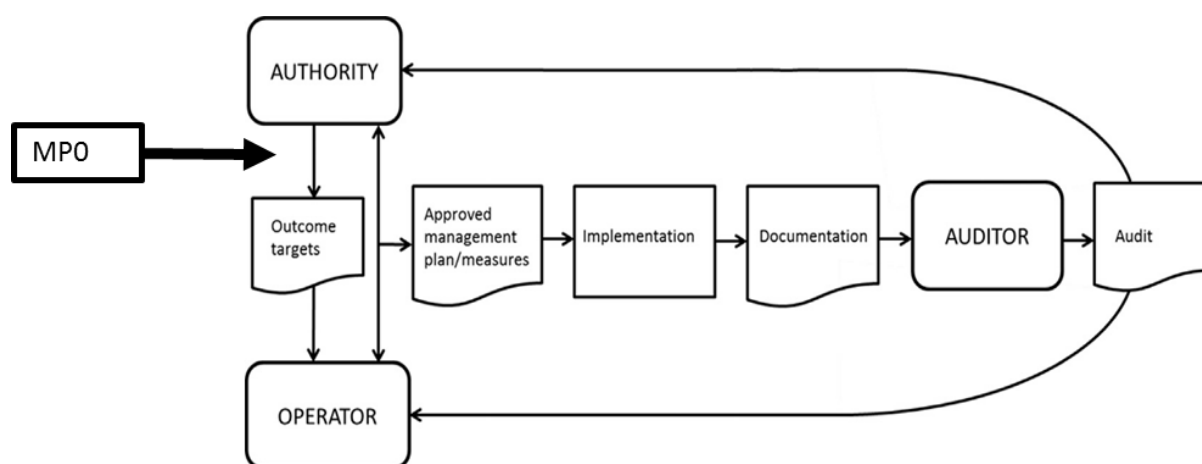


Figure 1.1 Conceptual model of a results based management in fisheries (Modified from Nilsen et al., 2015)

A common template (Table 1.1) was developed to gather the information from each CS. The template contains information on which area, stocks, fleet and RFMS agencies it applies to, fishery identification, management and preliminary information on the value chain. With emphasis on the current state of affairs and the main problems faced, the proposed specific case study objectives were identified. In cases where data and information were available, some potential for improvements using new or existing approaches/tools were suggested. Available CS contact information on RFMS agencies and stakeholders is also provided as these actors are crucial in the to the MP1 development.

The FarFish MPOs compile input from FarFish D2.1, meeting with CS leaders and investigating teams in Faro, Portugal (nov. 2017) and other relevant documents/publications/reports relevant for each CS. Table 1.1. provides the universal structure of the MPO and the following tables contain the CS specific MPO information. Extensive literature lists are provided on the latest literature and the most relevant figures are made available.

Table 1.1 MPO common Template

Current state		
This MPO apply to (area, stocks, fleet, authority and operators)		
Case study leader		
Fishery identification		
Species (target, bycatch)		
Geographical boundaries		
EU fisheries (nations, gear, vessels, catch, quota)		
Other nations		
Management		
Authorities		
Operators		
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs		
SFPA		
Governance		
RFMO		
MP (name, obj, area)		
CS objectives		
Harvesting control Rules (HCR)		
Data collection (fishery (catch,bycatch, employment)		
Assessment		
Monitoring, Control and Surveillance (MCR)		
Preliminary value chain		
Port		
Processing		
Market		
Challenges		
Potential improvements		

List of references

¹ Silva, C., H. Mendes, M. Rangel, L. Wise, K. Erzini, M. D. Borges, M. Ballesteros, J. L. Santiago, A. Campos, J. Vioarsson, and K. N. Nielsen. (2015). Development of a responsive fisheries management system for the Portuguese crustacean bottom trawl fishery: Lessons learnt. *Marine Policy* 52:19-25.

² Ramirez-Monsalve, P., J. Raakjaer, K. N. Nielsen, J. L. Santiago, M. Ballesteros, U. Laksa, and P. Degnbol. (2016). Ecosystem Approach to Fisheries Management (EAFM) in the EU - Current science-policy-society interfaces and emerging requirements. *Marine Policy* 66:83-92.

³ Nielsen, K. N., P. Holm, and M. Aschan. (2015). Results based management in fisheries: Delegating responsibility to resource users. *Marine Policy* 51:442-451.

2 Case study South West Atlantic

2.1 MPO South West Atlantic

Current state		Reference
	<p>This MPO apply to (area, stocks, fleet, authority and operators) to the international mixed fishery in FAO Area 41, mainly subarea 41.3.1 and 41.3.2, at the part of Patagonian shelf and slope (<300 m) that extends beyond the Argentina EEZ and the Falkland Islands Outer Conservation Zone (FOCZ). There are no RFMO or coastal states as authorities in this area. Potential authorities are DG MARE (EU), INIDEP (Argentina), CAFS (China), CGPOP (Brazil). The operators are LDAC and ARVI.</p>	
Case study leader	<p>University of Sao Paulo (USP), Brazil Contact person: Juliana Galvão, jugalvao@usp.br</p>	Revised JG 31.1.18
Fishery identification		
Species (target, bycatch)	<p>Main target Argentine Hake (<i>Merluccius hubbsi</i>), Australian hake (<i>Merluccius australis</i>), Argentine shorfin squid (<i>Illex argentinus</i>), southern blue whiting (<i>Micromesistius australis</i>), Longtailed souther cod (<i>Patagonotothen ramsayi</i>), wahoo (<i>Acanthocybium solandri</i>), blue shark (<i>Prionace glauca</i>).</p> <p>Bycatch Patagonian grenadier (<i>Macruronus magellanicus</i>), Patagonian toothfish (<i>Dissostichus eleginoides</i>), Rays mantas nei (<i>Raijiformes</i>), Stingrays (<i>Dasyatis spp.</i>), Longtail southern cod (<i>Patagonotothen ramsayi</i>), Forkbeard (<i>Phycis phycis</i>).</p>	<p>EC (2007) www.eurostat.eu FAO Fishery Facts Sheet</p>
Geographical boundaries	<p>EU HSBG fleet mainly fish in the area between the Patagonian shelf and slope that extends beyond the Argentinean EEZ and the Falklands Islands Outer Conservation Zone (FOCZ) close to the 300 m contour, an area without seamounts or VMEs. Spanish trawling takes place mainly between the parallels 44°S and 48°S and secondarily in the fishing grounds around parallel 42°S. Southern Argentine hake is distributed between 41°and 55°S. Argentine shortfin squid is distributed between 30°S and 50°S with a depth range from the surface down to 800m and southern blue whiting is distributed from about 38°S to nearly 62°S.</p>	<p>FarFish D2.1 Bench et al., (2009), EC (2008), Bisbal (1995), Ehrlich et al., (2013), Chen & Chiu (2009), Cheng et al., (2016) Chang et al. (2016) Crespi-Abril, A. C., & P. J. Baron (2012)</p>
EU fisheries (nations, gear,	<p>EU Nations; Spain (200 000t catch in 2014, 19 vessels), Portugal (squid, argentine hake, patagonian toothfish, Patagonian</p>	FarFish DoA,

vessels, catch, quota)	grenadier (no catch since 2005), Poland (squid, Patagonian grenadier) (no catch since 2002). Catches increased considerably in the period from 2008 to 2013 and there bycatch in trawl fisheries is frequent.	
Other nations	Coastal states (Argentina, Uruguay, Brazil, Falklands Island/Malvinas (UK), Taiwan, South Korea, China,	FarFish DoA
Management		
Authorities	DG MARE, CAFS, CGPOP, Argentina, FAO	FarFish D2.1
Operators (EU fleet)	LDAC, ARVI	FarFish D2.1
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	(1) URUGUAY (2) INIDEP, ICCAT, IEO, CTMFM, CAFS (3) Rianxeira S.A.U. (Crusoe Food), Grupo Calvo (Gomes da Costa Alimentos S.A.), Actemsa (Industrias Alimenticias Leal Santos Ltda.), Nueva Pescanova (Pescanova Brasil, Argenova, & Pesquerías Belnova S.A.), Noribérica (Urunova), Fandicosta, Iberconsa Argentina S.A., Pescapuerta, Gil Gomes Argentina S.R.L., Profand (Pesquera Deseado S.A.) (4) Oceana, CeDePesca	USP, JG, FarFish D2.1 FarFish, WP1
Governance	No RFMO apply to the mixed fisheries in FAO 41. Many countries have signed UNCLOS and the the UNGA Resolutions; 59/25 in 2004, UNGA Resolution 61/105 in 2006, Resolution 64/72 in 2009.	Portela et al., (2012)
RFMO	ICCAT, CCSBT	FarFish D2.1
MP (name, objective, area)	None, but there might be relevant MPs for the straddling stocks (<i>Merluccius hubbsi</i> , <i>Merluccius australis</i> , <i>Illex argentines</i> and <i>Micromesistius australis</i>) from Patagonian shelf that FarFish can relate to.	
CS objectives	1) To initiate dialogue between stakeholders involved in fishery in FAO area 41. 2) Improve the quality and quantity of data collection 3) Compile knowledge of the straddling stocks from the different scientific institutions. 4) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools.	FarFish D2.1
Harvesting control rules	11 areas closed for bottom trawling by EU fleet, according to UN Resolution 65/105 2006. Spain closed 9 areas for BT in 2011 due to identified VMEs. Two additional areas are closed for EU fleet due to existing trawling	Portela et al., (2012)

	<p>footprint. EU fleet restrictions apply for EU fleet, but not adopted by other foreign fleet or Argentina.</p> <p>There are some bycatch regulations from Brazillian government that apply both within EEZ and in international waters for the Brazilian fleet.</p>	<p>USP, JG Brazil (2011)</p>
Data collection (fishery, catch and bycatch, employment)	<p>Very scarce data collection in absence of RFMO or other authority. Main EU fishery nations are Spain, Portugal and France. EU fleet make reliable catch data, but this is not sufficient to do scientific advice or reliable stock assessment.</p> <p>Hake, squid and southern blue cod are shared stocks with Argentina, Falkland island and high seas.</p> <p>INIDEP (Argentina) collect data within EEZ and a joint commission of of Argentina/Uruguay (CTMFM). Falkland Island collect data within their EEZ by FIG from FICZ and FOCZ.</p> <p>Both FIG and INIDEP conduct research surveys.</p> <p>China, Taiwan and Korea are fishing in the area, but catch statistics from them are lacking. As CAFS is a FarFish RG, we are expecting some progress on this issue.</p>	<p>FarFish D2.1</p> <p>FIG (2017), FarFish DoA</p>
Assessment	<p>All species of commercial interest for EU fleet are straddling stocks, shared between Argentina, Falkland Islands and high seas. Southern blue whiting stock migrates between Argentine, Chilean and Falkland waters. The increasing stock of southern blue whiting in Falkland waters is possibly due to changes in migration pattern.</p>	<p>FIG (2017) Chang et al., (2016)</p>
MCS	<p>EU vessels fishing in subarea 41.3.1 and 41.3.2 need a special fishing permit (time limited, species, zone, fishing gear and depth)</p> <p>EU vessels not allowed to fish in unassessed areas</p> <p>Spain has adopted to a comprehensive set of measures and standards with are binding on the shipping company (vessel owner), including mandatory presence on board of an observer.</p>	<p>Portela et al., (2012) FarFish DoA</p>
Preliminary Value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018)		NOFIMA
Port	<p>Deep sea fish species caught in HSBG are mainly landed in Spain (Vigo), but also in Uruguay (Montevideo) for transhipment. Most Spanish vessels land in Galician ports, either by freezing catches at sea or transshipping</p>	<p>MRAG, MG Otero and PoLEM (2008), FarFish D2.1</p>

Processing	Spain dominates catches by European vessels in this area (97% in 2015), with small quantities caught by UK and Portuguese vessels. All in all European vessels are responsible for 9.4 % of total catch in these waters (2015) – with both shares and volume reduced from 2014. Argentine hake being the most important species. Catches enter the Spanish value chain by landings or transshipment	Farfish D2.1 www.fao.org/fishery/statistics/
Market	Global value chain – to be elaborated.	NOFIMA
Challenges		
Data poor situation	Uncomplete catch statistics on target and bycatch species (including bycatch species of non-commercial interest)	FarFish DoA
Management, lack of RFMO	Regulatory measures are not universally applied. Fishers from countries who enforce the measures find the measures ineffective and discriminatory since the area contrary to their own economic interests	Muños et al (2012)
MCS	Restrictions due to existing trawling footprint or identified VMEs area not accepted by non-EU fishing fleets, mainly Asian countries (China, Taiwan and South Korea)	FarFish DoA
MCS	If fishery activities expand into deeper water, there is an increased risk of interaction with VMEs	FarFish DoA
MCS	There is a need for increased compliance, monitoring and control in this area	
Potential improvements	Using new tools	
Data collection	Due to the limitations of information on catch statistics from non-EU nations, this issue is still under consideration.	
Management	Internal communication with FarFish partners will ensure that the FarFish contribution (models and or tools) will be relevant and add value management of the high seas fisheries in the area.	
Monitoring	Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools	CSIC

2.2 Contact information Stakeholders South West Atlantic

Authorities	Website/Adress/phone/Name	Email address
DG MARE		
CAFS	Chinese Academy of Fishery Sciences, http://www.cafs.ac.cn/ Contact person: Jilong LI	FarFish RG lijilong@cafs.ac.cn
CGPOP	General Coordination of Fisheries Planning and Management, Brazil	
Operators		
LDAC	Long Distance Fleet Advisory Council, EC http://ldac.eu/aboutus Contact person: Alex Rodriguez	FarFish Partner (5) alexandre.rodriguez@ldac.eu
ARVI	Cooperativa de Armadores de Pesca del Puerto de Vigo www.arvi.org Contact person:	arvi@arvi.org Email contact person
Scientists		
INIDEP	The National Institute of Fisheries Research and Development in Argentina, http://www.inidep.edu.ar Contact person: Agustín Schiariti	FarFish RG agustin@inidep.edu.ar
ICCAT	www.iccat.int Contact person: Paul de Bruyn	FarFish RG paul.debruyn@iccat.int
FAO	The Food and Agriculture Organization of the United Nations. www.fao.org/fisheries/en Contact person: Alejandro Anganuzzi	FarFish Reference Group Member FAO-CV@fao.org Alejandro.Anganuzzi@fao.org
CTMFM	Joint Argentinean-Uruguay Technical Commission of the Maritime Front, http://www.ctmfm.org	
NGOs		
OCEANA	http://oceana.org Dr. Mônica Brick Peres	
CeDePesca		

2.3 Relevant literature and websites South West Atlantic

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Websites

Global fishing watch, sustainability through transparency <http://globalfishingwatch.org/>
 Database on EU external water fleet <http://www.whofishesfar.org/>
 FAO Fisheries statistics www.fao.org/fishery/statistics/

2.4 Supplementary Material South West Atlantic

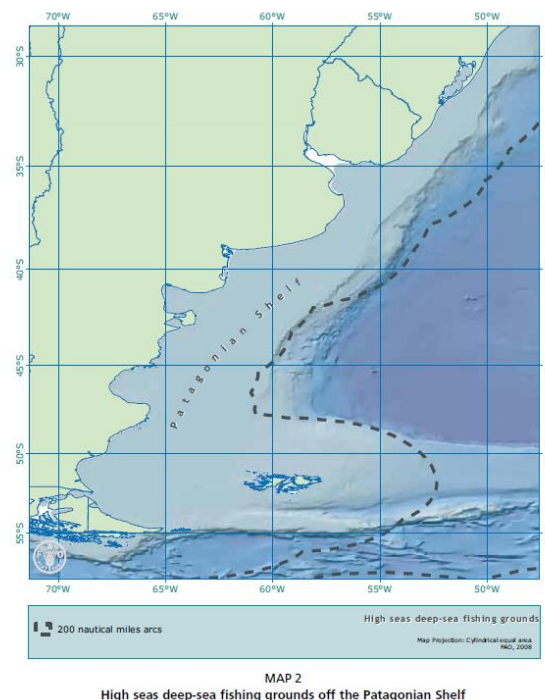


Figure 2.1 High seas deep sea fishing grounds off the Patagonian Shelf (Bench et al., 2009)

The Southeast South American shelf large marine ecosystem: G A Bisbal

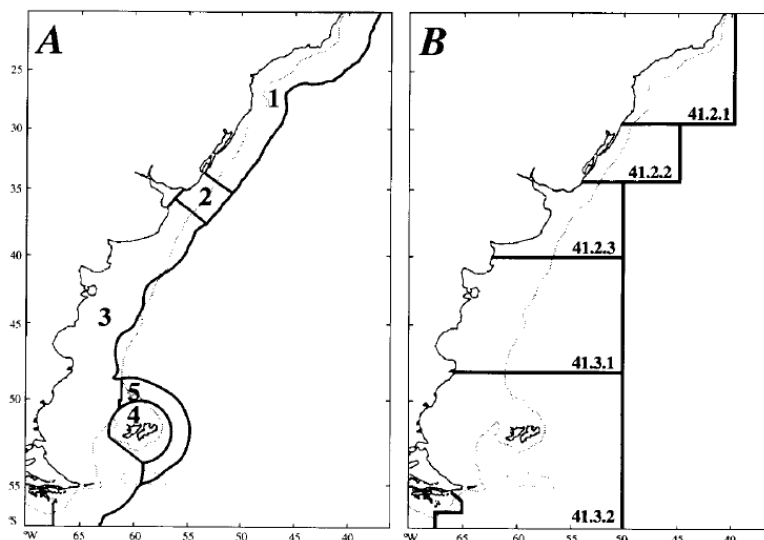


Figure 2.2 Maritime boundaries and jurisdictional areas in the SSASLME (southern South American Large Marine Ecosystem) (1) Brazilian EEZ (200 nm) (2) Uruguayan EEZ (200 nm). (3) Argentine EEZ (200 nm), (4) Falkland FICZ, (5) Falkland Islands (FOCZ). FAO subareas 41.3.1 (Northern Patagonia), 41.3.2 (Southern Patagonia) (Bisbal, 1995)

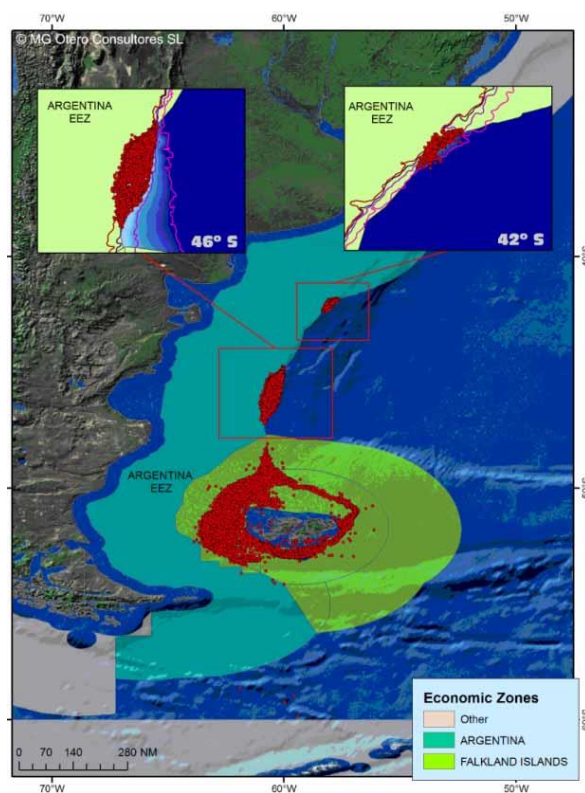


Figure 2.3 Locations of Spanish fishing effort in the SW Atlantic (EC, 2008)

3 Case study area South East Atlantic

3.1 MPO South East Atlantic

Current state		Reference
	This MPO apply to (area, stocks, fleet, authority and operators) to the international fishery in FAO Area 47. EU fleet (Spain, Portugal, Poland, Cyprus) historically fishing on the stocks of alfonsino, hake, Patagonian toothfish, deep-sea crab, pelagic armourhead and orange roughy. Authorities are SEAFO and DGMARE, while relevant operators are LDAC, ADAPI, ANFACO-CECOPECA, OPAGAC AND OPROMAR	
Case study leader	Institute of Marine Research (IMR), Norway Contact person: Lidvard Grønnevet (LG), lidvard.gronnevet@hi.no	Revised LG 24.1.18
Fishery identification		
Species (target, bycatch)	Target: Alfonsino (<i>Beryx splendens</i>), boarfish/pelagic armourhead (<i>Pseudopentaceros richardsoni</i>), orange roughy (<i>Hoplostethus atlanticus</i>), skates, sharks, deep-sea crab (<i>Chaceon erythraeae</i>), Patagonian toothfish (<i>Dissostichus eleginoides</i>), Wreckfish (<i>Polyprion americanus</i>), Grenadiers nei (<i>Macrourus</i> spp.), Blue antimora (<i>Antimora rostrata</i>), King crab (<i>Lithodidae</i> spp, <i>Lithodes ferox</i> , <i>Paralomis formosa</i>) Bycatch species: Warty dory (<i>Allocyttus verucossus</i>), Spiky oreo (<i>Neocyttus rhombiodalis</i>), Guinea oreo (<i>Allocyttus guineensis</i>), Smoot oreo dory (<i>Pseudocyttus maculatus</i>)	FarFish D2.1 SEAFO (2017a)
Geographical boundaries	SEAFO convention area (Fig. 3.1), being all waters beyond areas of national jurisdiction in the area. Fishing around seamounts, Deep sea ocean (>2000m), seamounts, The most active fishing area in SEAFO is subarea B1 and D (Fig. 3.2). Patagonian toothfish ; 2011-2014, Sub Area D, concentrated over seamounts in D1 Orange roughy , mainly around Ewling seamount and Valdivis Bank, Division B1 Deep-sea crab ; mainly on seamount by Valdivia Bank (part of Walvis Ridge) located in Division B1 of the SEAFO CA, at depths 280-1150m Pelagic armourhead ; mainly by Korean trawl in southern and northern part of Valdivia Bank, Division B1. Alfonsino ; three main fishing grounds in B1	FarFish D2.1 IMR (2015) SEAFO (2017a) SEAFO (2017a) SEAFO (2017a) SEAFO (2017a) SEAFO (2017a)

		SEAFO (2017a)
EU fisheries (nations, gear, vessels, catch, quota)	<p>EU Nations; Spain (Patagonian toothfish, Alfonsino, Deep-Sea crab, Pelagic armourhead, Grenadier nei, Blue antimora, king crab), Portugal (Alfonsino, Deep-Sea crab, Wreckfish), Poland (alfonsino), Cyprus (Alfonsino)</p> <p>In 2017, two Spanish vessel were fishing in SE Atlantic.</p> <p>Patagonian toothfish, no catch since 2010 (SEAFO 2017a).</p> <p>Fishing nations SEAFO (2017a), Spain, Japan, Korea and South Africa.</p> <p>Fishing nations FAO Area 47 statistics; Spain, Japan, Korea, South Africa, Uruguay and Chile. Most important previously was Uruguay.</p> <p>Most common gear is Spanish longline system and the trotline. Major bycatch of grenadiers is being discarded. 22% of TAC was taken in 2015 and 2016. TAC (2017) Subarea D: 266 t. Only Japanese catches since 2012. Catch Japan 2017: 12 tonnes, <1 tonnes discard. Last reported IUU in 2012, but extent of IUU fishing at present is unknown.</p> <p>Orange roughy, no catch since 2006, very small catch by South Africa and maybe Portugal (FAO statistics). The most important fishing nation previously being Namibia.</p> <p>Fishing nations SEAFO (2017a), Norway, Namibia, South Africa)</p> <p>Fishing nations FAO statistics area 47; Norway. Portugal, Spain, Namibia and South Africa. Period 2000-2015</p> <p>No Norwegian catch since 2000,</p> <p>TAC=no directed fishery, Bycatch limit=14 t.</p> <p>Alfonsino, no catch since 2005 by EU fleet and Norwegian fleet. (Historical fishing nations SEAFO 2017a, Namibia, Norway, Russia, Portugal, Ukraine, Korea). Eu fleet fishing mostly in late 1990s. Historically caught by bottom trawl by Norway (bottom trawl, area A1), Portugal (bottom trawl, area UNK), Spain (mid-water trawl and longliners, area UNK), Poland (not specified gear, area UNK), Cyprus (bottom trawl, area UNK). Bycatch of Boarfish (<i>Capros aper</i>), blackbelly rosefish (<i>Helicolenus actylopterus</i>), imperial blackfish (<i>Schedophilus ovalis</i>), oilfish (<i>Ruvettus pretiosus</i>), silver scabbardfish (<i>Lepidopus caudatus</i>)</p> <p>Deep-sea red crab, no catch by Spain since 2004 (Pots, UNK area), no catch Portugal since 2007 (Pots, area UNK). Fishing nations SEAFO 2017a, Japan (140 tonnes in 2017), Korea (only catch in 2015, 104 tonnes), Namibia (135-198 tonnes in period 2011-2014). 2014;</p>	<p>FarFish D2.1</p> <p>www.whofis hesfar.eu</p> <p>SEAFO (2017a) appendix IV, Lanings, discards and bycatch tables)</p> <p>SEAFO (2017a) appendix V</p> <p>SEAFO (2017a)</p> <p>SEAFO (2017a)</p>

	<p>50% of TAC was caught. TAC: 200t in D0, 200t in remainder SEAFO CA</p> <p>Pelagic armourhead, no catch Spain since 2003 (bottom trawl, longline, Area B1). Previous fishing nations SEAFO, 2017a) Namibia, Russia, Ukraine, Spain, Cyprus, Korea and South Africa. Spain, main gear used midwater trawl. Bycatch of blackbelly rosefish, alfonsino, imperial blackfish, oilfish, Cape bonnethmouth, silver scabbardfish. TAC (2016):143 t, TAC (2017)=135 t</p> <p>Wreckfish, no catch Portugal since 2007 Portugal (lonlingers, area A) TAC=143</p> <p>Grenadiers, no catch since 2010, Spain (lonlingers, Area D0, D1)</p> <p>Blue antimora, no catch since 2010, Spain (longliners, Are D0, D1)</p> <p>King crabs, no catch since 2010, Spain (longliners, Area D0,D1)</p>	<p>SEAFO (2017a)</p> <p>SEAFO (2017a)</p> <p>SEAFO (2017a)</p>
Other nations	<p>Japan (catch 2016, Patagonian toothfish, deep-sea crab. South Korea (Pelagich armourhead, midwater trawl), Namibia (catch 2016, some Alfonsino, some deep-sea crab, some Pelagic armouhead, orange roughy, bottom trawl area B1 and C0), South Africa, Norway, Ukraine, Russia</p>	FarFish D2.1
Management		
Authorities	SEAFO, DG MARE	FarFish D2.1
Operators	LDAC, ADAPI, ANFACO-CECOPESCA, OPAGAC AND OPROMAR	FarFish D.1 CETMAR
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	<p>(1) MFMR (Namibia), BCC (2) IMR, SEAFO (3) Nueva Pescanova (Marnova Lda.), Freiremar, Mascato (Suppapakkers processing plant), Nueva Pescanova (Nova Nam, Novagroup), Iberconsa, Marfrio Namibia Fishing, Pescapuerta (Tunacor), Pereira Fishing (4) EJF, OCEANA, WWF ADENA</p>	FarFish, DoA, CETMAR
Governance	SEAFO, (SEAFO area exclude EEZ of the coastal states (BCC=Namibia, Angola, South Africa)	FarFish D2.1
RFMO	SEAFO	
MP (name, obj, area)	Objective of convention (The Convention on the Conservation and Management of Fisheries Resources in the South East Atlantic Ocean) is to ensure the long-term conservation and sustainable use of the fishery resources in the Convention Area through the effective implementation of the Convention.	FarFish D.2.1 www.seafo.org
CS objectives	<p>1) Improve data quality and quantity</p> <p>2) Advance biological knowledge, and improve monitoring in the SEAFO area</p>	FarFish D2.1

	3) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools	CSIC
Harvesting control	<p>Scientific committee (SC) in SEAFO</p> <p>Patagonian toothfish: TAC (2015) 264 t in subarea D, TAC (2017) = 266 t in Subarea D.</p> <p>Orange roughy; 2016 moratorium on directed fishery and 4 tonnes of bycatch allowance in Division B1 and 50 t in the remaining SFAO CA.</p> <p>SEAFO SC recommends a moratorium for 2017 and 2018 for directed fishery in Division B1, and allowance for bycatch limit as proportion (10%) of the average landings from the last five years with positive catches (2001-2005), equivalent to 4 tonnes.</p> <p>Deep-sea red crab: primarily utilized by Namibia and Japan. Commission adopted SC advice to apply HCR as for Greenland halibut in NAFO. TAC: 190 t for B1 and 200 t for the remainder of SEAFO CA.</p> <p>Pelagic armourhead: MSY= 128 t, no other reference points. TAC reviewed every two years. TAC=143 t</p> <p>Alfonsino: No biological reference points determined, SC suggest to use an empirical HCR to regulate fishery until the data situation is improved. ICES HCR category 5: data poor stocks</p>	FarFish D2.1
Data collection (fishery (catch, bycatch, employment))	<p>Data collection by SEAFO, FAO and IMR (RV Dr Fritjof Nansen survey Jan-Feb 2015)</p> <p>Specific comments on Deep-sea crab; SEAFO SC, sampling is quite good. Specific comments on Pelagic armourhead; geo-referenced data on catch and effort from Korean fishery 2010-2013. Age/length data not available. Data on maturity, natural mortality, reproductive parameters. Alfonsino, Patagonian toothfish and Orange roughy; no specific comments currently</p>	FarFish D2.1 IMR (2015)
Assessment	<p>Scientific committee (SC) in SEAFO.</p> <p>Patagonian toothfish, no agreed stock assessment, lack knowledge on mortality, growth, reproduction, feeding and trophic role.</p> <p>Orange roughy, no assessment, no fishing lately and therefore no data. CPUE available (1995-2005), trawl data. Namibia conducted scientific survey in 2016. Lack of knowledge from this area on recruitment, length-weight relationships, growth, reproduction parameters, natural mortality, feeding and trophic relationships)</p>	FarFish D2.1 SEAFO (2017a) SEAFO (2017a)

	<p>Deep-sea crab, Good data, although short time series, lack of knowledge on growth parameters, no biological reference points presently, stock assessment and review every other year (last 2016)</p> <p>Pelagic armourhead, CPUE data as indicator for biomass and support analysis with CPUE trends. Depletion estimators used to estimate population abundance</p> <p>Alfonsino available, some scarce length frequency data and length /weight from Korean trawlers 2010-2013, reproductive parameters, and production. Lack of knowledge; natural mortality, feeding and trophic relationships. Nominal CPUE applied to derive a perception of the development of the fishery in the period 2010-2012.</p>	
MCS	<p>All vessels are required to:</p> <ul style="list-style-type: none"> - be formally authorised to fish - report catches on a 5-day interval - report VMS positions on a 2-hourly interval - have an independent scientific observer onboard - comply with port inspection procedures; and - not make transshipments in the SEAFO CA <p>IUU list is managed by SEAFO</p> <p>Protection of deep-sea sharks, banning of direct fishery and report of all bycatch of sharks (<5% fin weight of total shark bycatch)</p> <p>Reduce incidental bycatch of seabirds and sea turtles</p> <p>Ban of gillnets</p>	<p>FarFish D2.1</p> <p>SEAFO (2018)</p>
Preliminary value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018)		NOFIMA
Port	Very small utilization rates historically and no fishing recently. Spanish vessels participated in the patagonian toothfish fishery in 2010. Spanish and Portuguese vessels fished deep-sea crab in 2007	NOFIMA
Processing	No info on processing, if crabs are caught, they are likely frozen onboard and landed in Spain/Portugal	NOFIMA
Market	No info yet.	
Challenges		
Data poor situation	TAC is usually not based on sufficient data.	FarFish D2.1
Management	Maintain international framework for future work and protection. Although fishing effort in the CS is currently low, FarFish will focus the work to advance biological knowledge, improve monitoring and compliance in the SEAFO area.	FarFish D2.1

Management, performance of SEAFO	Strengthening the RFMOs performance in terms of scientific knowledge, monitoring and enforcement. The priorities of FarFish will reflect the priorities of SEAFO	FarFish DoA , Annex 1, part B, Table 2.1c
Potential improvements	Using new tools	
Data collection	Improve quality of logbook data and its submission Exploring the feasibility for a self-sampling programme	Farfish DoA
Assessment	Analyse current stock assessment methods Improvements using new or existing tools is dependent on the defined CS objectives and OT, making sure that the FarFish contribution is relevant also by consulting SEAFO (FarFish RG)	Farfish DoA
Monitoring	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools	CSIC

3.2 Contact information South East Atlantic

Authorities	Website/Adress/phone/Name	Email address
DG MARE		
SEAFO	South East Atlantic Fisheries Organisation www.seafo.org Contact person: Paulus Kainge	FarFish RG pkainge@mfmr.gov.na
Operators		
LDAC	Long Distance Fleet Advisory Council, EC http://ldac.eu/aboutus Contact person: Alex Rodriguez	FarFish Partner (5) alexandre.rodriguez@ldac.eu
ADAPI	Association of Portuguese Industrial Fishing-boat Owners, Portugal Contact person: António Miguel Cunha	Farfish RG antonio.cunha@testacunhas.pt
ANFACO-CECOPECA	National Association of Fish and Seafood Canning Manufactures, Spain www.anfaco.es Contact person: Gonzalo Ojea	FarFish Partner (17) ojea@anfaco.es
OPAGAC	Organization of Associated Producers of Large Tuna Freezers, Spain Contact person: Julio Morón	Farfish RG julio.moron@opagac.org
OPROMAR	Organization of Fresh Fish Producers of the Port an d Ría de Marín, Spain Contact person: Francisco Javier Teijeira	FarFish Partner (19) fcoteijeira@opromar.com

Supporting institutions		
FAO	The Food and Agriculture Organization of the United Nations. www.fao.org/fisheries/en Contact person: Alejhandro Anganuzzi	FarFish RG FAO-CV@fao.org Alejandro.anganuzzi@fao.org
BCC	The Benguela Current Commission http://www.benguelacc.org/index.php/en/	hashali@benguelacc.org
MFMR	Ministry of Fisheries and Marine Resources, Namibia http://www.mfmr.gov.na/ Contact person: Paulus Kainge	FarFish RG pkainge@mfmr.gov.na
Scientists		
IMR	Institute of Marine Research, Norway www.imr.no Contact person: Lidvard Grønnevet	FarFish Partner (9) lidvard@imr.no
SEAFO	Contact person: Paulus Kainge	FarFish RG pkainge@mfmr.gov.na
Other Industry		
MARNOVA	Frozen product distribution company (Vigo-Spain)	marnova@marnova.com
FREIREMAR	Fishing vessel charter companies, frozen storage company and firm focused on processing and marketing of fresh and frozen seafood (Vigo-Spain)	vigo@freiremar.es
MASCATO S.A.	Fishing and commercialization of sea products company (Namibia) Contact person: Barbara du Plessis	Tel. +264 64 21 69 00 barbara@merlus.com.na
MASCATO S.A.	Fishing and commercialization of sea products company (South Africa-Processing plant) Contact person: Emile Loggenberg	Tel. +27 21 577 4777 emile@plet-bay.co.za
NOVANAM LTD	Part of the Pescanova Group. Processing plant (hake, mainly)	Tel. +264 61 248 226 info@novanam.com
IBERCONSA	Fishing, processing and distribution of frozen sea products (Vigo-Spain)	iberconsa@iberconsa.es
MARFRIO NAMIBIA FISHING	Fishing, processing and marketing of frozen sea products (Marin-Spain)	marfrio@marfrio.com
TUNACOR GROUP	Fishing and Processing plant	Tel. +264 64 203 351 tunacor@tunacor.com.na

PEREIRA FISHING	Fishing freezer vessels company and commercial cold-store	Tel. +264 (64) 216500 reception@blueseas.com.na
NGOs		
WWF ADENA (Spain-EU)	Contact person: Raul García	pesca@wwf.es
OCEANA	Contact person: Maria José Cornax	europe@oceana.org
EJF	Environmental Justice Foundation, EJF takes part of LDAC Contact person: Irene Vidal	info@ejfoundation.org

3.3 Relevant literature and websites South East Atlantic

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http://www.seafo.org/media/0e1b52cf-d53e-4f58-a995-730cae47ab17/SEAFOweb/pdf/Publications/SEAFO%20Nansen%20Cruise%20Report%20OCT2016_pdf

FarFish (2017). Deliverable No 2.1: Case study characterisation 1.0.

<https://www.farfish.eu/outcomes/>

SEAFO (2017a) Report of the 13th scientific committee meeting, 20 – 24 November 2017, Swakopmund, NAMIBIA. http://www.seafo.org/media/72e43665-5c43-4038-9f1f-96eebef05325/SEAFOweb/pdf/Meeting%20Files/2017/SC/SC%20Report%202017_pdf

SEAFO (2017b) South East Atlantic fisheries organisation Report of the 14th annual meeting of the commission, 27 – 30 November 2017, Swakopmund, NAMIBIA
http://www.seafo.org/media/7a838fc6-e315-4ec8-ab65-e20be2e060fd/SEAFOweb/pdf/Meeting%20Files/2017/COMM/Commission%20Report%202017_pdf

SEAFO (2018) IUU Vessel list 2018 http://www.seafo.org/media/0b7bac63-8959-4520-af5f-2e0f3d7f0dd4/SEAFOweb/pdf/IUU/IUU_List%202018_pdf

Websites

Global fishing watch, sustainability through transparency <http://globalfishingwatch.org/>

Database on EU external water fleet <http://www.whofishesfar.org/>

The Benguela Current Commission (BCC) <http://www.benguelacc.org/index.php/en/>

SEAFO <http://www.seafo.org/>

FAO FIRMS sheet: Oreo Dories <http://firms.fao.org/firms/resource/13380/en>

FAO FIRMS sheet: Spiky oreo <http://firms.fao.org/firms/fishery/755/en#TargetSpecies>

FAO FIRMS sheet: Guinea oreo <http://firms.fao.org/firms/fishery/755/en#TargetSpecies>

FAO FIRMS sheet: Smoot oreo dory <http://www.fishbase.org/summary/Pseudocyttus-maculatus.html>

3.4 Supplementary material South East Atlantic

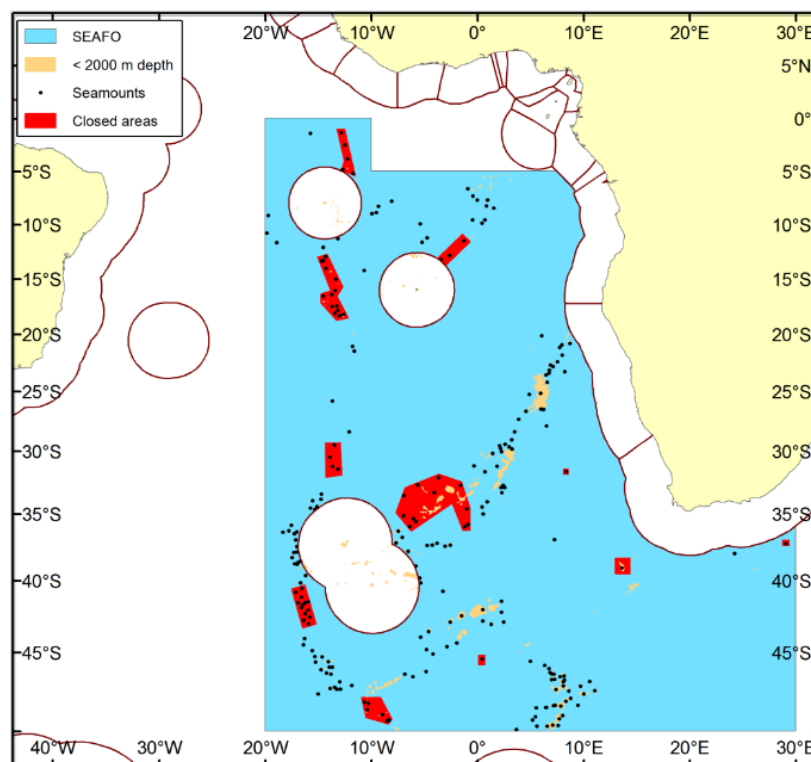


Figure 3.1 The SEAFO Convention Area (blue) showing seamounts and subareas shallower than 2000m (black dots & orange areas) and the subareas closed to fishing (red polygons) at the time of the cruise (IMR, 2016)

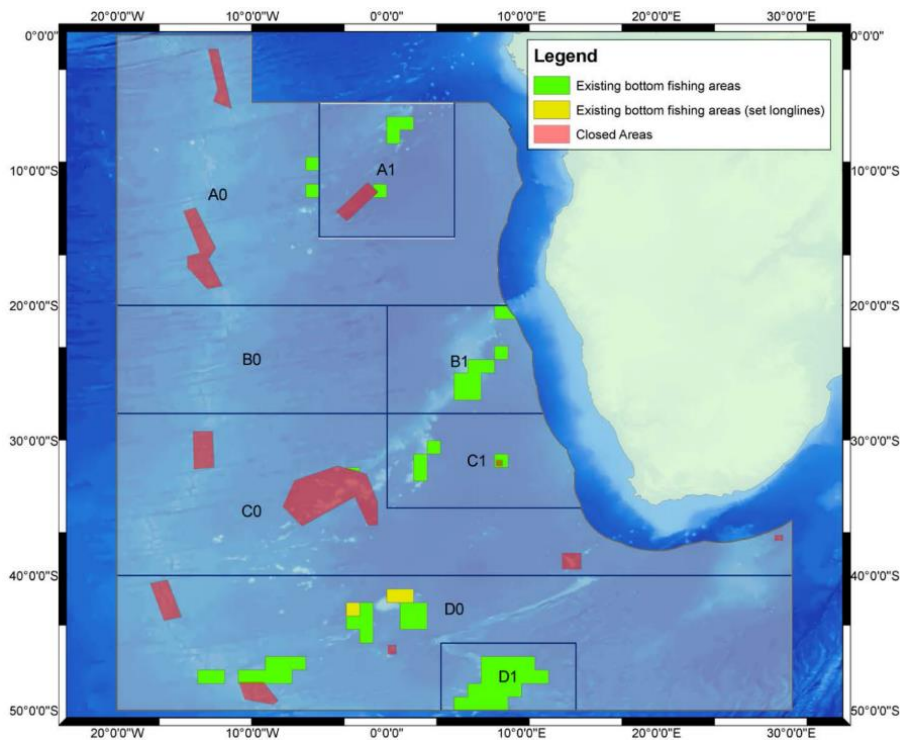


Figure 3.2 Existing fishing areas (www.Seafo.org)

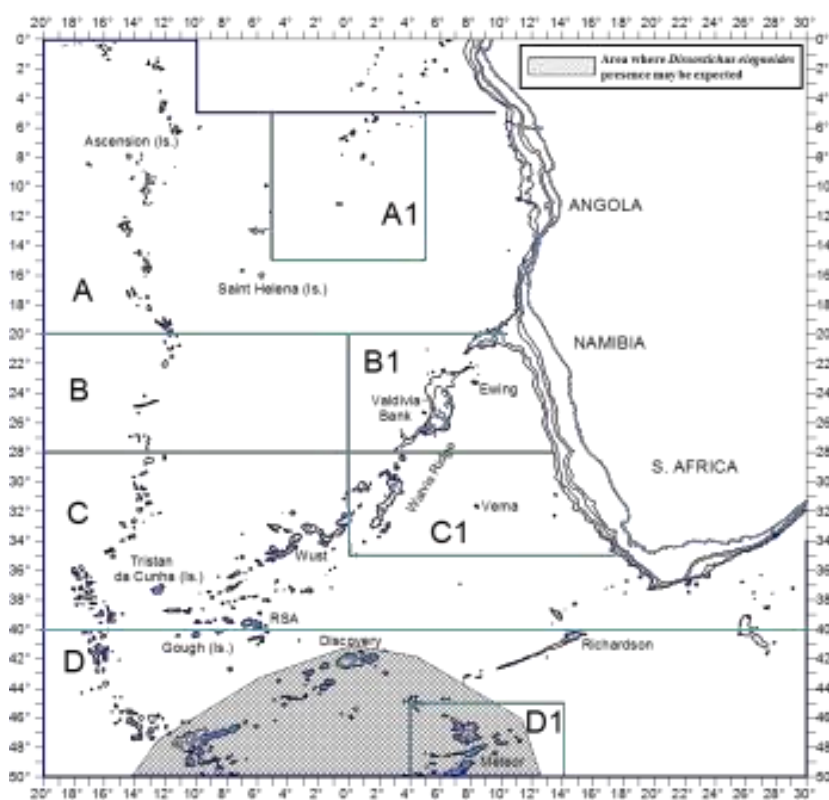


Figure 3.3 Species geographical distribution in the SEAFO CA (source: Species profile on the SEAFO website. www.seafo.org).

4 Case study area Cape Verde

4.1 MPO Cape Verde

Current state		
<p>This MPO apply (area, stocks, fleet, authority and operators) to EU fishery of tuna (yellowfin, bigeye, skipjack) in Cape Verde EEZ according to the fisheries agreement (SFPA), but EU also target blue shark and swordfish. Relevant fleets are purses seiners, longliners, pole and line and the vessels are from Spain, Portugal and France. Relevant authorities are DG MARE and DNEM while operators are LDAC, OPROMAR, OPAGAC, and ANFACO-CECOPESEA.</p>		
Case study leader	National Institute for Fisheries Development (INDP), Cape Verde Contact persons: Maria Osvaldina Silva; Osvaldina.Silva@indp.gov.cv Elisia Da Cruz; Elisia.Cruz@indp.gov.cv Benvindo Fonseca: benvindo.fonseca@indp.gov.cv	Revised EDC, 29.1.18 BF, 12.2.18
Fishery identification		
Species (target, bycatch)	Target: Yellowfin tuna (<i>Thunnus albacares</i>), Bigeye tuna (<i>Thunnus obesus</i>), Skipjack tuna (<i>Katsuwonus pelamis</i>), Bycatch; sea birds, turtles, swordfish (<i>Xiphias gladius</i>), blue shark (<i>Prionace glauca</i>)	FarFish D2.1, SFPA, appendix 2
Geographical	Pole and line; beyond 12 nautical miles from the base line Tuna seiners; beyond 16 nautical miles from the base line, taking into account the archipelagic nature of the Cape Verdean fishing zone. Surface longliners; beyond 18 nautical miles from the base line. Species distribution is described by ICCAT Yellowfin: cosmopolitan species distributed in the tropical and subtropical oceanic waters of the three oceans. Bigeye: distributed throughout the Atlantic ocean between 50°N and 45°S, but not in the Mediterranean Sea. Swims deeper than the other tropical tuna species and exhibits extensive vertical movements. Skipjack: Schooling in the tropical and subtropical waters of the three oceans. Predominant species aggregated to FADs. Swordfish: widely distributed in the Atlantic Ocean and Mediterranean Sea. Blue shark: highly migratory from tropical to temperate waters worldwide. Potentially two stocks in South Atlantic, one in the equatorial area and another in the southwestern area between 19° and 41°S latitude.	SFPA, appendix 2. ICCAT (2016) Domingo et al., (2008)

EU fisheries (nations, gear, vessels, catch, quota)	<p>Nations; Spain, Portugal, France</p> <p>Total reference catch (SFPA): 5 000 t/year</p> <p>Catch (tonnes) by foreign fleet in Cape Verde waters ;</p> <table border="1" data-bbox="421 461 1098 658"> <thead> <tr> <th>EU</th> <th>2014</th> <th>2015</th> <th>2016</th> </tr> </thead> <tbody> <tr> <td>Tuna</td> <td>5.334</td> <td>327</td> <td>7.924</td> </tr> <tr> <td>Sharks</td> <td>519</td> <td>2.700</td> <td>2.058</td> </tr> <tr> <td>Others</td> <td>21</td> <td>53</td> <td>0</td> </tr> <tr> <td>Total</td> <td>5.875</td> <td>3.080</td> <td>9.982</td> </tr> </tbody> </table> <table border="1" data-bbox="421 725 1098 909"> <thead> <tr> <th>JAPAN</th> <th>2014</th> <th>2015</th> <th>2016</th> </tr> </thead> <tbody> <tr> <td>Tuna</td> <td>1.287</td> <td>1.110</td> <td>Unavailable</td> </tr> <tr> <td>Sharks</td> <td>463</td> <td>501</td> <td>Unavailable</td> </tr> <tr> <td>Others</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total</td> <td>1.750</td> <td>1.611</td> <td>0,00</td> </tr> </tbody> </table> <p>Vessels: Tuna purse seiners: Spain (16), France (12), target species; Yellowfin, bigeye and skipjack. By-catches in compliance with ICCAT and FAO recommendations.</p> <p>Surface longline: Spain (23), Portugal (7), target species; swordfish, blue shark, yellowfin tuna, bigeye tuna. By-catches in compliance with ICCAT and FAO recommendations</p> <p>Pole and line tuna vessels: Spain (7), France (4), Portugal (2); target species; yellowfin tuna, bigeye tuna, skipjack tuna. By-catches in compliance with ICCAT and FAO recommendations</p> <p>Currently; 1 Portuguese and 15 Spanish vessels</p>	EU	2014	2015	2016	Tuna	5.334	327	7.924	Sharks	519	2.700	2.058	Others	21	53	0	Total	5.875	3.080	9.982	JAPAN	2014	2015	2016	Tuna	1.287	1.110	Unavailable	Sharks	463	501	Unavailable	Others	0	0	0	Total	1.750	1.611	0,00	SFPA, appendix 2 DGP/INDP provided by CS lead. Whofishesfar. org
EU	2014	2015	2016																																							
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Other nations	Japan, Senegal, Cape Verde																																									
Management																																										
Authorities	DNEM, DGRM and DG MARE	FarFish, D2.1, CETMAR																																								
Operators	LDAC, ANFACO-CECOPECA, OPAGAC	FarFish D2.1, CETMAR																																								
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	(1) ICCAT, COSMAR, SIGQ, The Secretary of Maritime Economy, Ministry of Tourism, Transport and Maritime Economy (2) ICCAT, INDP, INE (3) UBAGO GROUP MARE S.L., FRESCOMAR S.A., ATUNLO cv (processing plant), FRIGROVE, CALVO ATLANTICO S.A (4) “Overseas Fishery Cooperation Foundation”, Japanese APESC- Cape Verde Fisheries Association	CETMAR INDP, EDC																																								

SFPA	2014-2018, 5000 t/year	SFPA
Governance	The management of the fishery sector is assured by the National Directorate of Maritime Economy, an institution of the Ministry of Transport, Tourism and Maritime Economy. The Secretary of Marine Economy is a new institution recently created by the government and it belongs to the Ministry of transport, tourism and Maritime Economy (situated in Sao Vicente Island). SIGQ is dependent on DNEM and has replaced ACOPECA	INDP
RFMO	ICCAT	FarFish D2.1
MP (name, objective, area)	Cape Verde Fisheries Management Plan (PGRP). Objective; ensure that the fisheries of Cape Verde contribute to increase national production, food safety, quality of fishery products, employment, and to decrease balance of payment deficit. The PGRP proposes a set of measures for the rational exploitation of fisheries resources and the development of the fisheries sector in a sustainable way. This plan also contemplates shark fishing, fished by foreign vessels. However in relation to tuna fishery done by foreign fleet the management measures applicable are the ones set by ICCAT	FarFish D2.1
CS objectives	<ol style="list-style-type: none"> 1. In conformity with ICCAT, collect and analyse data on bycatch of swordfish and blue shark by the EU fleet in the Cape Verde EEZ if the data, if the data is available. If sufficient data is accessible, model scenarios, which may add value to development harvest control rules for these bycatch species. 2. Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools 	INDP, FarFish D2.1, CSIC
Harvesting Control Rules	<p>Skipjack tuna (ICCAT); MSY (143 000 – 170 000), current yield (2013): 203 500 t, Relative biomass (B2013/Bmsy): Probably >1, Fishing mortality (F2013/Fmsy): probably <1, seasonal moratorium FADs Jan.2013 (From African coast to 10°S and 5°W latitude to 5°E longitude during January-February)</p> <p>Yellowfin tuna (ICCAT); MSY (~144 600 t) (based on non-equilibrium production model (ASPIC) and age structured model (VPA), Relative biomass (B2013/Bmsy): 0.95 (0.71-1.36), Relative Fishing mortality (F2014Fmsy): 0.77 (0.53-1.05). Time area closure for FAD associated surface fishing, TAC 110 000 t, authorization for vessels (>20 m), specific limits of number of longline and/or purse seine boats for a number of fleets</p>	<p>ICCAT (2014) ICCAT (2016)</p> <p>ICCAT (2015c)</p>

	<p>Bigeye tuna MSY 78 824 t (67 725-85 009 t), Yield (2014): 72 575 t, Relative biomass (B2014/Bmsy): 0.67 (0.48-1.20), Relative Fishing mortality (F2014)/Fmsy: 1.38 (0.61-1.85), TAC (2012-2015): 85 000 t, restriction of longline boats, purse seine boats, no fishing with natural or artificial floating objects in January and February as for skipjack.</p> <p>Blue shark High uncertainty in Bmsy, Fmsy high uncertainty. F2013/Fmsy: 0.01-1.19, B2013/Bmsy: 0.78-2.03. Incomplete catch reports.</p> <p>Swordfish Catch limits, min size limits (125/119 cm LJFL), TAC no more than 15 000 t due to poor data. Catches below TAC since 2002 (by 2014)</p>	ICCAT (2015a)
Data collection (fishery (catch and bycatch), employment,	<p>INDP, data collection, compilation of fisheries statistics, research and assessment</p> <p>DNEM, all EU vessels report catch statistic to Ministry responsible for fisheries in Cape Verde and electronically or by fax to the flag Member State.</p> <p>INDS National Fisheries Institute, collect data for commercial tuna fishery (catch, effort, supplemented with data from other sources)</p> <p>INE compiles socio-economic data on the fisheries.</p>	FarFish D2.1 INDP
Assessment	<p>ICCAT stock assessment , INDP</p> <p>Skipjack: Reference year 2013. Assessment based on catch only, and catch and effort data, Bayesian Surplus Production model (BSP). Problem with bycatch of juvenile bigeye and yellowfin tuna juveniles in FAD fishing for skipjack</p> <p>Yellowfin: Reference year 2014. Considered as one stock whole Atlantic. Assessment based on age structured and a non-equilibrium production model. Most recent analysis in 2010 indicate overfishing, but annual catches 2012-2014 were below MSY. Concern FAD-related mortality of small yellowfin</p> <p>Bigeye: Reference year 2014. Considered as one stock. An Assessment in 2015 using a variety of models, including non-equilibrium production models, age structured models (VPA) and integrated statistical assessment models. Bigeye is considered overfished and there is a concern FAD-related mortality of small yellowfin</p> <p>Blue shark: Production models fitted to CPUE data, length based age structured models, hierarchial cluster analysis. For the South</p>	<p>ICCAT (2014)</p> <p>ICCAT (2016)</p> <p>ICCAT (2015c)</p> <p>ICCAT (2015d)</p> <p>ICCAT (2017)</p>

	<p>Atlantic stock, estimates that stock is not overfished in BSP model, but state spaced BSP predicts that stock could be overfished and that overfishing could be occurring.</p> <p>Swordfish: South Atlantic. TAC 15 000 t, Current yield (2014): 9 885 t, Bmsy 11 055 t, F: unknown, Relative Biomass (B2011/BMSY): unknown, but likely above 1, Relative Fishing Mortality (F2011/FMSY): unknown, but likely below 1. Not overfished, country specific TACs.</p>	
MCS	<p>As established in the SFPA Agreement, all vessels authorized to fish in Cape Verde waters shall be obliged to communicate their catches to the Ministry responsible for fisheries in Cape Verde</p> <p>Vessels are obliged to report catch to Ministry responsible for fisheries in Cape Verde within 30 days.</p> <p>Autoridade Competente para os Productos da Pesca (ACOPESCA) are responsible for control, inspection and certification of fish products from 2014. Is recently replaced by Serviços de Inspeção e Garantia de Qualidade (SIGQ).</p> <p>Maritime and Port Agency (AMP)</p> <p>Operations Centre for Maritime Safety (COSMAR) is under the command of the Coast Guard</p> <p>All data shall be reported to Directorate National of Maritime Economy (DNEM) and to INDP</p> <p>Inspections (sea, port), Observers</p>	FarFish D2.1, SFPA
IUU	<p>VMS (80% of industrial fleet has installed VMS), AIS, ERS (from Sept.1 2015), but VMS is weakened by poor internet connectivity and electrical grid interruptions.</p> <p>All EU vessels shall keep fishing logbook , Catch reports</p> <p>Cape Verde has adequate surveillance infrastructure (patrol aircraft, sea based patrol vessels and coastal patrols) to effectively control resources within its EEZ. Has adequate trained officers to conduct MCS operations.</p>	<p>Pramod (2017)</p> <p>Pramod (2017)</p>
Preliminary value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018).		NOFIMA
Port	<p>Cape Verde catches are landed in West Africa, long liners use Cape Verde as base. Cape Verde is usually used mainly through trans-shipment.</p> <p>Vessel owners pay 55-65 Eur/tonne as well as advances per vessel.</p> <p>Evaluation in 2013 suggested very little induced effects for Cape</p>	<p>Faro Meeting minutes</p> <p>FarFish, WP3</p>

	Verde as fish is landed in other ports. Tuna from seiners was landed for further processing in Abidjian and from longliners for transshipment in Cape Verde.	
Processing	National canneries are present in Cape Verde with problem of supply. Information on national processing are available through project partner. National processing is too expensive due to island costs.	Faro Meeting minutes
Market	Fish from seiners are processed in Abijian and enter primarily European market as canned products. Fish from longliners are sent in freezer containers primarily to Europe for further processing (info from 2013 evaluation)	FarFish, WP3 FarFish evaluation
Challenges		
Fishery, bycatch	In the agreement established between EU and Cape Verde, the sharks, swordfish and turtles must be considered as by catches. However, it is noted that the quantity of sharks caught is bigger than tuna some years. This issue must be well clarified or discussed in the next agreement to be established.	INDP
Management	Competition with national fleet The implementation of PGRM is in progress as DNME has the updated the plan Fisheries legislation is in an updating process	FarFish D2.1, INDP
MCS	Insufficient control and monitoring Noncompliance of PGRP by foreign vessels.	FarFish D2.1, INDP
Potential improvements	Using new tools	
Data collection	The case study is enclosed in ICCAT, which is responsible for stock assessment of tuna and tuna like species and has a number of tools. As ICCAT is a part of FarFish RG, internal communication with FarFish partners will ensure that FarFish contributes in a relevant matter eg. Visualisation.	FarFish D2.1
Management	Application of RBM principles and the RFMS framework to Cape Verde tuna fishery.	FarFish D2.1
Monitoring	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools	CSIC
Capacity building	Development and implementation of biological sampling and data collection programmes	FarFish D2.1

4.2 Contact information Stakeholders Cape Verde

Authorities	Name/Website/Contact person	Email address/telephone
Secretary of Marine Economy (under the new Ministry of transport, tourism and Maritime Economy)	Contact person: Dr. Paulo Lima Veiga	Paulo.veiga@mem.gov.cv
DNEM	National Directorate of Maritime Economy Contact person: Carlos Evora	Tel: 0023 823 17500 carlosevora50@gmail.com
DG MARE	Contact person (FarFish): Ms Jurate Smalysyte, Contact person (for INDP): joao Aguiar Machado Fisheries attachés Arnaud Appriou (based in Senegal)	Tel. 0032 229 63389 jurate.smalysyte@ec.europa.eu Tel. 0032 229 91111 Joao.machado@ec.europa.eu Tel. 00221 33889 2963 arnaud-pierre.appriou@eeas.europa.eu
Operators		
ANFACO-CECOPECA	National Association of Fish and Seafood Canning Manufactures, Spain www.anfaco.es Contact person: Gonzalo Ojea	FarFish Partner (17) ojea@anfaco.es
LDAC	Long Distance Fleet Advisory Council, EC http://ldac.eu/aboutus Contact person: Alex Rodriguez	FarFish Partner (5) alexandre.rodriguez@ldac.eu
OPAGAC	Organisation of Associated Producers of Large Tuna Freezer Vessels, Spain Contact person: Julio Morón	FarFish RG julio.moron@opagac.org
Supporting institutions		
AMP	Maritime and Port agency www.amp.cv Contact person: Antonio Cruz Lopes	Tel: 0023 833 33020 Cruz.lopes@amp.cv

Coast Guard	Contact person: Pedro Santana	Tel: 0023 823 00857 guardacosteiracaboverde@gmail.com Secretaria.cgc@hotmail.com
INDP	National Institute for Fisheries Development (INDP) Contact persons: Maria Osvaldina Silva, Elisia Da Cruz, Benvindo Fonseca	FarFish Partner (2) Osvaldina.Silva@indp.gov.cv Elisia.Cruz@indp.gov.cv Benvindo.Fonseca@indp.gov.cv
Maritime Police	Contact person: Leandro Fortes	Tel: 0023 823 00483/2314631 leandro.fortes@pn.gov.cv
SIGQ	Serviços de Inspeção e Garantia de Qualidade Contact person: Delvis Fortes	Tel: 0023 823 17500 Tel: 0023 851 62638/9950031 Delvis.fortes@dnem.gov.cv
Scientists		
INE	Instituto Nacional de Estatística www.ine.cv Contact person: Osvaldo Rui Monteiro Borges	Tel: 0023 826 13827 inecv@ine.gov.cv
ICCAT	Contact person: Paul de Bruyn, Driss Meski	FarFish RG paul.debruyn@iccat.int driss.meski@iccat.int
FAO	Food and Agriculture Organization of the United Nations, (FAO Representative in Cabo Verde; Luciano Fonseca) Contact person: Alejandro Anganuzzi	FarFish RG FAO-CV@fao.org Luciano.fonseca@fao.org Alejandro.Anganuzzi@fao.org
UNI-CV	University of Cape Verde Contact person: Astrigilda Silveira (Vice-Reitora) Corine Almeida	Tel: 0023 833 40700/2326452 reitorias@adm.unicv.edu.cv astrigilda.silveira@docente.unicv.edu.cv corrine.almeida@docente.unicv.edu.cv
Other industry		
OPROMAR	Organization of Fresh Fish Producers of the Port and Ría de Marín, Spain Contact person: Francisco Javier Teijeira	FarFish Partner (19) fcoteijeira@opromar.com

ORTHONGEL	Organisation of producers of frozen and deep-frozen tropical tuna, France Contact person: Michel Goujon	mgoujon@orthongel.fr
UBAGO GROUP MARE S.L.,	Contact person (for CETMAR): Jose Antonio de la Fuente Contact person (for INDP): Andres Espinosa	jose.delafuente@ubagogroup.com Tel: 0034 629 504445 andres@ubagogroup.com
FRIGROVE		info@frigrove.com
FRESCOMAR S.A.,	Contact person: Manuel Monteiro	Tel: 0023 823 26742/ 898 18596 Mlmonteiro.frescomar@ubagogroup.com
ATUNLO cv (processing plant)	Contact person: Alejandro Pazo	Tel: 0023 823 17178/9738555 Alejandro.pazo@atunlo.com pazomanzano@hotmail.com
CALVO PESCA ATLANTICO S.A	www.grupocalvo.com Contact person (for CETMAR): Oscar Gustavo Álvarez (Operating manager) Contact person (for INDP): Jose Luis Calvo Pumpido	oscar-gustavo.alvarez@calvo.es Tel: 0034 981 704040
NGOs		
OFCF Japan	“Overseas Fishery Cooperation Foundation” a Japanese NGO Adress: Sankaidou Bldg. 9-13, Akasaka 1, Minato-ku City: Tokyo http://www.ofcf.or.jp/ Contact person:	Tel: 0081 335 855087 Senmonka@ofcf.or.jp

4.3 Relevant literature and websites Cape Verde

DNEM (2017). Catch statistics. Cape Verde. National Directorate of Maritime Economy

Domingo, A., Amorim, A., Miller, P., Arfelli, C., Forselledo, R., Ríos, M., and Doño, F., (2008). Aspectos del ciclo reproductivo y estructura de la población del tiburón azul (*Prionace glauca*) en el océano Atlántico Sur [Aspects of reproductive cycle and population structure of the blue shark (*Prionace glauca*) in the South Atlantic Ocean]. In spanish. SCRS/2008/144. ICCAT

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https://www.iccat.int/Documents/Meetings/Docs/2014_SKJ_ASSESS_ENG.pdf
- ICCAT (2015a). Report for biennial period, 2014-15 PART I (2014) - Vol. 2, English version, Madrid, Spain. https://www.iccat.int/Documents/BienRep/REP_EN_14-15_I-2.pdf
- ICCAT (2015b). Report for biennial period, 2014-15 PART II (2014) - Vol. 2, English version, Madrid, Spain. https://www.iccat.int/Documents/BienRep/REP_EN_14-15_II-2.pdf
- ICCAT (2015c) Report of the 2015 ICCAT Bigeye tuna stock assessment session, Madrid, Spain – July 13 to 17, 2015,
https://www.iccat.int/Documents/Meetings/Docs/2015_BET%20ASSESS_REPORT_ENG.pdf
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https://www.iccat.int/Documents/Meetings/Docs/2017_ATL_SWO_ASS_REP_ENG.pdf
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- Pramod, G (2017) Cape Verde – Country Report, 7 p, In: Policing the Open Seas: Assessment of Fisheries Monitoring Control and Surveillance in 84 countries, IUU Risk Intelligence-Policy Report No. 1, Canada, 814 pages <https://iuriskintelligence.com/admin/wp-content/uploads/2017/04/Cape-Verde-country-Report-Global-Fisheries-MCS-Report-2017.pdf>
- Zweig T (2015). The current status and management of South Africa's chondrichthyan fisheries. *African Journal of Marine Science*, 37 (2): 233-248 DOI: 10.2989/1814232X.2015.1044471

Websites:

<https://iuriskintelligence.com/>

Database on EU External water fleet www.Whofishesfar.org

Instituto Nacional de Estatística www.ine.cv

International commission for the Conservation of Atlantic tunas www.iccat.int/en/Assess.htm

Global fishing watch, sustainability through transparency <http://globalfishingwatch.org/>



FAO factsheet blue shark <http://firms.fao.org/firms/resource/13429/en>
 FAO factsheet Swordfish <http://firms.fao.org/firms/resource/10024/en>
 FAO factsheet Skipjack tuna <http://firms.fao.org/firms/resource/15/en>
 FAO factsheet Bigeye tuna <http://firms.fao.org/firms/resource/9/en>
 FAO factsheet Yellowfin tuna <http://firms.fao.org/firms/resource/20/en>

4.4 Supplementary material Cape Verde



Figure 4.1 Cape Verde EEZ (nations online project)

5 Case study area Senegal

The development of a case study specific MPO covering all the target species in Senegal CS was considered unattainable. Therefore, the case study leader was asked to prioritize which fishery the MPO should address based on their challenges. Consequently, the black hake fishery was selected because of the mixing of two species in the catches. Also, these black hake species are evaluated as a single stock, due to the limited knowledge about the two. Following, in order to obtain a sustainable management of the two species, species specific assessment models are desirable.

5.1 MPO Senegal

Current state		Reference
This MPO apply to (area, stocks, fleet, authority and operators) to EU fishery for Black Hake in Senegalese EEZ (shared with Guinea in the southern part). Demersal trawlers for EU (Spain). Relevant authorities are DG MARE and MPEM, while relevant operator are LDAC and OPROMAR		
Case study leader	COREWAM, Contact person: Mamadou Diallo, mlsdiallo@gmail.com	Revised MD, 5.2.18
Fishery identification		
Species (target, bycatch)	Target: Two species of black hake, Tropical African hake (<i>Merluccius polli</i>), Senegalese hake (<i>Merluccius senegalensis</i>). Bycatch; 7% cephalopods, 7% crustaceans, 15% other deep-water demersal fish (level of bycatch authorized according to the agreement).	SFPA, appendix 2 FarFish D2.1, COREWAM (MD)
Geographical boundaries	Fishing in deepwater 150-1000m, Permitted fishing Zone given in SFPA. <i>Merluccius polli</i> , distributed between 8 °N and 26 °N and caught between 33°N and 10°N, at depth from 200 to 1000 m. <i>Merluccius senegalensis</i> , distributed between 12 °N and 33 °N caught between 25°N and 18.5°S, at depth from 100 to 600 The Senegalese coast extends between 16°04'N (St. Louis, northern border with Mauritania) and 12°20'N (Cap Roxo, southern border with Guinea-Bissau) that encloses Gambian waters (13°05'N-13°36'N).	EU, SFPA, appendix 2, Fall et al., (2016) COREWAM (MD)
EU fisheries (nations, gear, vessels, catch, quota)	EU nations; Spain Total reference catch (SFPA) (both hake species): 2 000 tons/year Vessels; Deep-sea trawlers . Catch of hake by EU + Senegal in Senegal EEZ is approximately 6,000 tons a year.	EU, SFPA COREWAM (MD)

Other nations	Senegalese trawlers (3 to 5) mainly, but also some artisanal canoe (Cayar, located around 60 km in the north of Dakar)	COREWAM (MD)
Management		
Authorities	DG MARE, MPEM	Faro meeting, D2.1
Operators	LDAC and OPROMAR	CETMAR
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	(1) CSRP, CECAF, COMAHFAT, ECOWAS, ISRA (2) FAO/CECAF, CRODT (3) SOPERKA, Grupo Profand (Senefand), Grupo Eduardo Vieira S.A., Senevisa (freezer fleet), Amerger (processing plant) (4) GREENPEACE, APRAPAM (Association pour la Promotion et la Responsabilisation des Acteurs de la Pêche Artisanale Maritime)	FarFish D2.1 CETMAR
SFPA	2014-2019	
Governance	Reference framework of DPM activities; Sectoral Policy Letter (LPS-PA). LPS covers management of fisheries resources and their habitats, adjustments of fishing effort, valorisation of fisheries products, licencing, improvement of infrastructure and provision of advice to artisanal sector and training.	
RFMO	CSRP, CECAF	FarFish D2.1
MP (name, obj, area)	Fisheries Code aims to achieve good management of fisheries resources and to ensure their sustainable development. The Code include management plans for fisheries, provisions on IUU fishing, co-management and implementation of participatory approaches. Committee for the Eastern Central Atlantic Fisheries (CECAF) WG on Assessment of Demersal Resources Subgroup North; The overall objective of the Group is to contribute to the improvement of the management of demersal resources in Northwest Africa through assessment of the state of the stocks and the fisheries to ensure the best sustainable use of the resources for the benefit of the coastal countries.	FarFish D2.1 FAO/CECAF (2013)
CS objectives	1) Develop sustainable MP of the two hake species. Stock discrimination, specify F, SSB improving HCR and traditional stock assessment for hake. Improve species-specific knowledge, need access to data, maybe from National management institution. 2) Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools.	Faro meeting

	3) Observers on EU vessels, improve bycatch registration, self - sampling protocols, improve monitoring of catch, effort and sizes for hake as target and bycatch species	
Harvesting control rules	Fishing zones, MPAs, fish breeding grounds, national parks, Minimum mesh size 70 mm, minimum commercial catch size 35 cm, bycatch regulations, and Biological rest period 1 May-30 June. Bycatch regulations: Elasmobranch are not allowed on-board and must be promptly released. Prohibition of coastal demersal fishing trawlers (fish-cephalopod option) from detaining hake bycatch. MSY (both hake species) = 1657 t	SFPA, Appendix 2, CRODT (2017) Fall et al., (2016)
Data collection (fishery catch and bycatch employment)	Catch reports compiled by Centre of Dakar Thiaroye (CRODT), Research surveys; Coastal demersal, deep demersal, coastal stock surveys. Commercial fishing surveys at the port of Dakar and in artisanal fisheries mainly in Cayar	FarFish D2.1 COREWAM (MD)
Assessment	Demersal in EEZ: FAO/CECAF working groups using Schaefer dynamic production stock assessment models implemented in excel, CRODT. Stocks are considered moderately exploited. Current management recommendations; Do not increase the fishing effort pending data refresh.	FAO/CECAF (2013), Farfish D2.1 COREWAM, MD
		Fernández-Peraltza et al., (2011),
		Fall et al., (2016)
		Rey et al., (2016)
MCS	VMS/AIS Inspections (landings and at sea), number of inspections are increasing (Maritime patrol operations, Air patrol operations) Observer embarkation on board Certification of catches for the EU marked.	FarFish D2.1, COREWAM (MD)
Preliminary value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018).		NOFIMA

Port, transport, processing, marked	There are trade statistics for hake and customs data (ISRA/CRODT). Senegal is not the target fishery, the vessels fish on their way to Guinea Bissau, even in Mauritania and Morocco. The species is only targeted by European vessels. Hake is partly landed in Dakar, but also in European harbours. All hake landed in Senegal are exported, and the processing is done in Europe. The hake is transported frozen on board vessels. There is no local consumption of hake. These last years, there is the opening of an African market to Cameroon and Côte d'Ivoire.	FAO/CECAF (2013). FarFish D2.1, Faro meeting minutes. NOFIMA, (SE)
Challenges		
Data collection	The two species of hake has data limitation to discriminate the stocks, poorly known biology in Senegaleze EEZ, stocks are not separated in catch statistics, of even in scientific fishing statistics (especially in Senegalese data)	COREWAM (MD) Fall et al., (2016)
Assessment	Need to improve assessment models as the species are currently assessed as one single stock. A recent study imply that these black hakes attain the fastest growth ever given for any hake species, following age at maturity at the end of first year for <i>M.Senegalensis</i> and during the second year for <i>M.polli</i> .	FarFish D2.1 Rey et al., (2016)
Fishery, stock discrimination	The species have overlapping distribution, are mixed in catches and are commonly marketed as Merluccius and evaluated as a single stock. Lack of knowledge on the two species of hake, bycatch registrations need to be species specific	Fernández-Peralta et al., (2011, 2017) Faro meeting
Management, sustainability	SFPA is set to 2000 t, but the MSY is set to 1657 t. Overexploitation of particularly demersal species, but increasingly also coastal pelagic stocks.	Fall et al., (2016) FarFish D2.1
MCS	There is a need to increase controls of fishing vessels (observers and inspections)	Faro meeting
Other concerns	Coastal erosion, climate change, pollution, ecosystems degradation	FarFish D2.1, p 22
Potential improvements	Using new tools	
Data	Contribute to improved stock assessment by data collection and analysis	FarFish D2.1
Assessment	Improve stock assessment models and tools, developing networks, working groups and knowledge transfer. FarFish aim to add value to present work in CECAF applying new models and tools.	Farfish D2.1,

Monitoring	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools	CSIC
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5.2 Contact information Stakeholders Senegal

Authorities	Website/phone/Name	Email address
DG MARE	Contact person: Mr Dominique Claeys Fisheries attaché: Arnaud Appriou	Tel. +32 229 55279 dominique.claeys@ec.europa.eu Tel. +221 33889 2963 arnaud-pierre.appriou@eeas.europa.eu
MPEM	Ministry of Fishery and Maritime Economy, Senegal Contact person: Dr Mamadou Goudiaby	magoudiaby@yahoo.fr
Operators		
LDAC	Long Distance Fleet Advisory Council, EC, http://ldac.eu/aboutus Contact person: Alex Rodriguez	FarFish Partner (5) alexandre.rodriguez@ldac.eu
OPROMAR	Organization of Fresh Fish Producers of the Port and Ría de Marín, Spain Contact person: Francisco Javier Teijeira	FarFish Partner (19) fcoteijeira@opromar.com
Scientists		
ISRA (CRODT is an entity of ISRA)	INSTITUT SÉNÉGALAIS DE RECHERCHES AGRICOLES (ISRA) Contact person: Massal Fall	FarFish Partner (14) massal.fall@gmail.com
CECAF	The Fishery Committee for the Eastern Central Atlantic Working group on the Assessment of Demersal Resources- Subgroup North Contact person:	
FAO	The Food and Agriculture Organization of the United Nations. www.fao.org/fisheries/en Contact person: Alejandro Anganuzzi	FarFish RG FAO-CV@fao.org Alejandro.Anganuzzi@fao.org

ICCAT	International Commission for the Conservation of Atlantic Tunas www.iccat.int Contact person: Paul de Bruyn	FarFish RG Paul.debruyn@iccat.int
NGOs		
GREENPEACE	www.greenpeace.org/africa	
APRAPAM	Association pour la Promotion et la Responsabilisation des Acteurs de la Pêche Artisanale Maritime www.aprapam.org Contact person: Gaoussou Gueye	gueyegaoussou@gmail.com

5.3 Relevant literature and websites Senegal

DPSP (2016) Rapports annuels 2013 à 2016. Direction de la Protection et de la Surveillance des Pêches au Sénégal

Fall M., Balguerias E., Daniel, P., Sano B.-S., and Diédhiou A. (2016). Report of the annual meeting of the Joint Scientific Committee on the Fisheries Agreement between the Republic of Senegal and the European Union. Dakar, Senegal, February 29, 01 and 02 March 2016. Reports of the Joint Scientific Committees. Brussels, 62 p. + Annexes. (In French)
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Fernández-Peralta L, Quintanilla LF, Rey J. (2017). Overlapping Distribution of Two Sympatric Species: The Case of Black Hakes, *Merluccius polli* Cadenat 1960 and *Merluccius senegalensis* Cadenat 1960, Off Mauritania. In: Ramos A., Ramil F., Sanz J. (eds) Deep-Sea Ecosystems Off Mauritania. Springer, Dordrecht. https://link.springer.com/chapter/10.1007/978-94-024-1023-5_6

Lombarte A, Torres GJ, Morales-Nin B. (2003) Specific *Merluccius* otolith growth patterns related to phylogenetics and environmental factors. *Journal of the Marine Biological Association of the United Kingdom*. 83(2):277-81. <https://www.cambridge.org/core/journals/journal-of-the-marine-biological-association-of-the-united-kingdom/article/specific-merluccius-otolith-growth-patterns-related-to-phylogenetics-and-environmental-factors/A886B536D7E2CE3070FD48E61C5B597E>

Meiners C, Fernandez L, Salmeron F, Ramos A., (2010). Climate variability and fisheries of black hakes (*Merluccius polli* and *Merluccius senegalensis*) in NW Africa: A first approach. *Journal of Marine Systems*. 80(3-4):243-7.

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Pramod, G., Koutob, V. and Gopikrishna, M. (2017) Senegal – Country Report, 11 pages, In: Policing the Open Seas: Global Assessment of Fisheries Monitoring Control and Surveillance in 84 countries, IUU Risk Intelligence – Policy Report No.1, Canada, 841 pages.

<http://iuriskintelligence.com/admin/wp-content/uploads/2017/04/Senegal-country-Report-Global-Fisheries-MCS-Report-2017.pdf>

Rey J, Fernandez-Peralta L, Garcia A, Nava E, Clemente MC, Otero P, Villar EI and CA. Piñerio (2016). Otolith microstructure analysis reveals differentiated growth histories in sympatric black hakes (*Merluccius polli* and *Merluccius senegalensis*). *Fisheries Research*. 179: 280-90.

<https://www.sciencedirect.com/science/article/pii/S0165783616300844>

Roldán MI, García-Marín JL, Utter FM and Pla C (1999). Genetic relationships among *Merluccius* species. *Heredity*. 83:79.

<http://www.nature.com/index.html?file=/hdy/journal/v83/n1/full/6885300a.html>

SFPA agreement EU-Senegal <https://ec.europa.eu/fisheries/cfp/international/agreements/senegal/>

Résultats Généraux de la Pêche Maritime. Direction des Pêches Maritimes (DPM) Vue générale du secteur des pêches de la République du Sénégal. FAO/FID/CP/SEN. www.gouv.sn

Websites

Global fishing watch, sustainability through transparency <http://globalfishingwatch.org/>

Database on EU external water fleet <http://www.whofishesfar.org/>

FAO FACTS SHEET <http://firms.fao.org/firms/resource/10123/en>

5.4 Supplementary material Senegal

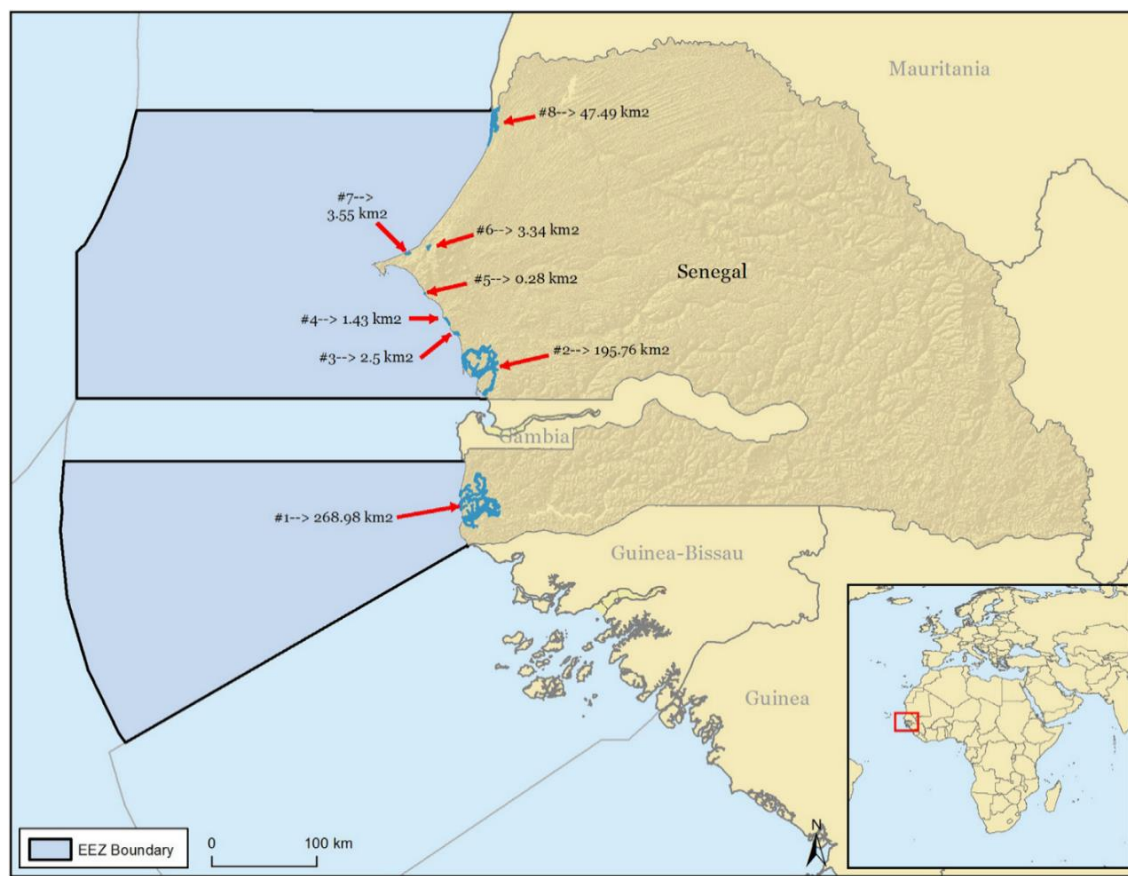


Figure 5.1 Senegal EEZ, (Belhabib et al., 2009)

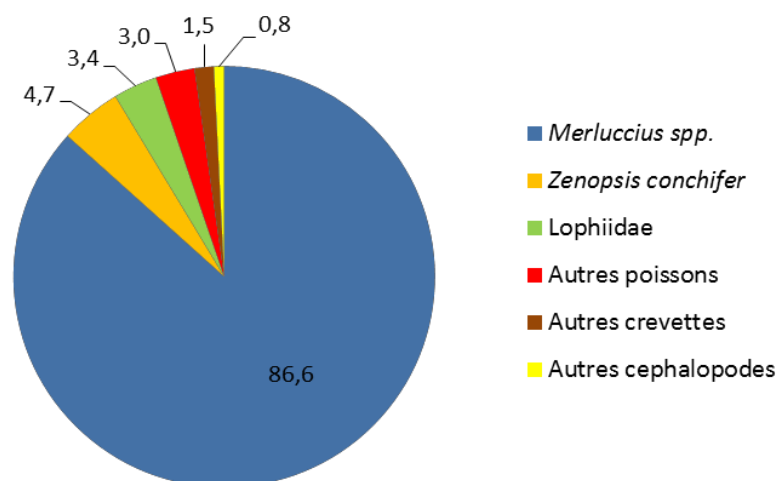


Figure 5.2 Figure 1.1.3. Relative composition (percentage) of landings related to the activity of the EU trawl fleet in Senegal's fishing zone during 2015 (Fall et al., 2016)

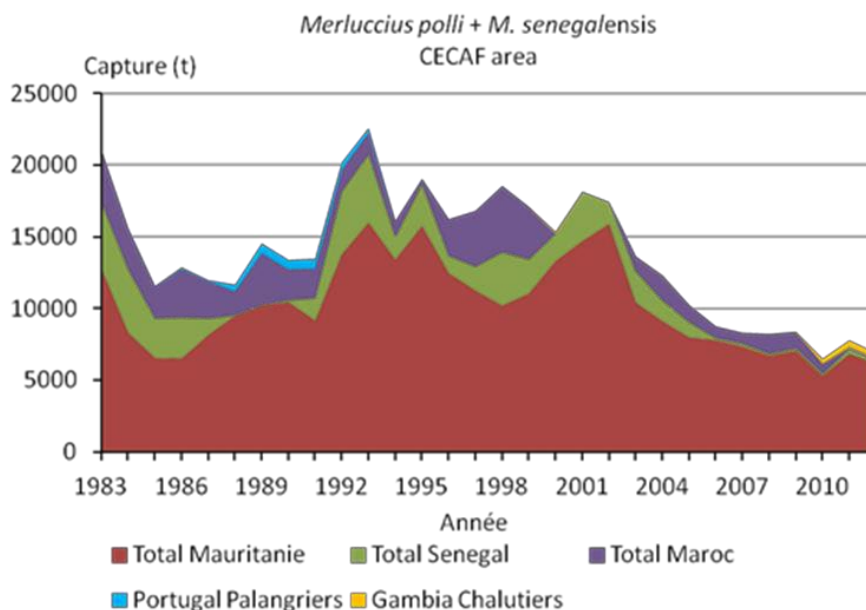


Figure 5.3 Evolution of the catches made on all the components of the composite stock of black hake (Morocco, Mauritania, Senegal, Gambia) between 1983 and 2012 according to the data reported to CECAF (FAO, 2015) 14 (Fall et al., 2016)

Table 5.1 Table 5.1 Distinctive morphological characteristics between *Merluccius senegalensis* and *M. polli* (Fall et al., 2016)

Species	Common characters	Distinctive characters
<i>Merluccius senegalensis</i>	Fusiform body, wider in front. The head is large, elongated, the terminal mouth, widely split and furnished with strong teeth. The fins are thornless, There are two	The belly is silver. It has 11 rays on the first dorsal 13 to 18 gill rakers on the first branchial arch, 11 to 14 on the lower branch. There are 124 to 155 small scales on the lateral line. Abdominal cavity with a whitish band. Caudal fin without white tip.
<i>Merluccius polli</i>	separate ridges, the first short and high, the second wide, indented, and anal-like. The pelvic women are in the jugular position. The caudal is truncated	The belly is gray-steel to blackish. There are 10 rays in the first dorsal and 8 to 12 gill rakers on the first gill arch, 8 to 9 of which are on the lower branch. 102 to 127 scales on the lateral line. Blackish abdominal cavity. Caudal fin with a white tip

Table 5.2 Synthesis of the results of black hake stock assessments conducted in the CECAF North area from 1993 to 2013, presented by the different components and historical catch and CPUE series used by each CECAF working group (Fall et al., 2016)

CECAF Working Groups	Series Captures and Abundance	Merluccius spp. (Merluccius senegalensis et M. polli)
CECAF working groups of 1993, 1997 and 2000		Insufficient biological data (1993), mixed catches, application of the limited model (1997), possible increase in fishing effort (2000)
CECAF Working Group (2003) FAO 2006a	Morocco (1983-1999)	Overexploited. F_{cur} / F_{scurB} exploitation rate (%) = 107 and abundance level $B / BMSY$ (%) = 47. No activity
	Mauritania (1983-2001)	Fully exploited. Exploitation rate F_{cur} / F_{scurB} (%) = 97 and level of abundance $B / BMSY$ (%) = 78. Decrease fishing effort.
	Senegal (1983-2001)	Not fully exploited. Exploitation rate F_{cur} / F_{scurB} (%) = 68 and level of abundance $B / BMSY$ (%) = 64 Do not increase the effort.
CECAF Working Group (2004) FAO 2006b	Mauritania (1983-2002)	Overexploited by CPUE trend. Do not adjust the model. Taken not registered freezer trawlers and by-catch of large pelagic boats
	Senegal (1983-2002)	Not fully exploited. F_{cur} / F_{scurB} exploitation rate (%) = 37 and level of abundance $B / BMSY$ (%) = 76. $MSY_{merlus} = 1657$ t. Do not increase the effort.
CECAF Working Group (2007) FAO 2012a	Mauritania (1983-2006)	Overexploited. Exploitation rate F_{cur} / F_{scurB} (%) = 73 and level of abundance $B / BMSY$ (%) = 45. Do not increase the current fishing effort (2006). Catches should not exceed 7000 t
	Senegal (1983-2005)	Overexploited. Exploitation rate F_{cur} / F_{scurB} (%) = 41 and level of abundance $B / BMSY$ (%) = 47. Do not increase the current fishing effort (2005). Catches should not exceed 600 t.

CECAF Working Group (2010) FAO 2012b	Mauritania (1983-2008)	Not fully exploited. Exploitation rate F_{cur} / F_{scurB} (%) = 71 and level of abundance $B / BMSY$ (%) = 145. Do not exceed the effort of 2008. Uncertainty results.
	Senegal (1983-2005) (2007 repeated evaluation considering an environmental effect)	Not fully exploited. Exploitation rate F_{cur} / F_{scurB} (%) = 9 and level of abundance $B / BMSY$ (%) = 186. Uncertainty results
CECAF Working Group (2013) FAO 2015	Mauritania (2000-2012)	Not fully exploited. Exploitation rate F_{cur} / F_{scurB} (%) = 75 and abundance level $B / BMSY$ (%) = 140. The fishing effort could be increased by 10%.

6 Case study area Mauritania

The development of a case study specific MPO covering all the target species in Mauritan CS was considered unattainable. Therefore, the case study leader was asked to prioritize which fishery the MPO should address based on their challenges. Consequently, the shrimp fishery was selected because of bycatch issues.

6.1 MPO Mauritania

Current state		
This MPO apply (area, stocks, fleet, authority, and operators) to EU shrimp fishery in Mauritanian EEZ. Relevant fleet are demersal trawlers. Relevant authorities are DG MARE, MPEM and ONISPA, while relevant operator is LDAC. EU vessels (demersal) are from Spain.		
Case study leader	IMROP Contact person: Khallahi Brahim, medfall_khall@yahoo.fr	
Fishery identification		
Species (target, bycatch)	Target: two species of shrimp, Langostino/Prawn (<i>Farfantepenaeus notialis</i>) and Gamba/Southern pink shrimp (<i>Parapenaeus longirostris</i>). Other species; <i>Melicertus kerathurus</i> , <i>Aristeus varidens</i> , <i>Plesionika heterocarpus</i> , <i>Aristaeopsis edwardsiana</i> Bycatch; 8% cephalopods, 10 % crabs, 15 % fish	FarFish D2.1, Faro meeting
Geographical	The southern pink shrimp/Gamba is distributed from Cape Spartel (35°47'N) to Sidi Ifni (29°22'N) in coastal areas at depths between 20 and 700 m. In the waters of Mauritania, the fishery of southern pink shrimp/gamba is carried out in deep waters (100 – 350 m) mainly between 21° and 19°N (Mainly between 20°30N and the Senegal border). Langostino has a reproduction and nursery area in the Banc d'Arguin and another identified area in the mouth of the Senegal river. The fishery of langostino is carried out in two main coastal areas; around Cap Trimiris between 20°N and 18°30N and south of Nouakchott, between 17°30N and 17°N (mainly south of 17°50'N) at depths between 25 and 70 m. In 2016 and in first half of 2017, Spanish vessels mainly fished between 20°N and south of Nouackchott to the border with Senegal. North of 20°N, the fishery was conducted in deeper waters.	FAO/CECAF (2013) Bouzouma et al., (2017) FAO/CECAF (2013) Bouzouma et al., (2017)
EU fisheries (nations, gear,	Nations (SFPA); Spain (4150 t), Italy (600 t), Portugal (250 t) Total reference catch (SFPA): 5000 t/year	SFPA (2015-2019)

vessels, catch, quota)	<p>Vessels: Shrimp vessels/demersal trawlers</p> <p>According to data from the EU, the utilization rate is low (below 20% 2015-2016) with reported catch of 984 tonnes in 2016.</p> <p>The catch composition of <i>P. longirostris</i> and <i>P. notialis</i> vary between years, with <i>P. longirostris</i> being most abundant the last years.</p> <p>During the years 2013, 2014, 2015, 2016 and the first half of 2017, EU vessels are the only foreign vessels to have access to the Mauritanian fishing zone in this category, they are all Spanish. In 2016, out of 8 authorizations granted, only 6 were used. In 2015, the effort of EU fleet corresponded to one month of fishing activity. In 2017, the same 6 vessels authorized to fish shrimp operated in Mauritania.</p>	<p>FarFish D2.1</p> <p>Bouzouma et al., (2017)</p> <p>Bouzouma et al., (2017)</p> <p>Bouzouma et al., (2017)</p>
Other nations	Mauritania	
Management		
Authorities	DG MARE, MPEM, ONISPA	Faro meeting, FarFish D2.1, CETMAR
Operators	LDAC	CETMAR
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	<p>(1) DPI, CECAF, DARE</p> <p>(2) IMROP, FAO, CMR</p> <p>(3) ANAFACO-CECOPECA, OPROMAR</p> <p>(4) PECHECOPS, Mauritanie 2000,</p>	Faro meeting, FarFish D2.1, CETMAR
SFPA	<p>2015-2019, 5000t, bycatch 8% cephalopods, 10 % crabs, 15 % fish. Category 1- Fishing vessels specialising in crustaceans other than spiny lobster and crab (maximum 5000 tonnes/year; maximum 25 vessels), Spain (4150 t), Italy (600 t), Portugal (250 t), max 25 vessels at time</p> <p>In 2015 and 2016, 6 licences granted, but only 5 used and 2 vessels flying the Mauritanian flag carried out an activity in this fishing category</p>	<p>FAO/CECAF (2013)</p> <p>Bouzoma et al., (2016)</p>
Governance	Management plan National Fisheries Management plan (MFMP)	
RFMO	The Fishery Committee for the Eastern Central Atlantic (CECAF)	
MP (name, obj, area)	MFMP: objective: "Harness the fishing heritage of the country, in a sustainable way, the maximum benefit for the people of	FarFish D2.1

	<p>Mauritania, and participate more actively in efforts to develop an inclusive blue economy source of wealth and employment.</p> <p>Management goals</p> <ol style="list-style-type: none"> (1) Improve knowledge of fisheries resources and their environment (2) Optimize the management of the exploitation of fishery resources (3) Strengthen integration of the fisheries sector to the national economy (4) Develop maritime business (5) Promote the development of continental fishing and aquaculture (6) Strengthen good governance of fisheries 										
CS objectives	<ol style="list-style-type: none"> 1) Reduce bycatch in shrimp fishery, as several bycatch species are overexploited. Improve technology, increase number of scientific observers on board the shrimp vessels. Scientific observer should collect data and the value in the bycatch. Specification of bycatch species in ships logbook data. 2) Advance knowledge on shrimp landing fluctuations in the context of environmental forcing. Assess vulnerabilities originated from the combined action of human exploitation and adverse oceanographic conditions. Analyse alternatives to minimize risks. 	<p>Faro Meeting</p> <p>CSIC</p>									
Harvesting control Rules	<p>FAO/CECAF</p> <p>Closed seasons September-October, April-May,</p> <table border="1" data-bbox="427 1249 1198 1480"> <thead> <tr> <th>Regulations</th> <th><i>P. longirostris</i></th> <th><i>P. notialis</i></th> </tr> </thead> <tbody> <tr> <td>Minimum mesh size (mm, stretched mesh)</td> <td>50 mm</td> <td>50 mm</td> </tr> <tr> <td>Minimum landing size and weights</td> <td>6 cm TL</td> <td>200 individuals/kg</td> </tr> </tbody> </table>	Regulations	<i>P. longirostris</i>	<i>P. notialis</i>	Minimum mesh size (mm, stretched mesh)	50 mm	50 mm	Minimum landing size and weights	6 cm TL	200 individuals/kg	<p>FAO/CECAF (2003/2013)</p>
Regulations	<i>P. longirostris</i>	<i>P. notialis</i>									
Minimum mesh size (mm, stretched mesh)	50 mm	50 mm									
Minimum landing size and weights	6 cm TL	200 individuals/kg									
Data collection (fishery (catch and bycatch), employment)	<p>Sampling is based on an observer programme by IMROP.</p> <p>Catch and effort data for shrimp trawler are recorded in the database “Journal de pêche”, information derived from the logbooks completed by the ships captains (quantities, number of hours, number of operations by boat, by species or groups of species and by geographical zone). Monthly catch data (by species) and effort data of Spanish shrimpers are provided by the National Association of Ship Owners of Fresh Fruit Freezer Vessels (ANAMAR) to the IEO.</p>	<p>FarFish D2.1</p> <p>FAO/CECAF (2013)</p>									
Assessment	<p>Assessment provided by FAO/CECAF working group on the Assessment of Demersal Resources - Subgroup North.</p>	<p>FAO/CECAF (2013)</p>									

	<p>Projections and assessment for state of stocks are done using Schaefer dynamic production model</p> <p><i>P. notialis</i>; 2013: Under-exploited with low Fishing mortality</p> <p><i>P. longirostris</i>, 2013: Fully exploited (2002-2012), but with low Fishing mortality.</p> <p><i>P. longirostris</i> 2015: Not fully exploited</p> <p><i>P. notialis</i> 2015: Fully exploited</p>	<p>Bouzouma et al., (2016)</p> <p>Bouzouma et al., (2017)</p>
MCS	<p>Coast guard (GCM); The fisheries monitoring centre of the coast guard is Nouadhibou.</p> <p>Délégation à la surveillance des pêches et au contrôle en mer; surveillance operations of fisheries regulations at sea and ship control operations activities including illegal fishing and flags of convenience.</p>	FAO/CECAF (2013)
Preliminary value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018)		NOFIMA
Port	The shrimp catches are not landed in Mauritania. It would be reasonable to assume they are landed in Spain and enters the processing there	Faro meeting
Processing	Shrimp probably primarily landed in Spain, we have no info on the further processing of this, will have to be investigated	NOFIMA (WP3)
Market		
Challenges		
Fishery	High bycatch in shrimp fishery	Faro meeting, IMROP
MCS	Problems with access for IMROP inspectors/observers on board EU vessels	Faro meeting, IMROP
Other concerns	Environmental forcing. The fluctuations in landings are associated with climatic/oceanographic fluctuations and affects the profitability of the fleet.	CSIC
Potential improvements		
Assessment, Early warning of risks	Using new tools Advanced knowledge on how the signal of oceanographic processes affects the shrimps stocks and the shrimp fishery will improve assessment and dampen the fluctuations in landings. Given the present capacity of the scientific community to foresee the impact of large-scale climatic oscillations, this might help to rise early warnings and preventive measures to protect	CSIC

	the stock and improve long-term profitability of the EU fleet targeting shrimp.	
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6.2 Contact information Stakeholders Mauritania

Authorities	Website/Adress/phone/Name	Email address
DG MARE	Contact person: Mr Mirko Marcolin Fisheries attaché: Mr Eric Lunel (based in Nouakchott)	Tel. +32 229 67152, mirko.marcolin@ec.europa.eu eric.lunel@eeas.europa.eu
MPEM	Department of Fisheries and Maritime Economy	
ONISPA	Office National d'Inspection des produits de la peche et aquaculture	
Operators		
LDAC	Long Distance Fleet Advisory Council, EC http://ldac.eu/aboutus Contact person: Alex Rodriguez	FarFish Partner (5) alexandre.rodriguez@ldac.eu
Supporting institutions		
CECAF	The Fishery Committee for the Eastern Central Atlantic	
DARE	Directory of Fisheries Management in Mauritania. Contact person: Lamine Camara	FarFish RG laminecam2000@yahoo.fr
DPI	Direction de la Pêche industrielle	
Scientists		
CMR	Corten Marine Research www.cmrweb.nl Contact person: Ad Corten	FarFish RG adcorten@gmail.com
FAO	Food and Agriculture Organization of the United Nations, Contact person: Alejandro Anganuzzi	FarFish RG Alejandro.Anganuzzi@fao.org
IMROP	Mauritanian Institute for Oceanographic Research and Fisheries Contact person: Khallahi Brahim	FarFish (P7) medfall_khall@yahoo.fr
Other Industry		

OPROMAR	Organization of Fresh Fish Producers of the Port and Ría de Marín, Spain Contact person: Francisco Javier Teijeira	FarFish Partner (19) fcoteijeira@opromar.com
ANFACO-CECOPECA	National Association of Fish and Seafood Canning Manufactures, Spain www.anfaco.es Contact person: Gonzalo Ojea	FarFish Partner (17) ojea@anfaco.es
NGOs		
NGO PECHECOPS	754 BIS , Z.R.A Nouakchott, Mauritanie BP 05-	Tel. +222 22350155/222 36301979 promoconsult_pechecops@yahoo.fr
NGO Mauritanie 2000	Presidium Coordinator Nedwa Moctar Nech NGO Mauritanie 2000	ongmauritanie2000@mauritel.mr

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Websites

- Fishery Committee for the Eastern Central Atlantic (CECAF) <http://www.fao.org/fishery/rfb/cecaf/en>
 Global fishing watch, sustainability through transparency <http://globalfishingwatch.org/>
 Database on EU external water fleet <http://www.whofishesfar.org/>



6.4 Supplementary material Marutitania

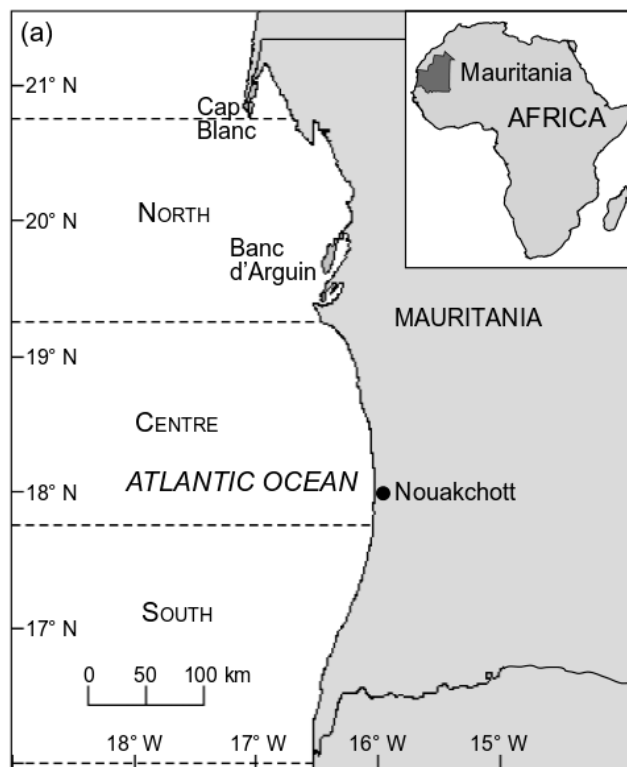


Figure 6.1 Map of Mauritanian waters (FarFish, D2.1)

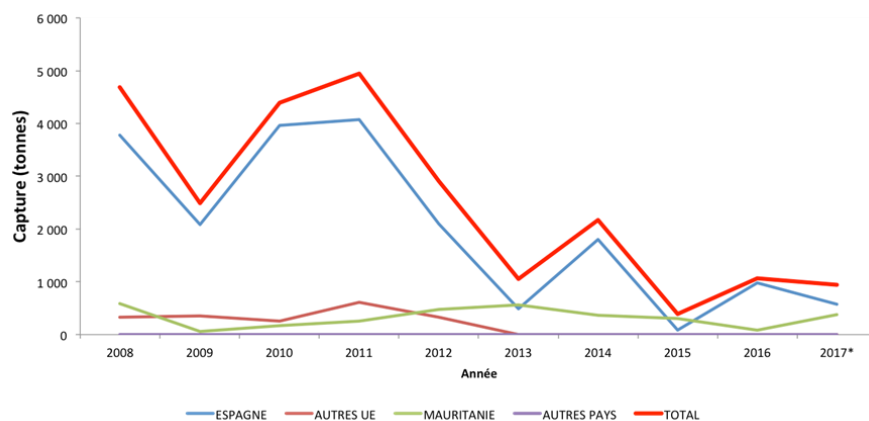


Figure 6.2 Shrimp landings (t, all species) by trawlers 1990-2017 *

Sources: Secretaría General de Pesca (SGP) - Instituto Español de Oceanografía (IEO), for Spanish-flagged vessels, Mauritanian Institute for Oceanographic Research and Fisheries (IMROP) for other vessels; * December 2015 and the first half of 2017 (Bouzouma et al., 2017)

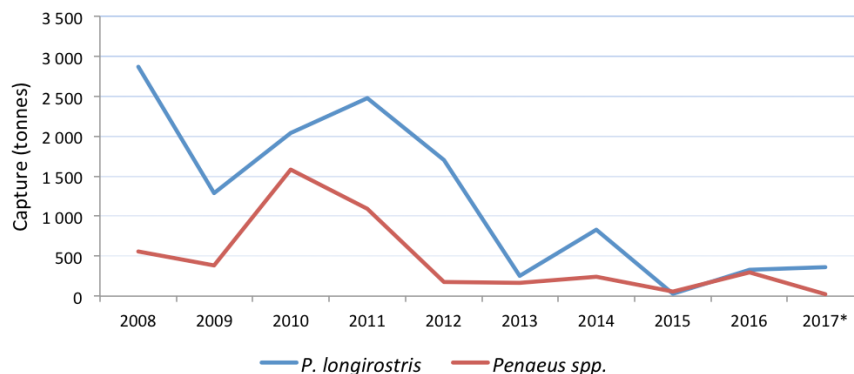


Figure 6.3 Landings (t) of *P. longirostris* (Gamba) and *Penaeus spp.* (Langostino) by the Spanish trawlers 1990-2017 *

Source: Secretary General of Pesca (SGP) -Instituto Español de Oceanografía (IEO); * December 2015 and first half 2017 (Bouzouma et al., 2017)

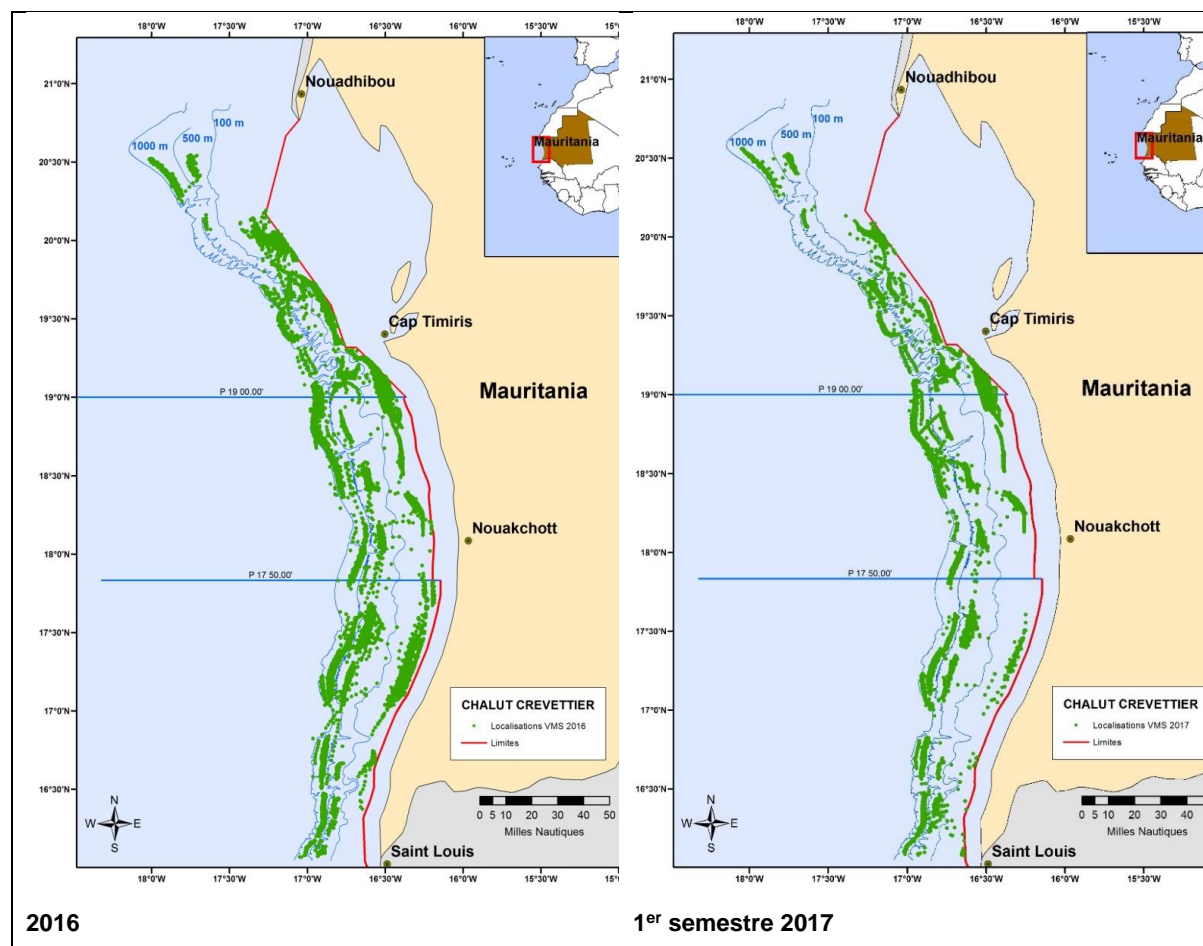


Figure 6.4 Fishing zones for Spanish trawlers targeting shrimp in the Mauritanian fishing zone in 2016 and the first half of 2017. Source: VMS Secretaría General de Pesca (MAGRAMA) data processed by Instituto Español de Oceanografía (IEO) (Bouzouma et al., 2017)

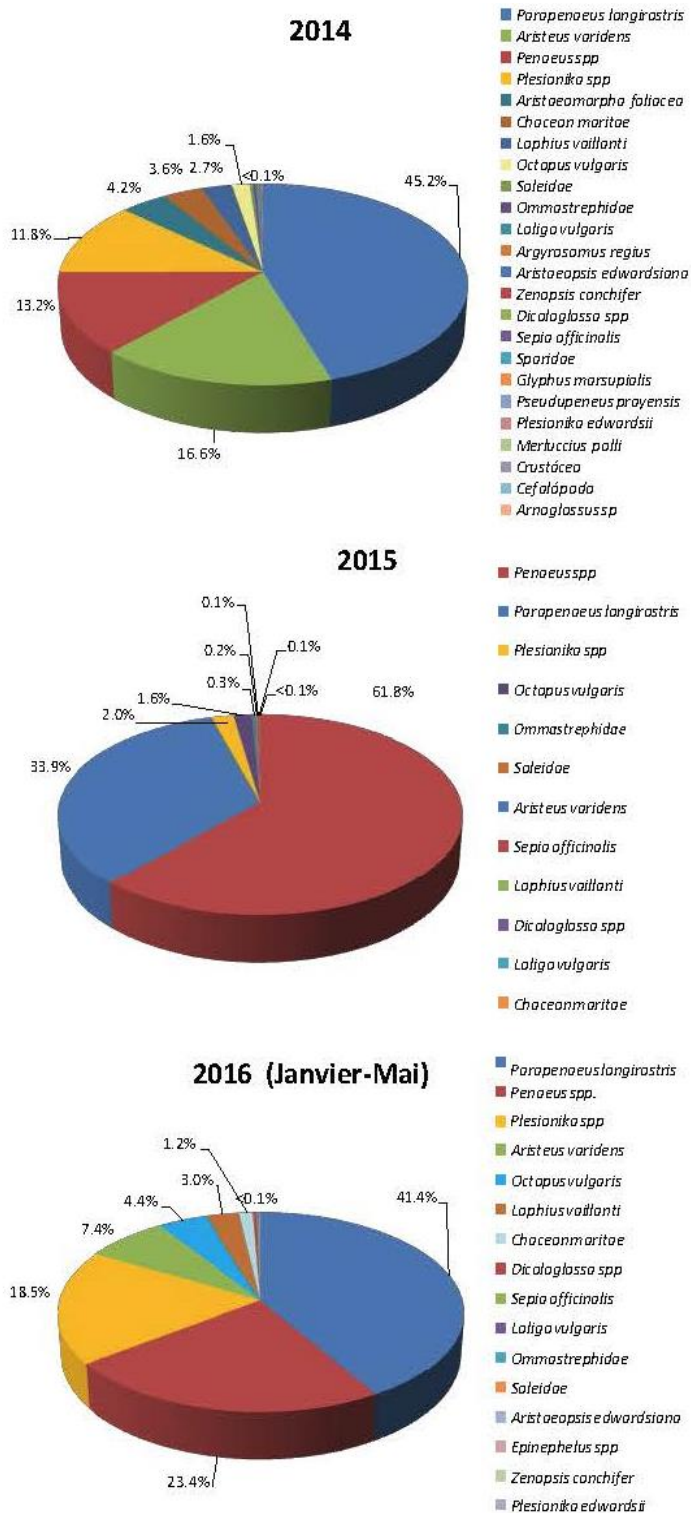


Figure 6.5 Specific composition of landings resulting from the activity of the Spanish -flagged vessels engaged in a trawl craft targeting shrimp in the fishing zone of Mauritania over the years 2014, 2015 and 2016. Source: Instituto Español de Oceanografía (IEO), (Bouzoma et al., 2016)

Table 6.1 Species composition in spanish trawl vessels, based on source data from IEO Figure 6.5 above (Bouzoma et al., 2016)

Common name	Latin	2016	2015	2014
Shrimp	<i>Parapenaeus longirostris</i>	X	X	X
Shrimp	<i>Penaeus spp</i>	X	X	X
Shrimp	<i>Plesionika spp</i>	X	X	X
Shrimp	<i>Aristeus varidens</i>	X	X	X
West African geryon crab	<i>Chaceon maritae</i>	X	X	X
Common octopus	<i>Octopus vulgaris</i>	X	X	X
African anglerfish	<i>Lophius vaillanti</i>	X	X	X
Sole fish	<i>Dicologlossa spp</i>	X	X	X
Common cuttlefish	<i>Sepia officinalis</i>	X	X	X
European squid	<i>Loligo vulgaris</i>	X	X	
Squid family	<i>Ommastrephidae</i>	X	X	
Sole family	<i>Soleidae</i>	X	X	
Scarlet shrimp	<i>Aristaeopsis edwardsiana</i>	X		X
Grouper fish	<i>Epinephelus spp</i>	X		
Silvery John Dory	<i>Zenopsis conchifer</i>	X		X
Soldier striped shrimp	<i>Plesionika edwardsii</i>	X		X
Giant gamba prawn	<i>Aristaeomorpha foliacea</i>			X
Meagre fish	<i>Argyrosomus regius</i>			X
Sea breams	<i>Sparidae</i>			X
Kangaroo shrimp	<i>Glyphus marsupialis</i>			X
West African goatfish (Perch-likes)	<i>Pseudupeneus prayensis</i>			X
Bengula Hake	<i>Merluccius polli</i>			X
Crustaceans	<i>Crustáceo</i>			X
Cephalopods	<i>Cefalópodo</i>			X
Mediterranean scaldfish	<i>Arnoglossus sp</i>			x

7 Case study area Seychelles

7.1 MPO Seychelles

Current state		Reference
<p>This MPO apply (area, stocks, fleet, authority and operators) to EU fishery for Tuna within Seychelles EEZ with exception of restricted or prohibited areas. Target species are tuna (skipjack and yellowfin). Authorities are SFA and DG MARE, while operators are LDAC, ANFACO-CECOPECA and OPAGAC. EU vessels (purse seines and longliners) are from Spain, France and Italy</p>		
Case study leader	Seychelles Fishing Authority (SFA) Contact person: Vincent Lucas, vlucas@sfa.sc	Revised, VL, 9.2.18
Fishery identification		
Species (target, bycatch)	Target: Yellowfin tuna (<i>Thunnus albacares</i>), Bigeye tuna (<i>Thunnus obesus</i>), Skipjack tuna (<i>Katsuwonus pelamis</i>). Bycatch: Bonito (<i>Euthynnus affinis</i>), Dolphin fish (<i>Coryphaena hippurus</i>), Rainbow runner (<i>Elegatis bipinnulata</i>), triggerfish (Balistidae) billfish Istiophoridae), wahoo (<i>Acantocybium solandri</i>)	Faro meeting
Geographical boundaries	Seychelles EEZ (1/3) of tuna catch, outside EEZ 2/3 of catch in West Indian Ocean. List of fishing zones and forbidden zones are given in SFPA agreement Protocol.	Faro meeting, FITI (2016)
EU fisheries (nations, gear, vessels, catch, quota)	Nations; Spain, France, Italy, Portugal Total reference catch (SFPA): 50 000 t/year, Catch within Seychelles EEZ 2016 ; French: 16 004 t yellowfin, 13 541 t skipjack, Spanish: 10 717 t yellowfin, 15 567 t skipjack. EEZ skipjack catches increased in 2016 by 115% Tuna seiners, FADs (ref. catches 700 t): Spain (22, 2015;17 licensed, 2016; 14 licenced)), France (16; 2015;12 licenced, 2016;12 licenced), Italy (2), Total (40), Target mostly skipjack and yellowfin Surface longline (ref catches =< 250 GRT: 90 t) (ref catches >250 GRT: 120 t): Spain (2), France (2), Portugal (2). Target mostly bigeye and yellowfin. The vessels usually take out their license, but does not always use it (depend on tuna distribution). Number of licences taken up every year vary. Currently 29 vessels; 16 Spanish, 12 French. Current number of EU vessels operation in Seychelles EEZ; French: 12 Purse Seine, 1 Supply Vessel, 1 Longliner Spanish: 14 Purse Seine, 11 Supply Vessels Italy: 1 Purse seine	SFPA FarFish D2.1 SFA, VL SFA (2016) EU, SFPA SFA (2015) FarFish D2.1 Whofishesfar.org SFA, VL
Other nations	Purse seiners; South Korea, Seychelles, Japan, Mauritius	SFA, VL

	Longliners: Taiwan (POC), Japan, China, Mauritius	FarFish D2.1 FiTI (2016)
Management		
Authorities	DG MARE, SFA	Faro meeting
Operators	LDAC, ANFACO-CECOPECA, OPAGAC	CETMAR
Stakeholders (5) Supporting institutions (6) Scientists (7) Other industry (8) NGOs	(1) IOTC, contracting Parties and Cooperation Non-Contracting Parties of the IOTC (2) IOTC, SFA, IEO, IRD, IFREMER, AZTI (3) ORTHONGEL, INPESCA, Grupo Albacora S.A., SAPMER, DONGWON INDUSTRIES CO. Ltd., Thai Union (4) WWF, ISSF, FPAOI	SFA, VL CETMAR SFA, VL SFA, VL
SFPA	2014-2020	
Governance	Fisheries Act of 1986, and Regulations of 1987, Maritime Zone Act (1977), Fisheries Improvement Project (FIP) for the Indian Ocean, Seychelles Marine Spatial Plan Initiative, (http://seymsp.com/)	WWF(2016) Huntington (2016) SFA, VL
RFMO	Indian Ocean Tuna Commission (IOTC)	
MP (name, obj, area)	Long term policy objectives of the Government of Seychelles for the fishing industry is promoting sustainable management to ensure the long-term viability of the industry, and maximising employment, revenue from fisheries and foreign exchange earnings. IOTC Management plan for FADS Cooperating with Contracting Parties (Members) and Non-Contracting Parties of the IOTC with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by the organisation's establishing Agreement and encouraging sustainable development of fisheries based on such stocks.	FarFish D2.1 IOTC (2008, 2017d) SFA, VL
CS objectives	1) In conformity with IOTC, which are monitoring the number of FADs in the Indian Ocean, investigate the economic consequences of different FAD-number scenarios as emerging from the ad hoc IOTC working group. 2) Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools 3) Contribution to the assessment of the sustainability of non-target species included in the recent discard ban (17/04) that	Faro Meeting SFA, VL IOTC IOTC (2017f)

	<p>are not currently assessed (e.g. dolphinfish, wahoo, barracuda, rainbow runners)</p> <p>4) Analysis of the economic and social impacts of the discard ban (17/04)</p>	IOTC
Harvesting Control Rules (HCR)	<p>Yellowfin; MSY: 422 000 t,</p> <p>Skipjack; MSY: 684 000 t, Not well determined models, new assessment in 2017 not published yet.</p> <p>Bigeye; MSY: 104 100 t. Quota applicable for yellowfin tuna and HCR have been established for Skipjack.</p> <p>Other Species: Holothurians; Limited entry/ Close season and quota. Spiny Rock Lobster Fishery: Limited entry and close season</p> <p>Industrial fishing vessels (Seychelles and foreign) vessels are prohibited from shallow banks and reefs. 17 MAPs as of 2008.</p> <p>Seychelles Marine Spatial Planning (SMSP) to establish more no-take zones.</p>	<p>IOTC (2017c)</p> <p>SFA, VL</p>
Data collection (fishery; catch and bycatch, employment)	<p>SFA; logbook, VMS data, catch, effort, length frequency, species composition, observer programme (IRD, IEO)</p> <p>Fishery independent surveys by SFA for demersal species</p>	FarFish D2.1
Assessment	<p>Indian Ocean Tuna Commission (IOTC)</p> <p>Yellowfin; Fox-form Bayesian biomass dynamics model, and integrated age-structured models. Yellowfin is overfished in the west Indian Ocean. IOTC has set limits to yellowfin tuna catches, which will make Seychelles quotas drop by 15 %</p> <p>Skipjack; difficult to assess due to rapid population dynamics, maybe continuous spawning, selectivity usually uninformative about year class strength and relative abundance indices derived from pole and line and purse seine fisheries are generally considered to be less reliable than those of longline fisheries. Recent models seem to have used stock synthesis. Skipjack is in relatively good state.</p> <p>Bigeye; Assessed using Stock Synthesis and ASPM software, bigeye is in relatively good state</p> <p>Catch rates of other species are declining, reflecting over-fishing pressure in open-access fisheries</p>	<p>IOTC (2015)</p> <p>IMF (2017)</p> <p>FarFish D2.1</p> <p>IOTC (2015)</p>
Monitoring, Control and Surveillance (MCS)	<p>Seychelles participate in IOTC regional observer scheme to monitor trans-shipments at sea on carrier vessels for the industrial longline fleet. Transshipment only within Seychelles' ports.</p> <p>VMS, ERS, observers appointed by Seychelles authorities.</p>	<p>SFA, VL</p> <p>SFPA, sec.4</p> <p>SFA, VL</p>

	<p>Fisheries Monitoring Centre (FMC), makes annual vessel compliance, check logbooks, receives obligatory VMS data and conducts sea patrols, catch certificate scheme (ensuring no IUU fishing activity)</p> <p>Regional Fisheries Surveillance Project (RFSP) and IOC SmartFish (programme managed by the Indian Ocean Commission, funded by the European Union and co-implemented by the Food and Agriculture Organization of the United Nations).</p> <p>Seychelles National Scientific Observer Programme; deployment of observers on-board industrial purse seiners. EMS pilot project to complement human observers.</p>	<p>Fisheries Act 2014.</p> <p>FarFish D2.1 IOTC (2015) SFA, VL</p>
Preliminary Value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018).		NOFIMA
Port	<p>Designated port for landing activities is Victoria, Mahé, all EU vessels shall endeavour to procure in Seychelles all supplies and services required for their operations.</p> <p>EU vessels land the majority of catches in Seychelles (92% of Spanish catch, 82% of French catch)</p>	<p>EU, SFPA, sec.3, chpt VI, FarFish DoA,p18</p>
Processing	<p>Indian Ocean Tuna (IOT), a branch of Union Thai /Seychelles Government (60/40), has a canning factory employing half the fishery sector in the Seychelles (approx. 2,500, 60 % foreign workers). IOT is responsible for 95 % of Seychelles manufacturing export, and 45 % of imports, producing 1.6 million cans daily from 340 tons of tuna (world's second largest tuna canning factory). Most tuna landings are transhipped, fresh or frozen, elsewhere (64 % in 2013) (www.sib.gov.sc/index.php/sectors/fisheries)</p>	<p>Farfish D2.1 (p. 44-45). NOFIMA</p>
Marked	Canned tuna enters the global market, while the whereabouts of transhipped tuna are unknown, but probably with Europe as primary market.	NOFIMA
Challenges		
Data collection	Landing reports. Many longliners do not land domestically and that makes it difficult to obtain good logbook coverage, transshipments/landings as well as size frequency data. However, information on landings in foreign ports is received.	FarFish D2.1
Assessment	Lack of assessment of the sustainability of non-target species (e.g. dolphinfish, wahoo, barracuda, rainbow runners)	IOCT
Management	Effort regulation of DFADs. There is a very large number of DFADs in the Indian Ocean and with FAD free tuna campaign in market countries; this may affect trade of tuna from the Indian Ocean.	Faro Meeting

	Understand the social and economic consequences under scenarios including a reduction in the number of FADs.	
Management	There is a need to improve compliance with Conservation and Management Measures (CMM).	SFA, VL
MCS	<ul style="list-style-type: none"> a) Regionally coordinated observer programme is required b) Promote regional cooperation to combat IUU c) Control at sea largely restricted to national fleet d) Lacking of manpower and equipment for surveillance 	FarFish D2.1
Potential improvements	Using new tools	
Assessment	Contribute to the assessment of non-target species included in recent discard ban (IOTC, 17/04)	
Management, monitoring	<ul style="list-style-type: none"> a) Increase compliance by observer training and port state inspections b) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools 	FarFish D2.1 CISC
Management, tools, model scenarios	The case study is enclosed in IOTC, which is responsible for stock assessment of tuna and tuna like species in the Indian Ocean and has a number of tools. IOTC ad hoc working group on FADs is addressing number of FADs. As IOTC is a part of FarFish RG, the communication will ensure that FarFish contributes in a relevant matter eg. Visualisation, model scenarios. The dialogue is in progress.	IOTC (2008, 2015, 2015, 2017a, 2017b, 2017c)

7.2 Contact information Stakeholders Seychelles

Authorities	Website/Address /Contact person	Phone, Email address
DG MARE	Contact person: Mr Alan Gray Fisheries attachés: Mr Hervé DELSOL (based in Mauritius)	Tel: 0032 229 90077 alan.gray@ec.europa.eu Tel. +230 02071525-143 herve.delsol@eeas.europa.eu
SFA	Seychelles Fishing Authority www.sfa.sc Contact person: Vincent Lucas	FarFish Partner (15) vlucas@sfa.sc
Operators		
LDAC	Long Distance Fleet Advisory Council, EC http://ldac.eu/aboutus Contact person: Alex Rodriguez	FarFish Partner (5) alexandre.rodriguez@ldac.eu

ANFACO-CECOPECA	National Association of Fish and Seafood Canning Manufactures, Spain www.anfaco.es Contact person: Gonzalo Ojea	FarFish Partner (17) ojea@anfaco.es
OPAGAC	Organisation of Associated Producers of Large Tuna Freezer Vessels, Spain Contact person: Julio Morón	julio.moron@opagac.org
Supporting institutions		
IOTC	Indian Ocean Tuna Commission Conservation of Atlantic Tunas www.iccat.int Contact person: Paul de Bruyn CC: Driss Meski	FarFish RG paul.debruyne@iccat.int driss.meski@iccat.int
Scientists		
ICCAT	International Commission for the Conservation of Atlantic Tunas www.iccat.int Contact person: Paul de Bruyn CC: Driss Meski	FarFish RG paul.debruyne@iccat.int driss.meski@iccat.int
IOTC	See above	See above
Other industry		
INPESCA	Contact through ANFACO-CECOPECA	
SAMPER	Contact person: Anthony Signour	assignour@sapmer.com
Grupo Albacora S.A	Contact through ANFACO-CECOPECA	
Dongwon Industries, CO. Ltd	Contact person: Hugo Yoo	gagame2@dongwon.com
ORTHONGEL	Organisation of producers of frozen and deep-frozen tropical tuna, France Contact person: Michel Goujon	mgoujon@orthongel.fr
Thai Union	Contact person: Lazazzara, Tony	Tony.Lazazzara@thaiunion.com
NGOs		
ISFF	International seafood sustainability foundation https://iss-foundation.org/ Contact person: Holly Koehler (Vice President for Policy and Outreach)	Tel: 00202 746 1438 hkoehler@iss-foundation.org
WWF	Worldwide fund for nature https://www.wwf.org.uk/	

	Suggested contact person: Castiano Manuel	mcastiano@wwf.org.mz
SIOTI	The Sustainable Indian Ocean Tuna Initiative (Fisheries Improvement Project (FIP)) Contact person: Jan Robinson	janrobinson71@gmail.com

7.3 Relevant literature and websites, Seychelles

FarFish (2017). Deliverable No 2.1: Case study characterisation 1.0.

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<http://seymsp.com/>

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7.4 Supplementary material Seychelles

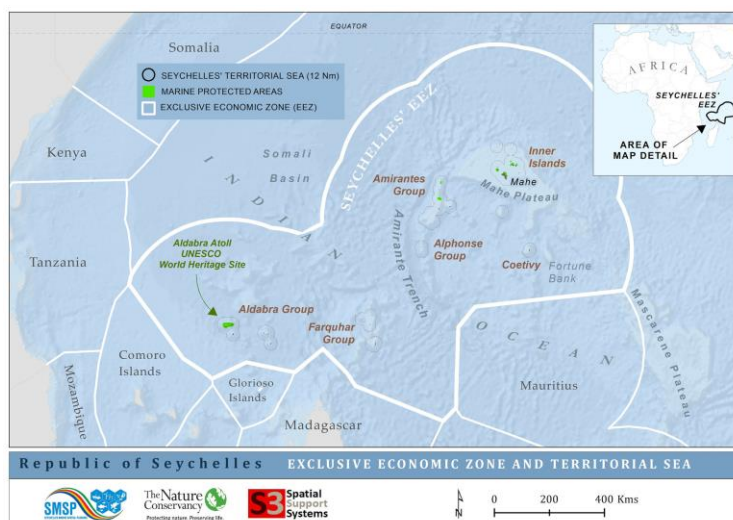


Figure 7.1 Republic of Seychelles Exclusive economic zone and territorial Sea (SMSP, 2015)

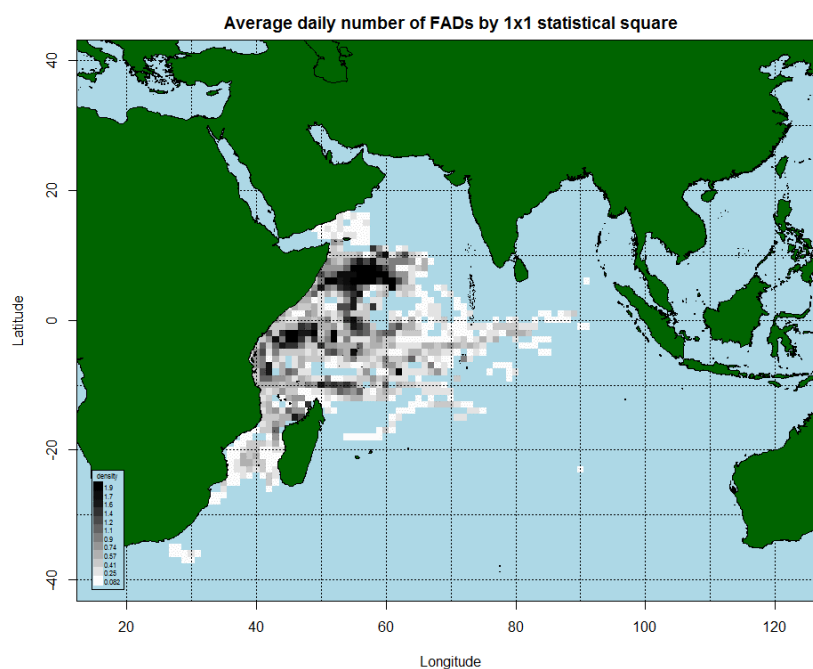


Figure 7.2 Average daily density of FADs used by one vessel of the Spanish and associated fleet in the Indian Ocean in January 2017, by 1x1° statistical square (IOTC 2017)

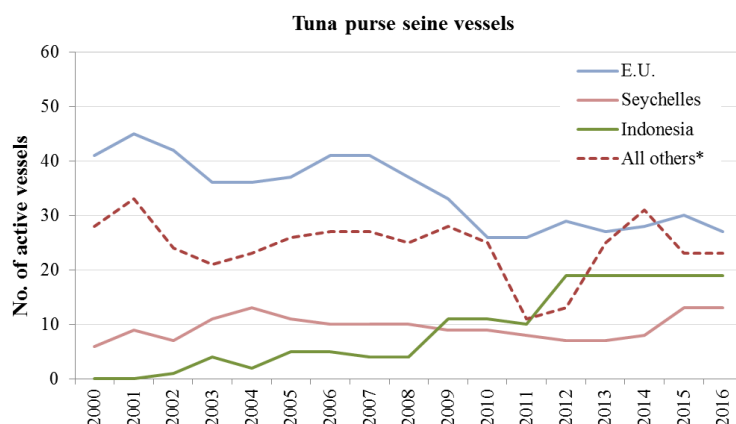


Figure 7.3 Number of active vessels in the Indian Ocean 2000-2016 for tuna purse seine (PS) Note: all other purse seine fleets includes I.R. Iran, Japan, Rep.of Korea, Mauritius, Malaysia and Thailand (with the exception of Australia whose purse seine fleet fishes exclusively for southern Bluefin tuna) (IOTC, 2017 c)

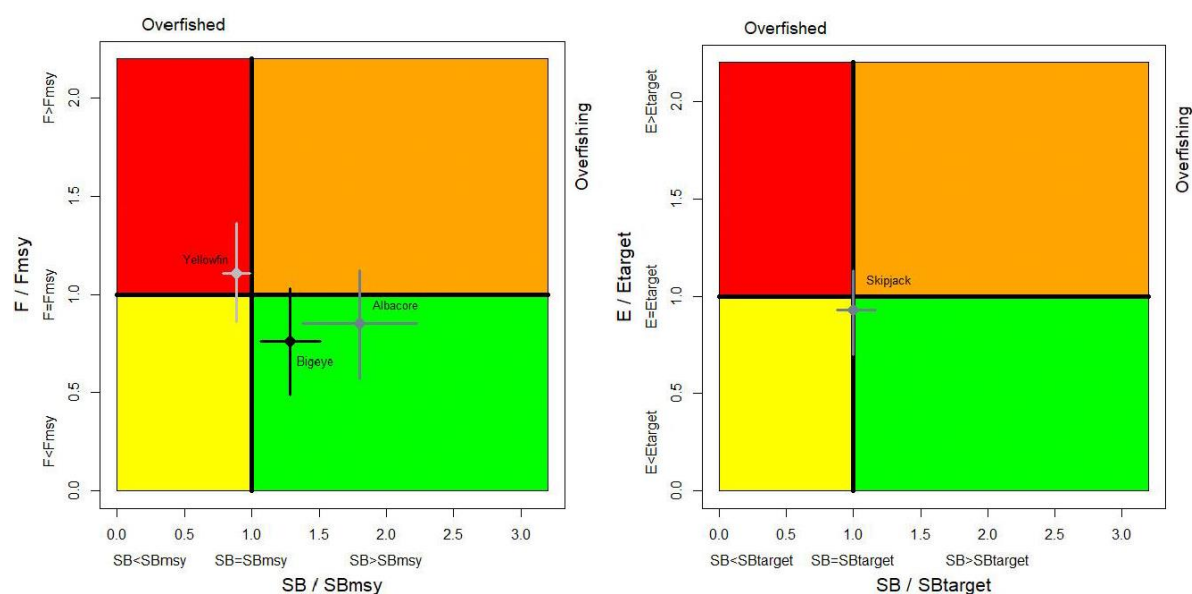


Figure 7.4 (Left) Combined Kobe plot for bigeye tuna (black: 2015), yellowfin tuna (grey: 2015), and albacore tuna (dark grey: 2014) showing the estimates of current spawning stock size (SB) and current fishing mortality (F) in relation to SBtarget and Ftarget. (Right) Kobe plot for Skipjack tuna (2016) showing the estimates of the current spawning stock status (SB) and exploitation rate in relation to SBtarget and Etarget. Numbers in brackets indicate the last year of data available at the time of the assessment. Cross bars illustrate the range of uncertainty from the model runs with 80% CI (IOTC, 2017c)

8 Brief summary of objectives, challenges and potential improvements for all case studies

The current status of fishery, management, challenges, objectives and potential improvements are tailor made for the specific case study areas based on the present available information from case study leaders, FarFish partners, RFMO reports and relevant literature available. The suggested case study specific objectives (Table 8.1), identified challenges (Table 8.2) and potential improvements (Table 8.3) based the currently available information are summarized and compiled to ease comparison between the CS.

Table 8.1 FarFish Case study objectives from MPOs

South West Atlantic
<ol style="list-style-type: none"> 1) To initiate dialogue between stakeholders involved in fishery in FAO area 41 2) Improve the quality and quantity of data collection 3) Compile knowledge of the straddling stocks from the different scientific institutions 4) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools
South East Atlantic
<ol style="list-style-type: none"> 1) Improve data quality and quantity 2) Work to advance biological knowledge, and improve monitoring in the SEAFO area 3) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools
Cape Verde
<ol style="list-style-type: none"> 1) In conformity with ICCAT, collect and analyse data on bycatch of swordfish and blue shark by the EU fleet in the Cape Verde EEZ if the data, if the data is available. If sufficient data is accessible, model scenarios, which may add value to development harvest control rules for these bycatch species. 2) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools
Senegal
<ol style="list-style-type: none"> 1) Develop sustainable MP of the two hake species. Stock discrimination, specify F, SSB improving HCR and traditional stock assessment for hake. Improve species-specific knowledge, need access to data, maybe from National management institution. 2) Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools 3) Observers on EU vessels, improve bycatch registration, self -sampling protocols, improve monitoring of catch, effort and sizes for hake as target and bycatch species
Mauritania
<ol style="list-style-type: none"> 1) Reduce bycatch in shrimp fishery, as several bycatch species are overexploited. Improve technology, increase number of scientific observers on board the shrimp vessels. Scientific observer should collect data and the value in the bycatch. Specification of bycatch species in ships logbook data. 2) Advance knowledge on shrimp landing fluctuations in the context of environmental forcing. Assess vulnerabilities originated from the combined action of human exploitation and adverse oceanographic conditions. Analyse alternatives to minimize risks.

Seychelles	
1)	In conformity with IOTC, which are monitoring the number of FADs in the Indian Ocean. Investigate the economic consequences of different FAD-number scenarios as emerging from the ad hoc IOTC working group.
2)	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools
3.	Contribution to the assessment of the sustainability of non-target species included in the recent discard ban (17/04) that are not currently assessed (e.g. dolphinfish, wahoo, barracuda, rainbow runners)
4.	Analysis of the economic and social impacts of the discard ban (17/04)

Table 8.2 FarFish Case study challenges

Southwest Atlantic	
Data poor situation	Lack of knowledge on IUU as well as catch statistics on target and bycatch species (including bycatch species of non-commercial interest)
Management, lack of RFMO	Regulatory measures are not universally applied. Fishers from countries who enforce the measures find the measures ineffective and discriminatory since they are contrary to their own economic interests.
MCS	Restrictions due to existing trawling footprint or identified VMEs area not accepted by non-EU fishing fleets, mainly Asian countries (China, Taiwan and South Korea)
MCS	If fishery activities expand into deeper water, there is an increased risk of interaction with VMEs
MCS	There is a need for increased monitoring and control in this area
Southeast Atlantic	
Data poor situation,	TAC usually not based on sufficient data.
Management	Maintain international framework for future work and protection Although fishing effort in the CS is currently low, FarFish will focus the work to advance biological knowledge, and improve monitoring, compliance and enforcement in the SEAFO area.
Management, performance of SEAFO	Strengthening the RFMOs performance in terms of scientific knowledge, monitoring and enforcement. The priorities of FarFish will reflect the priorities of SEAFO
Cape Verde	
Fishery, bycatch	In the agreement established between EU and Cape Verde, the sharks, swordfish and turtles must be considered as by catches. However, it is noted that the quantity of sharks caught is bigger than tuna some years. This issue must be well clarified or discussed in the next agreement to be established
Management	Competition with national fleet. The implementation of PGRM is in progress as DNME has updated the plan.

	Fisheries legislation is in an updating process
MCS	Insufficient control and monitoring Noncompliance of PGRP by foreign vessels
Senegal	
Data collection	The two species of hake and there is data limitation to discriminate the stocks, poorly known biology in Senegaleze EEZ. Stocks are not separated in catch statistics, of even in scientific fishing statistics (especially in Senegalese data)
Assessment	Need to improve assessment models as the species are currently assessed as one single stock. A recent study imply that these black hakes attain the fastest growth ever given for any hake species, following age at maturity at the end of first year for <i>M.Senegalensis</i> and during the second year for <i>M.polli</i> .
Fishery, stock discrimination	The species have overlapping distribution and are mixed in catches and are commonly marketed as Merluccius and evaluated as a single stock. Lack of knowledge on the two species of hake, bycatch registrations need to be species specific
Management, sustainability	SFPA is set to 2000 t, but the MSY is set to 1657. Overexploitation of particularly demersal species, but increasingly also coastal pelagic stocks
MCS	There is a need to increase controls of fishing vessels (observers and inspections)
Other concerns	Coastal erosion, climate change, pollution, ecosystems degradation
Mauritania	
Fishery	Bycatch in shrimp fishery
MCS	Problems with access for IMROP inspectors/observers on board EU vessels
Other concerns	Environmental forcing. The fluctuations in landings are associated with climatic/oceanographic fluctuations and affects the profitability of the fleet
Seychelles	
Data collection	Landing reports. Many longliners do not land domestically and that makes it difficult to obtain good logbook coverage, trans-shipments/landings as well as size frequency data. However, information on landings in foreign ports is received. Lack of bycatch statistics from non-EU fleet.
Assessment	Lack of assessment of the sustainability of non-target species (e.g. dolphinfish, wahoo, barracuda, rainbow runners)
Management	Effort regulation of DFADs. There is a very large number of DFADs in the Indian Ocean and with FAD free tuna campaign in market countries; this may affect trade of tuna from the Indian Ocean. Understand the social and economic consequences under scenarios including a reduction in the number of FADs.

Management	There is a need to improve compliance with Conservation and Management Measures (CMM)
MCS	<ul style="list-style-type: none"> a) Regionally coordinated observer programme is required b) Promote regional cooperation to combat IUU c) Control at sea largely restricted to national fleet d) Lack of manpower and equipment for surveillance

Table 8.3 FarFish Potential improvements

Southwest Atlantic	
Data collection	Due to the limitations of information on catch statistics from non-Eu nations, this issue is still under consideration.
Management	Internal communication with FarFish partners will ensure that the FarFish contribution (models and/or tools) will be relevant and add value management of the high seas fisheries in the area.
Monitoring	Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools
Southeast Atlantic	
Data collection	Improve quality of logbook data and its submission Exploring the feasibility for a self-sampling programme
Assessment	Analyse current stock assessment methods Improvements using new or existing tools is dependent on the defined CS objectives and OT, making sure that the FarFish contribution is relevant also by consulting SEAFO (FarFish RG)
Monitoring	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools
Cape Verde	
Data collection	The case study is enclosed in ICCAT (FarFish RG), which is responsible for stock assessment of tuna and tuna like species and has a number of tools. As ICCAT is a part of FarFish RG, internal communication with FarFish partners will ensure that FarFish contributes in a relevant matter eg. Visualisation
Management	Contribute to the application of RBM principles and the RFMS framework to Cape Verde tuna fishery
Monitoring	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools
Capacity building	Improve capacity building by development, implementation of biological sampling and data collection programmes
Senegal	
Data collection	Contribute to improved stock assessment by data collection and analysis
Assessment	Improve stock assessment models and tools, developing networks, working groups and knowledge transfer. FarFish aim to add value to present work in CECAF (FarFish RG) applying new models and tools.

Monitoring	Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools
Mauritania	
Assessment, Early warning of risks	Advanced knowledge on how the signal of oceanographic processes affects the shrimps stocks and the shrimp fishery will improve assessment and dampen the fluctuations in landings. Given the present capacity of the scientific community to foresee the impact of large-scale climatic oscillations, this might help to rise early warnings and preventive measures to protect the stock and improve long-term profitability of the EU fleet targeting shrimp
Seychelles	
Assessment	Contribute to the assessment of non-target species included in recent discard ban (IOTC, 17/04)
Compliance, monitoring	<ul style="list-style-type: none"> a) Increase compliance by observer training and port state inspections b) Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools
Management, tools, model scenarios	The case study is enclosed in IOTC (FarFish RG), which is responsible for stock assessment of tuna and tuna like species in the Indian Ocean and has a number of tools. IOTC ad hoc working group on FADs is addressing number of FADs. As IOTC is a part of FarFish RG, the communication will ensure that FarFish contributes in a relevant matter eg. Visualisation, model scenarios. The dialogue is in progress