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[1] Document will be a draft until it was approved by the coordinator
[2] PU: Public, PP: Restricted to other programme participants (including the Commission Services), RE: Restricted to a group specified by the consortium (including the Commission Services), CO: Confidential, only for members of the consortium (including the Commission Services)
[3] The initials of the revising individual in capital letters

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Deliverable D3.2

First MR invitations submitted to case studies

24/03/2019

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Executive Summary

This document contains the 1st management recommendation (MR) invitations submitted to the case studies in the FarFish project. The purpose of these MR invitations is to offer selected operators (resource users) the opportunity to develop MRs in accordance with the responsive fisheries management system (RFMS) approach; following the "first draft general guidelines for making MRs" presented in FarFish deliverable 3.1. The RFMS is a management approach founded on the principles of results-based management (RBM). According to RFMS, the responsibility for fisheries management is partly transferred to the resource users, provided that they meet with necessary requirements set forth by the competent authorities and provide documentation confirming implementation and achievement of specified management objectives. The advantages of such an approach include facilitation of more bottom-up style of management where the actual resource users and other stakeholders are involved, which is likely to increase the sense of ownership of the resource users in the management. Other advantages are for example increased transparency, as well as reduced costs and increased coverage of monitoring, control and surveillance.

The MR invitations presented here are for each of the six FarFish case studies, i.e. the EU fleets operating in SW-Atlantic high-seas mixed demersal fishery, the SE-Atlantic high-seas mixed demersal fishery, Cabo Verde SFPA fishery, Senegalese SFPA fishery, Mauritanian SFPA fishery and the Seychelles SFPA fishery. The MR invitations follow up on a pre-invitation dialogues where the basics of the RFMS approach have been introduced. The MR invitations include a short description of what is to be the main focus of the MRs, identification of the main actors and their roles and responsibilities in the process, details on the current status of the fishery and finally the identification of so-called Outcome Targets (OTs) that are specific and measurable performance goals that the MRs are to meet.

It should be taken into consideration that this initial MR invitation is a preliminary version that will be developed further within the FarFish project. The OTs are for example likely to be developed further during the course of the project. It does also have to be considered that the EU fleet is only a subset of the resource users in the case studies, which is likely to have effect on the MRs in respect to impact, coverage and issues concerning "level playing field".

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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
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
CGPOP	General Coordination of Fisheries Planning and Management, Brazil
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

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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	Harvest Control Rule
HSBG	High Seas Bottom Gear
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IEO	Instituto Español De Oceanografia
IFREMER	French Research Institute for Exploitation of the Sea
IMR	Norwegian 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, France
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
LPS	The Sectoral Policy Letter, reference framework of the MPEM
MCS	Monitoring, Control and Surveillance
MFMP	National Fisheries Management Plan, Mauritania
MFMR	Ministry of Fisheries and Marine Resources, Namibia
MPEM	Department of Fisheries and Maritime Economy, Mauritania

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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 an d 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
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 Garantía 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< Fmsy
Authority	Organizational entity enacting authority in pursuit of the management objectives decided for a fishery e.g. a coastal state or the European Commission.

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Operator	Organizational unit with delegated authority to develop management plans and oversee or conduct fishing operations within the standards decided by a management authority

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1 Introduction

This document contains the 1st management recommendation (MR) invitations submitted to the case studies in the FarFish project. The purpose of these MR invitations is to offer selected operators (resource users) the opportunity to develop MRs in accordance with the responsive fisheries management system (RFMS) approach; following the "first draft general guidelines for making MRs" presented in FarFish deliverable 3.1 (FarFish, D3.1). The RFMS is a management approach founded on the principles of results-based management (RBM). According to RFMS, the responsibility for fisheries management is partly transferred to the resource users, provided that they meet with necessary requirements set forth by the competent authorities and provide documentation confirming implementation and achievement of specified management objectives.

The MR invitations presented in this document are set up according to the guidelines drafted in deliverable 3.1. According to those, the introduction is to include a number of items, including:

1. Description of the main focus and purpose of the MR;
2. Description of the fishery in question;
3. Details on the authorities that will be leading the process and the operators qualified to respond;
4. Details on the expected time frame for the MR planning period;
5. Identified incentives for participating operators;
6. Rights and duties of both operators and authorities participating in the RFMS process.

Items 2 and 3 are presented in the Management Plan Zero (MP0) (FarFish D4.1), which were produced for each case study (CS) and published in deliverable 4.1, and are included in each MR invitation. The MR invitations presented in this document follow up on "pre-invitation dialogues" that have already taken place to create mutual understanding of the RFMS process ahead. This dialogue includes discussion on main potential costs and benefits for both parties, main obstacles, as well as the roles and responsibilities of both parties participating in the process. The finalised MR invitations will be presented to the relevant operator(s). They lay down specific requirements expected on their behalf in the event of entering the process of developing their own MRs.

The three main players of the RFMS process

a) The *authorities* that establish OTs and approve / reject / revise the MRs.
b) The *operators*, who in cooperation with RTDs and other stakeholders, develop MRs based on OTs set by the authorities.
c) The *auditors*, who evaluate the MRs and audit their performance.

Structure of this document

This document contains MR invitations for each of the six FarFish case studies, i.e. the EU fleets operating in SW-Atlantic high-seas mixed demersal fishery, the SE-Atlantic high-seas mixed demersal fishery, Cabo Verde SFPA fishery, Senegalese SFPA fishery, Mauritanian SFPA fishery and the

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Seychelles SFPA fishery. The MR invitations presented for each case study includes three main sections: a) Introduction, b) the MP0s, and c) identification of suggested Outcome Targets (OTs), which are specific and measurable requirements, suggested by the authorities[4] leading the RFMs process, in order to reflect overall policy objectives in terms of biology, environment, economics and society.

Outcome Targets

OTs are specific and measurable requirements that are set by authorities in the MR invitation, to reflect policy objectives in the given management context and are either *obligatory* or *recommended*. An OT is a statement of the condition of an indicator relative to a reference point, often in the form of an inequality ('A>B') or a statement of presence/absence of some entity (e.g. 'a catch reporting system is present'). On the basis of relevant information, this statement can be assessed to be either true or false at a given point of time. OTs referred to as *obligatory* are seen as particularly important to reach the main objectives of the MR, while those referred to as *recommended* are not seen as vital for the MR progress, but are still likely to offer valuable input into the MR objective(s). It should be noted here, that the whether an OT is referred to as obligatory or recommended in this document, could be subject to change as the FarFish project progresses, i.e. in "Second MR invitation submitted to case studies" (D3.5) and "MR2 for each CS" (D4.4).

RFMS requires that operators develop MRs that demonstrate how obligatory OTs, set forward by authorities in the MR invitations, will be met. These OTs, as well as their level of priority, should be clearly laid out in the MR invitation. During the process of identifying the appropriate OTs for FarFish case studies, it has however become apparent the operators cannot be made solely responsible for a number of the most relevant OTs, meaning that the authorities will need to take on part of the responsibility to ensure successful implementation.

For further information on the structure and requirements of an OT, please visit "Draft 1 General Guidelines for making MPs", presented in FarFish deliverable 3.1.

[4] In the FarFish project, Work Package 3 has the role of "authorities" within the RFMS process, although relevant authorities will be consulted to the extent possible during the process.

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2 Case Study: South West Atlantic

2.1 Introduction

Main focus of MR

This document serves as a formal Management Recommendation (MR) invitation to the following European operators conducting mixed fisheries in FAO Area 41 in the South West Atlantic: LDAC and ARVI. The fishery is conducted in FAO major fishing area 41, mainly sub-areas 41.3.1 and 41.3.2, at the part of Patagonian shelf and slope (<300 m) that extends beyond the Argentinian EEZ and the Falkland Islands Outer Conservation Zone (FOCZ).

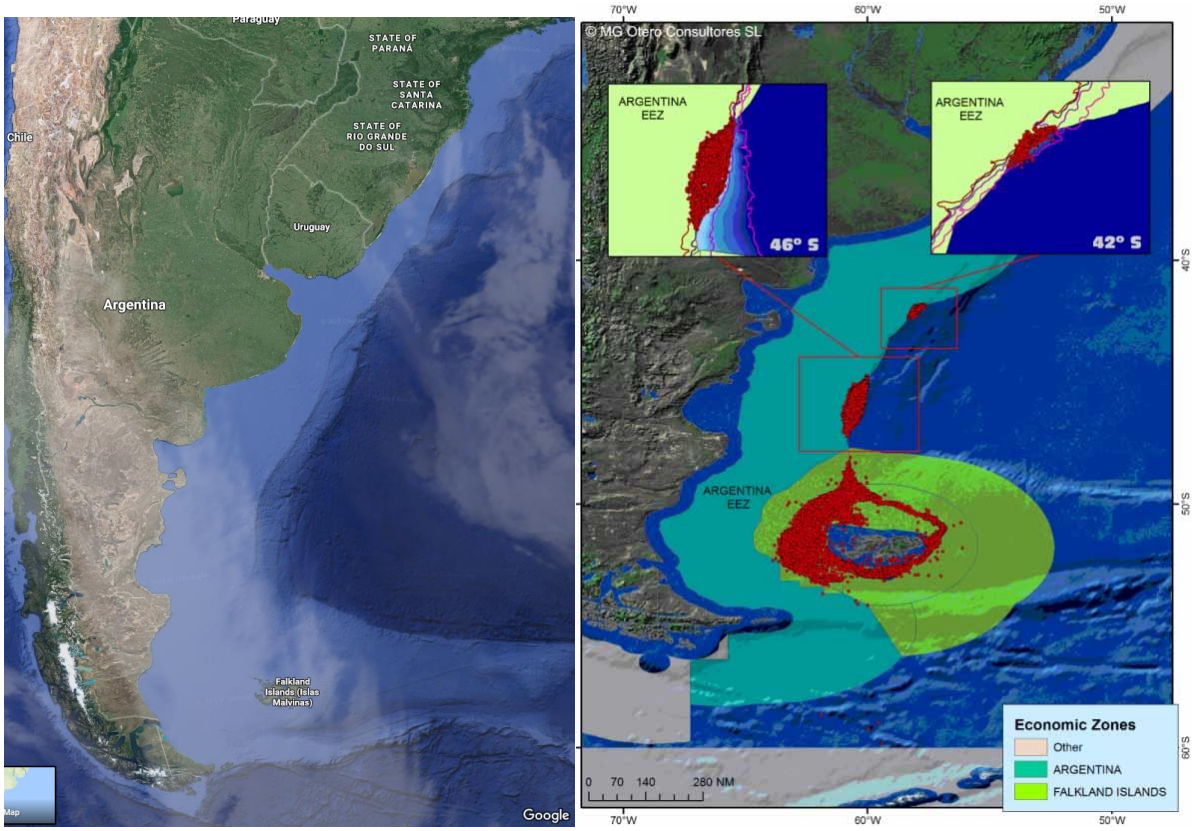

Figure 1:The fishery within the case study is mostly concentrated on international waters just outside the Argentinian EEZ and around Falklands islands (EC, 2008).

The EU fleet operating in this area primarily targets Argentine Hake (*Merluccius hubbsi*), Australian hake (*Merluccius australis*), Argentine shortfin squid (*Illex argentinus*), southern blue whiting (*Micromesistius australis*), with current catches in the South West Atlantic amounting to 2.6% of the EU fleets total catches (Eurostat).

Main characteristics of the fishery

The majority of the species caught in this fishery (with the exception of toothfish and grenadier) are not considered 'deep-sea' species (i.e. long-lived species, with low reproduction rate). Fishing effort declined dramatically after 1992 when Argentina expanded its EEZ several nautical miles eastwards, with the subsequent reduction of the area available for fishing. Thus, the main fishery area for this

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fleet is located between 44º and 48º S, where the majority of fishing effort (99.85%), registered by scientific observers between 1989 and 2004, was made in waters of less than 300 meters depth. The fleet is still fishing in the same area and at depths as in the 1990s and targeting the same species, with the exception of rock cod (*Patagonotothen* spp.), a species previously discarded at sea but has seen an increase in profitability[5].

The authority

In the absence of a Regional Fisheries Management Organisation (RFMO) in South Western international waters, there is no competent fisheries management authority in this area to take the lead in the RFMS process. In its absence, FarFish Work Package 3 representatives will act as the leading authority, whilst considering input from relevant authorities, e.g. FAO, DG MARE, CGPOP, CAFS and SEAFO. The main contact person in this process is Jónas R. Viðarsson[6], as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

The operators qualified to respond to the MR invitation are LDAC and ARVI, represented by Alexandre Rodriguez[7], the Executive Secretary of LDAC. The FarFish project fully recognises that the EU operators in this area are already meeting stricter requirements and regulations than other international fleets operating in the area. However, by developing a MR for the fishery, the EU operators will set a standard for other fleets to follow; a process that will be further promoted by the FarFish project, e.g. by facilitating a common meeting platform for key international fleets operating in the area. Therefore, one of the main incentives for the EU operators to take part in the RFMS process is the possibility to initiate a dialog with other international operators, such as the Chinese fleet (represented by CAFS), in order to create a more level playing field of high seas fisheries in the South West Atlantic international waters.

Roles and responsibilities of authorities and operators

The roles and responsibilities for authorities and operators are difficult to establish in this case study, given the fact that it is high-seas area with no RFMO or other type of legal supervising authority. The roles and responsibilities will therefore have to be established on a theoretical level. An initial set of suggested OTs are presented in this MR invitation document and the operators, represented by LDAC and aided by FarFish WP4, will develop an MR draft in order to demonstrate how they intend to meet these OTs (or a revised version of them). This MR draft is then to be presented back to the "authorities" (FarFish WP3), for further discussion and approval.

Time frame

An approved MR should be available by 31 January 2019 the latest.

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[5] EC. (2008). European Commission studies and pilot projects for carrying out the common fisheries policy No FISH/2006/17 - Lot 2. Analysis of the economic and social importance of community fishing fleet using bottom gears in the high-seas. Brussels: EC.

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2.2 MP0

Current state		Reference
This MP0 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.		
Case study leader	University of Sao Paulo (USP), Brazil Contact person: Juliana Galvão, jugalvao@usp.br	Revised JG 31.1.18
Fishery identification		
Species (target, bycatch)	Main target **Argentine Hake** (*Merluccius hubbsi*), **Australian hake** (*Merluccius australis*), **Argentine shorfin squid** (*Illex argentinus*), **southern blue whiting** (*Micromesistius australis*), Longtailed souther cod (*Patagonotothen ramsayi*), wahoo (*Acanthocybioum solandri*), blue shark (*Prionace glauca*). Bycatch **Patagonian grenadier** (*Macruronus magellanicus*), Patagonian toothfish (*Dissostichus eleginoides*), Rays mantas nei (*Raijiformes*), Stingrays (*Dasyatis spp.*), Longtail southern cod (*Patagonotothen ramsayi*), Forkbeard (*Phycis phycis*).	(EC, 2007a) (EC, 2007b) www.eurostat.eu FAO Fishery Facts Sheet
Geographical boundaries	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.	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)
EU fisheries (nations, gear, vessels, catch, quota)	EU Nations; Spain (200,000t catch in 2014, 19 vessels), Portugal (squid, argentine hake, Patagonian toothfish, Patagonian grenadier (no catch since 2005), Poland (squid, Patagonian grenadier) (no catch since 2002). Catches increased considerably in the period from 2008 to 2013 and bycatch in trawl fisheries is frequent.	FarFish DoA,
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

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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 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 (*Merluccius hubbsi*, *Merluccius australis, Illex argentines and Micromesistius australis*) from Patagonian shelf that FarFish can relate to.	
Case study 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
Harvest control rules	11 areas are 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 footprint. EU fleet restrictions apply for EU fleet, but not adopted by other foreign fleets or Argentina. There are some bycatch regulations from the Brazilian government that apply both within EEZ and in international waters for the Brazilian fleet.	Portela et al., (2012) USP, JG Brazil (2011)
Data collection (fishery, catch and bycatch, employment)	There is very scarce data collection within the area, due to the absence of RFMO or other authority. Main EU fishery nations are Spain, Portugal and France. EU fleet reports reliable catch data, but this is not sufficient to do scientific advice or reliable stock assessment. Hake, squid and southern blue cod are shared stocks with Argentina, Falkland island and high seas. INIDEP (Argentina) collect data within its EEZ and a joint commission of Argentina/Uruguay (CTMFM). Falkland Island collect data within their EEZ by FIG from FICZ and FOCZ. Both FIG and INIDEP conduct research surveys. China, Taiwan and Korea are fishing in the area, but catch statistics from them are lacking.	FarFish D2.1 FIG (2017), FarFish DoA

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	As there are Chinese representatives (CAFS and SHOU) in the FarFish RG, the hope is that the project can contribute to some progress on this issue.	
Assessment	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.	FIG (2017) Chang et al., (2016)
MCS	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) EU vessels are not allowed to fish in unassessed areas and Spain has adopted to a comprehensive set of measures and standards which are binding for the fishing company (vessel owner), including mandatory onboard observers.	Portela et al., (2012) FarFish DoA
Preliminary Value chain		
A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, November 2018)		NOFIMA
	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 of transhipping	MRAG, MG Otero and PolEM (2008), FarFish D2.1
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 transhipment	FarFish D2.1 www.fao.org/fishery/statistics/
Market	Global value chain – to be elaborated.	NOFIMA
Challenges		
r	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	

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Potential improvements		
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 to 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

2.3 Outcome Targets

The fact that the background concerning policy objectives and jurisdiction of authorities needed to fulfil the theoretical requirements for creating OTs within the RFMS process is largely absent; it is complicated to identify applicable OTs for this case study. This does however also provide FarFish with an exciting opportunity to test the RFMS concept and process in an unpresented environment, which is why this particular case study was chosen for the project. Applying the RFMS process in such a scenario requires realistic expectations from all relevant parties, which is why the OTs identified in this MR invitation are somewhat moderate. Following are four initial OTs identified for the South West Atlantic mixed fisheries case study, all of which are potentially to be subject to changes or amendments, depending on the evolvement of the RFMS process within the case study:

- **OT1**: Commitment by the EU fleet to help facilitate increased cooperation with fishing fleets operating in FAO major fishing area 41, as well as other key stakeholders. FarFish aims to offer a common platform (meeting), where such cooperation can be initiated. **Obligatory OT**.
- **OT2**: Compilation of existing knowledge and development and testing of methodology and (self-sampling) protocols to facilitate discrimination of the two hake stocks (*Merluccius australis* and *Merluccius hubbsi*). **Obligatory OT**.
- **OT3**: Commitment to transmit VMS/AIS signals. **Obligatory OT**.
- **OT4**: Commitment to honour the VMEs in accordance with the Council Regulation (EC) No 734/2008. **Obligatory OT**.

OTs do most commonly refer to an indicator value, but in this case the OTs are simply yes or no questions. The obligation involved in some of the OTs identified here, are already being implemented for the EU fleet, i.e. in terms of VMS/AIS signals and avoidance of VMEs in line with Council Regulation No 734/2008. The reason for them being included as OTs is to put increased pressure on other international fleets operating in the area to comply with these restrictions as well. Within this case study there are multiple international fleets operating, therefore compliance of only one fleet will have limited effects on the overall sustainability of this fishery; aside for highlighting a true interested in responsible fishing practices. The FarFish project will therefore, in its attempt to take on the role of an authority, do its best to establish equal playing field for all operators fishing in the area.

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2.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in South Western waters, a number of action points have been identified that could strongly support the case study objectives identified in the MP0. These action points have not been included in the list of OTs as they cannot be solely operationalised by the operators, as they require input/action from other relevant parties (authorities, scientific institutions, other international fleets, etc.). These are:

- Compilation of existing knowledge on main stocks being targeted in the fishery, which exist to some degree at different scientific institutions, mainly on the two hake stocks as well as main targeted cephalopods.
- Development and testing of self-sampling protocol for fleets targeting the two hake stocks (*Merluccius australis* and *Merluccius hubbsi*). This will be done with the intention to facilitate discrimination of the two hake stocks in catch. Although *M.hubbsi* largely dominate catches, due to an initially more northwards distribution of *M.australis*, it is important to separate between the stocks as environmental changes might facilitate increasing overlapping distribution of the stocks. This will not require obligatory participation from the operators but could be implemented on a voluntary basis and/or to be used by on-board observers.
- Develop user friendly, digital maps (VMS/AIS based) with the intention of; a) demonstrating the EU fleet's good compliance in reporting of activities and avoidance of identified VMEs (thus creating pressure on other international fleets to do the same), b) mapping fishing activities of other distant water fleets operating on identified VMEs, and c) visualise the frequency of VMS/AIS gaps.

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3 Case Study: South East Atlantic

3.1 Introduction

Main focus of MR

This document serves as a formal Management Recommendations (MR) invitation to the following European operators conducting mixed fishery in FAO area 47 in the South East Atlantic: LDAC, ADAPI, ANFACO-CECOPESCA, OPAGAC and OPROMAR. The limited fishing activity that is conducted in the waters beyond areas of national jurisdiction within the FAO Area 47 (under the jurisdiction of SEAFO), is mostly within subareas B1 and D (Figure 2).

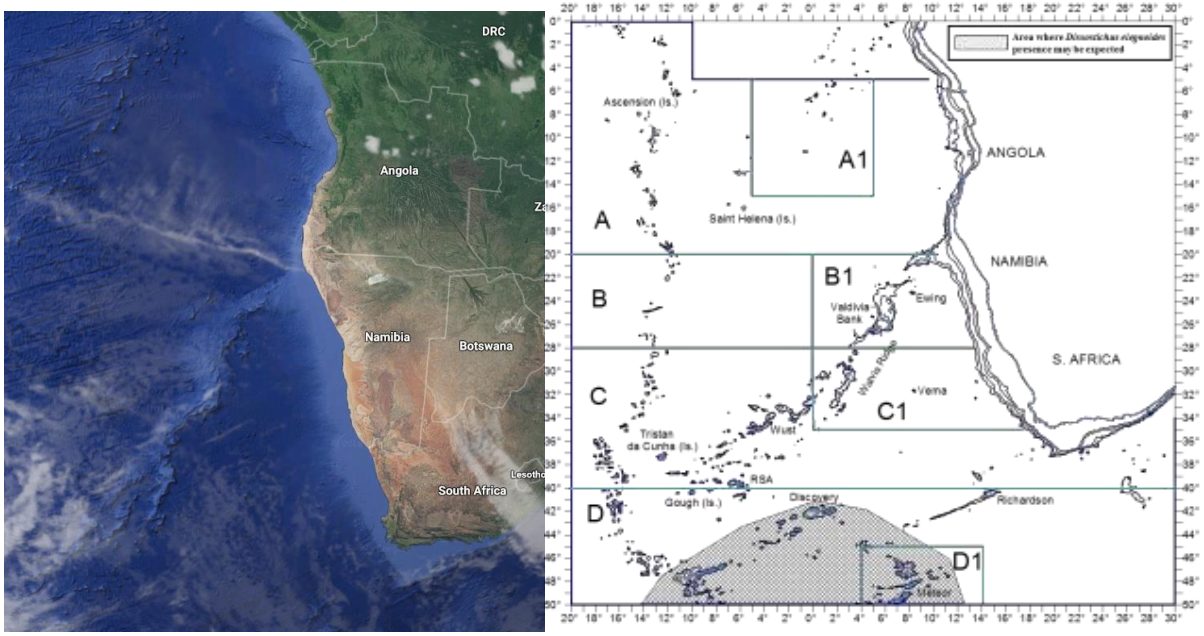

Figure 2: The case FarFish South East Atlantic case study area

Targeted species and their geographical target areas are: Patagonian toothfish; (mainly targeted between the years 2011-2014), Sub Area D, concentrated over seamounts in D1; orange roughy, mainly targeted around Ewling seamount and Valdivis Bank, Division B1; deep-sea crab, mainly targeted on seamount by Valdivia Bank (part of Walvis Ridge) located in Division B1 of the SEAFO convention area; pelagic armourhead, mainly targeted by Korean trawlers in southern and northern part of Valdivia Bank, Division B1; alfonsino, three main fishing grounds in B1.

Main characteristics of the fishery

The area has seen limited fishing activities in recent years and in 2017, only two Spanish vessels showed some activity but no reported catches. Other fleets operating in the SEAFO CA in 2017 were Japan and Namibia. According to the SEAFO 13th Scientific Committee Meeting Report[8], the only

[8] Available at: http://www.seafo.org/media/72e43665-5c43-4038-9f1f-96eebef05325/SEAFOweb/pdf/Meeting%20Files/2017/SC/SC%20Report%202017_pdf

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targeted species in 2017 were Patagonian toothfish (Japan; 12 tonnes), alfonsino (Namibia, <1 tonnes), deep sea crab (Japan; 140 tonnes; Namibia, 7 tonnes) and pelagic armourhead (Namibia, <1).

The authority

The competent authority in FAO area 47 is the South East Atlantic Fisheries Organisation (SEAFO), an RFMO with seven contracting parties: Angola, EU, Japan, Korea, Namibia, Norway and South Africa. Other relevant authority within the context of the EU fleet is DG MARE. FarFish Work Package 3 representatives will act as a leading authority in the FarFish RFMS process, considering input from SEAFO and DG Mare. The main contact person in this process is Jónas R. Viðarsson[9], as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC, ADAPI, ANFACO-CECOPESCA, OPAGAC and OPROMAR, coordinated by Alexandre Rodriguez[10] on behalf of LDAC and Gonzalo Ojea[11] on behalf of ANFACO. However, given the little or no activity of the EU fleet in the SEAFO area, their power to implement identified OTs will be subject to continued (or increased) fishing activity in the area.

Roles and responsibilities of authorities and operators

Given the limited fishing activity of the EU fleet in the SEAFO area, any responsibility that is put on their shoulders within the RFMS process, depends on whether EU fishing activities will occur in the area over the coming years. This must be taken into account when identifying OTs for the case study, as the roles and responsibilities set within the FarFish RFMS framework does not apply to the other distant water fleets operating in the area.

Time frame

An approved MR should be available by 31 January 2019 the latest.

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3.2 MP0

Current state		Reference
This MP0 applies 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 DG MARE, while relevant operators are LDAC, ADAPI, ANFACO-CECOPESCA, 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** (*Beryx splendens)*, **boarfish/pelagic armourhead** (*Pseudopentaceros richardsoni*), **orange roughy** (*Hoplostethus atlanticus*), skates, sharks, deep-sea crab (*Chaceon erytheiae*), **Patagonian toothfish** (*Dissostichus eleginoides*), **Wreckfish** (*Polyprion americanus*), **Grenadiers nei** (*Macrourus* spp.), **Blue antimora** (*Antimora rostrata*), **King crab** (*Lithodidae* spp, *Lithodes ferox, Paralomis formosa*). Bycatch species: Warty dory (*Allocyttus verucossus*), Spiky oreo (*Neocyttus rhombiodalis*), Guinea oreo (*Allocyttus guineensis*), Smoot oreo dory (*Pseudocyttus maculatus*)	FarFish D2.1 SEAFO SC (2017)
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 SC (2017)
EU fisheries (nations, gear, vessels, catch, quota).	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). In 2017, two Spanish vessels were fishing in SE Atlantic. **Patagonian toothfish**, no catch by Spain since 2010 (SEAFO SC 2017). Fishing nations SEAFO, Spain, Japan, Korea and South Africa. Fishing nations FAO Area 47 statistics; Spain, Japan, Korea, South Africa, Uruguay and Chile. Most important previously was Uruguay. Most common gear is Spanish longline system and the trotline. Major bycatch of grenadiers is being discarded. 22% of TAC was	FarFish D2.1 www.whofishesfar.eu SEAFO SC (2017) appendix IV, Lanings, discards and bycatch tables)

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	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.	
	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. Fishing nations SEAFO SC (2017), Norway, Namibia, South Africa) Fishing nations FAO statistics area 47; Norway. Portugal, Spain, Namibia and South Africa. Period 2000-2015 No Norwegian catch since 2000, TAC=no directed fishery, Bycatch limit=14 t.	SEAFO SC (2017) appendix V
	Alfonsino, no catch since 2005 by EU 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 (*Capros aper*), blackbelly rosefish (*Helicolenus actylopterus*), imperial blackfish (*Schedophilus ovalis*), oilfish (*Ruvettus pretiosus*), silver scabbardfish (*Lepidopus caudatus*).	SEAFO SC (2017)
	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; 50% of TAC was caught. TAC: 200t in D0, 200t in remainder SEAFO CA. **Pelagic armourhead,** no catch by Spain since 2003 (bottom trawl, longline, Area B1). Previous fishing nations SEAFO, 2017) 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.	SEAFO SC (2017)
	Wreckfish, no catch Portugal since 2007 Portugal (lonlingers, area A) TAC=143.	SEAFO SC (2017)
	Grenadiers, no catch since 2010, Spain (lonlingers, Area D0, D1)	
	Blue antimora, no catch since 2010, Spain (longliners, Are D0, D1)	
	King crabs, no catch since 2010, Spain (longliners, Area D0,D1)	
	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,	FarFish D2.1

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	orange roughy, bottom trawl area B1 and C0), South Africa, Norway, Ukraine, Russia	
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	(1) MFMR (Namibia), BCC (2) IMR, SEAFO, SEAFO Commission. (3) Nueva Pescanova (Marnova Lda.), Freiremar, Mascato (Suppapackers processing plant), Nueva Pescanova (Nova Nam, Novagroup), Iberconsa, Marfrio Namibia Fishing, Pescapuerta (Tunacor), Pereira Fishing (4) EJF, OCEANA, WWF ADENA	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
Case study objectives	1) Improve data quality and quantity. 2) 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 4)	FarFish D2.1 CSIC
Harvesting control	Harvesting control is based on recommendations from the Scientific committee (SC) in SEAFO, and decided by the SEAFO Commission. Patagonian toothfish: TAC (2015) 264 t in subarea D, TAC (2017) = 266 t in Subarea D. Orange roughy; 2016 moratorium on directed fishery and 4 tonnes of bycatch allowance in Division B1 and 50 t in the remaining SFAO CA. 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. 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. Pelagic armourhead: MSY= 128 t, no other reference points. TAC reviewed every two years. TAC=143 t 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	FarFish D2.1

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Data collection (fishery (catch, bycatch, employment)	Data collection by SEAFO, FAO and IMR (RV Dr Fritjof Nansen survey Jan-Feb 2015) 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	FarFish D2.1 IMR (2015)
Assessment	Scientific committee (SC) in SEAFO. **Patagonian toothfish**, no agreed stock assessment, lack knowledge on mortality, growth, reproduction, feeding and trophic role. **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) **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) **Pelagic armourhead**, CPUE data as indicator for biomass and support analysis with CPUE trends. Depletion estimators used to estimate population abundance **Alfonsino** available, some scare 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.	FarFish D2.1 SEAFO SC (2017) SEAFO SC (2017)
MCS	All vessels are required to: - 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 transhipments in the SEAFO CA IUU list is managed by SEAFO Protection of deep-sea sharks, banning of direct fishery and report of all bycatch of sharks (<5% fin weight of total shark bycatch). Reduce incidental bycatch of seabirds and sea turtles. Ban of gillnets.	FarFish D2.1 SEAFO (2018)
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.	

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Challenges		
Data poor situation	TAC is usually based on limited data.	FarFish D2.1
Management	Maintain international framework for future work and protection. Although fishing effort in the case study 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 Case study 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

3.3 Outcome Targets

The background within this case study, with very limited activity in the area, make policy objectives and jurisdiction of limited relevance in the context of the RFMS in this case study. There is however an active RFMO in the area (SEAFO), which is able to represent an authority within the context of RFMS and the FarFish project. Given the nature of the case study, expectations towards the case study MR must be realistic and take the limited operations of the EU fishing fleet into consideration. The OTs identified in this MR invitation are therefore on a more "theoretical" level and serve as "good practice" recommendations:

- **OT1**: Reporting of all catches via e-logbooks. **Obligatory OT**.
- **OT2**: Commitment to transmit VMS/AIS signals. **Obligatory OT**.
- **OT3**: Onboard observers. **Recommended OT**.

The fact that limited fishing operations currently exist within the case study area makes it difficult to identify applicable OTs at this stage. It is therefore recommended that the operators attempt to develop MR that are based on overall "good practice" methodology; but are flexible enough to be realistically applied. It is recognised that such development will require dialogue between authorities and operators, beyond what is usually needed in the context of RFMS.

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3.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in South Eastern waters, a number of action points have been identified that could strongly support the case study objectives identified in the MP0. These action points have not been included in the list of OTs as they cannot be solely operationalised by the operators, as they require input/action from other relevant parties (authorities, scientific institutions, other international fleets, etc.). These are:

- Compiling of existing knowledge on main stocks being targeted in the area, which exist to some degree at different scientific institutions and research programmes e.g. Nansen programme.
- Development of user friendly, digital maps (VMS/AIS based) with the intention of identifying fishing pressure of different fishing fleets. This will potentially create pressure on international fleets to send uninterrupted AIS signals.

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4 Case Study: Cape Verde

4.1 Introduction

Main focus of MR

This document serves as a formal Management Recommendations (MR) invitation to the following European operators active in the Cape Verde tuna fishery under the active SFPA: LDAC, ANFACO-CECOPESCA, OPROMAR and OPAGAC. The vessels operating under the agreement are from Spain, Portugal and France, mainly employing the following gear within Cape Verde EEZ: purse seines, longlines and pole and lines. Key target species are yellowfin, bigeye and skipjack tuna, while blue shark and swordfish are also caught to a considerable extend (either as target or bycatch species).

The fishery takes place within the Cape Verde EEZ, which covers an area of 789,400 km^2, much of which is exploited by foreign fishing fleets only (Stobberup, 2005). The continental shelves are narrow and irregular, with a total area of 5,394 km^2

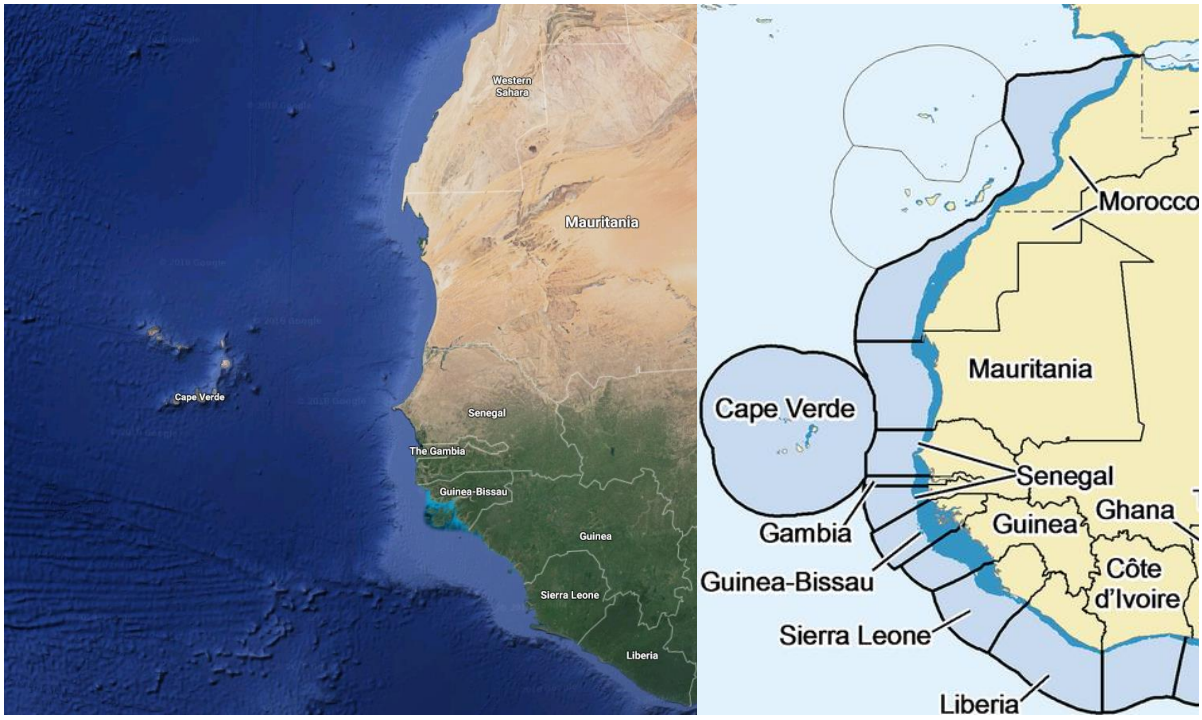

Figure 3: The Cape Verde EEZ covers an area of 789,400 km^2 but the continental shelves around the islands are only 5,394 km^2

The Cape Verde national fleet has limited interest in the blue shark fishery, mainly due to the high cost of production and lack of suitable vessel types. Catches of blue shark by foreign fleets have however increased over the past few years. The blue shark is considered capable to sustain relatively high levels of fishing mortality, compared to other shark species (Cortés et al., 2012), and the latest stock assessment by ICCAT in 2015 (Anon, 2015)[12] showed that the north Atlantic stock was unlikely to be

[12] Anonymous, 2015. Report of the 2015 ICCAT blue shark stock assessment session. Assessment meeting, Lisbon, Portugal (July 27 to 31, 2015). Available at: https://www.iccat.int/Documents/Meetings/Docs/2015_BSH%20ASSESS_REPORT_ENG.pdf

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overfished. However, high levels of uncertainty were involved in this assessment. INDP has expressed their concerns over the limited scientific information available regarding blue shark catches, stressing that not all countries were fully declaring their catches.

The case study objectives identified in MP0 are as follows:

1. In conformity with ICCAT, collect and analyse data on catches of swordfish and bycatches of blue shark by the EU fleet in the Cape Verde EEZ, if the data is available. If sufficient data is accessible, model scenarios, which may add value to development of HCR for these bycatch species.
2. Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools.

Main characteristics of the fishery

The SFPA is for tuna and tuna-like species and accounts for 5,000 reference tonnes per year for the EU fleet. Pole and line is allowed beyond 12 nm (yellowfin, bigeye, skipjack), tuna seiners beyond 16 nm (yellowfin, bigeye, skipjack) and surface longliners beyond 18 nm (swordfish, blue shark, yellowfin, bigeye). In 2016, EU catches of tuna amounted to 7,924 tonnes and catches of blue shark were 2,058 tonnes. But in periods where purse seiners are less active, catches of blue shark exceeds that of tuna. In 2017, total catches from EU tuna vessels amounted to just under 10,000, which is almost double the reference tonnes under the SFPA. Catches are dominated by Spanish vessels, which accounted for 98% of the catches in 2017, while catches from French and Portuguese vessels have fluctuated, but at much lower levels[13]. Over the four years that the current SFPA has been in place (2014-2018), 21 EU tuna purse seiners and 14 surface longliners have obtained fishing authorisations. Other fleets targeting the area, apart from the domestic fleet, is Japan and Senegal, both of which have made fishing agreements with Cape Verde.

The authority

The competent authority in the Cape Verde case study are DNEM, DGRM and DG MARE. FarFish Work Package 3 representatives will act as a leading authority in the FarFish RFMS process, considering input from DNEM, DGRM and DG MARE. The main contact person in this process is Jónas R. Viðarsson[14], as the leader of Task 3.3 (authority role within RFMS).

[13] DG MARE, 2018. Ex-post and Ex-ante evaluation study of the Sustainable Fisheries Partnership Agreement between the European Union and the Republic of Cabo Verde. Final Report. European Union, 2018. Available at: https://publications.europa.eu/en/publication-detail/-/publication/44beac2a-25a8-11e8-ac73-01aa75ed71a1/language-en

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The operators qualified to respond

LDAC, ANFACO-CECOPESCA, OPROMAR, ORPAGU and OPAGAC, coordinated by Alexandre Rodriguez[15] on behalf of LDAC and Gonzalo Ojea[16] on behalf of ANFACO.

Roles and responsibilities of authorities and operators

Once the MR invitation has been received by the operators, their representatives within the FarFish consortium, Alexandre Rodriguez (LDAC), Gonzalo Ojea (ANFACO), in cooperation with FarFish Work Package 4, will prepare a draft MR to be reviewed by authorities (WP3, with input from DNEM, DGRM, DG MARE). The authorities will evaluate the strategies and methodologies presented to achieve the OTs within the draft MR and will request a revised version, if needed. Once approved by authorities (foregoing a public hearing), the MR will enter the implementation stage, led by the operators. For further information on the RFMS process, please refer to the "first draft general guidelines for making MRs" presented in FarFish deliverable 3.1.

Time frame

An approved MR should be available by 31 January 2019 the latest.

4.2 MP0

Current state		
This MP0 applies (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-CECOPESCA.		
Case study leader	National Institute for Fisheries Development (INDP), Cape Verde Contact persons: Benvindo Fonseca: benvindo.fonseca@indp.gov.cv Maria Osvaldina Silva; Osvaldina.Silva@indp.gov.cv Elisia Da Cruz; Elisia.Cruz@indp.gov.cv	Revised EDC, 29.1.18 BF, 12.2.18
Fishery identification		
Species (target, bycatch)	Target: **Yellowfin tuna** (*Thunnus albacares*), **Bigeye tuna** (*Thunnus obesus*), **Skipjack tuna** (*Katsuwonus pelamis*), Bycatch; sea birds, turtles, **swordfish** (*Xiphias gladius*), **blue shark** (*Prionace glauca*)	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.	SFPA, appendix 2.

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<table>
<tr><td></td><td>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.</td><td>ICCAT (2016)

Domingo et al., (2008)</td></tr>
<tr><td>EU fisheries (nations, gear, vessels, catch, quota)</td><td>Nations; Spain, Portugal, France
Total reference catch (SFPA): 5,000 t/year

Catch (tonnes) by foreign fleet in Cape Verde waters;
<table><tr><th>EU</th><th>2014</th><th>2015</th><th>2016</th></tr><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></table>
<table><tr><th>JAPAN</th><th>2014</th><th>2015</th><th>2016</th></tr><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></td></tr><tr><td>Total</td><td>1.750</td><td>1.611</td><td></td></tr></table>
Vessels: Tuna purse seiners: Spain (16), France (12), target species; Yellowfin, bigeye and skipjack. Bycatches in compliance with ICCAT and FAO recommendations.

Surface longline: Spain (23), Portugal (7), target species; swordfish, blue shark, yellowfin tuna, bigeye tuna. Bycatches in compliance with ICCAT and FAO recommendations.

Pole and line tuna vessels: Spain (7), France (4), Portugal (2); target species; yellowfin tuna, bigeye tuna, skipjack tuna. Bycatches in compliance with ICCAT and FAO recommendations. Currently; 1 Portuguese and 15 Spanish vessels.</td><td>SFPA, appendix 2

DGP/INDP provided by case study lead.

http://www.whofishesfar.org</td></tr>
<tr><td>Other nations</td><td>Japan, Senegal, Cape Verde</td><td></td></tr>
</table>

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Management		
Authorities	**DNEM, DGRM and DG MARE**	FarFish, D2.1, CETMAR
Operators	**LDAC, ANFACO-CECOPESCA, 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 ACOPESCA.	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
Case study objectives	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
Harvest Control rules	**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) **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	ICCAT (2014) ICCAT (2016) ICCAT (2015b)

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	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 **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. **Blue shark** High uncertainty in Bmsy, Fmsy high uncertainty. F2013/Fmsy: 0.01-1.19, B2013/Bmsy: 0.78-2.03. Incomplete catch reports. **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).	ICCAT (2015a)
Data collection (fishery (catch and bycatch), employment,	**INDP**, data collection, compilation of fisheries statistics, research and assessment. **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. **INDS** National Fisheries Institute, collect data for commercial tuna fishery (catch, effort, supplemented with data from other sources). **INE** compiles socio-economic data on the fisheries.	FarFish D2.1 INDP
Assessment	ICCAT stock assessment, INDP **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. **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 **Bigeye**: Reference year 2014. Considered as one stock. An assessment in 2015 using a variety of models, including non-equlibrium 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. **Blue shark**: Production models fitted to CPUE data, length-based age structured models, hierarchial cluster analysis. For the South 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.	ICCAT (2014) ICCAT (2016) ICCAT (2015b) ICCAT (2015c) ICCAT (2017)

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	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.	
MCS	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 within 30 days. Autoridade Competente para os Productos da Pesca (ACOPESCA) has been responsible for control, inspection and certification of fish products from 2014. It has now been replaced by Serviços de Inspeção e Garantía de Qualidade (SIGQ). Maritime and Port Agency (AMP) Operations Centre for Maritime Safety (COSMAR) is under the command of the Coast Guard All data shall be reported to Directorate National of Maritime Economy (DNEM) and to INDP Inspections (sea, port), Observers 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.	FarFish D2.1, SFPA Pramod (2017)
IUU	All EU vessels shall keep fishing logbooks/Catch reports.	Pramod (2017)
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	Cape Verde catches are landed in West Africa, long liners use Cape Verde as base. Cape Verde is usually used mainly through trans-shipment. Vessel owners pay 55-65 EUR/tonne as well as advances per vessel. Evaluation in 2013 suggested very little induced effects for Cape Verde as fish is landed in other ports. Tuna from seiners was landed for further processing in Abidjan and from longliners for transhipment in Cape Verde.	Faro Meeting minutes FarFish, WP3
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

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Management	Competition with national fleet needs to be addressed. The updating of the of PGRP is in progress under the auspices of DNME. Fisheries legislation is in an updating process.	FarFish D2.1, INDP
MCS	Cape Verde has Insufficient control and monitoring capabilities. 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 e.g. 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

4.3 Outcome Targets

The following OTs were identified based on MP0 and input from key stakeholders (from both EU and Cape Verde) received at the MR kick off meeting in Vigo, held in June 2018. It was identified that current data collection includes a high level of uncertainty and that there is a need to improve data recording in order to improve stock assessments. The need to harmonize data and processes between EU and ICCAT was as well noted. This also applies for data records on bycatches, especially for blue shark caught by the EU fleet in large volumes. Thus, the following OT is identified:

- **OT1:** Development of an operational method for strengthening and harmonizing data protocols and reporting of swordfish and blue sharks. This includes improved data recording in e-logbooks of all catches (target- and bycatches) and might require recording more detail than only species and volume e.g. sizes and number of individuals. **Obligatory OT.**

A need for improved scheduling and logistic system for onboard observers on EU vessels has been identified due to lack of coordination, distribution, expenses and support. Thus, the following OT is identified:

- **OT2:** Setting of conditions for a better coordination of observer programme: content (protocols, criteria), schedules, processes, sharing of information. This is an OT that will have to be worked on in collaboration between operators and authorities as it includes harmonisation of Cape Verde, EU and ICCAT protocols on onboard observers. **Recommended OT.**

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Information on trade flows within the value chains of Cape Verde i.e. catches of all fleets operating within the Cape Verde EEZ, is very limited. Cape Verdean authorities have therefore very little oversight of what happens to much of the catches caught in their EEZ or on the value streams. This is also of concern in terms of food safety and value chain development (including local consumption), the following OT is therefore identified:

- **OT3:** Increase knowledge and data collection of trade flows to include for example destination, utilization, quantity, value. This could include providing copies of sales invoices (sales certificates) in order to verify what markets the catches enter i.e. canning or other processing for tuna. **Recommended OT.**

It is recognised that some of the data relevant for this OT can be confidential information (for example between fishing companies and their customers) and it is therefore expected that the MR draft will take that into consideration i.e. by suggesting what data can be provided, on what format, aggregation etc.

Finally, as it has been noted that INDP and other Cape Verde authority institutions cannot at present access and process the VMS data submitted by EU vessels, as their system is not currently compatible to the EU system. While this is an issue that must be addressed, it is not really within the power of the operators to do so. The operators do however need to transmit AIS signals to make it possible monitor them via satellite surveillance. The following OT has therefore been identified:

- **OT4**: Commitment to transmit VMS/AIS signals. **Obligatory OT**.

4.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in Cape Verde, a number of action points have been identified that could strongly support the case study objectives identified in the MP0. These action points have not been included in the list of OTs as the operators cannot solely operationalise them, as they require input/action from other relevant parties (authorities, scientific institutions, other international fleets, etc.). These are:

- A need for capacity building within Cape Verde in tuna stock assessment and management has been identified. With the aim of strengthening Cape Verdean administrative and scientific capacity, a number of people from FarFish case study partners in Cape Verde, selected through FarFish training needs assessment (deliverable 7.4), will participate in:
    - The UNU-FTP six-month training;
    - Regional training provided by FarFish;
    - Diploma programme (arranged by UiT under the FarFish project).

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- The necessity of increasing cooperation between Cape Verde national authorities, relevant RFMOs and EU has been identified. This includes for example the need to improve/harmonise data sharing between ICCAT, EU and Cape Verde authorities.
- Electronic reporting through e-logbooks by all fleets operating within the Cape Verde EEZ is needed so that Cape Verde authorities can fully monitor catches within their EEZ and thereby contribute to improved stock assessment of both local stocks (which may serve as prey for other important commercial species) and stocks assessed by ICCAT. It is also important that authorities in Cape Verde (including INDP) have full access to the logbook data. The EU fleet is currently providing logbook data to the flag states, but in order to decrease the uncertainty in stock assessment - fleets operating within the area need to provide such data.
- The development of VMS/AIS digital maps that clearly show: a) Fishing activities of both EU fleets and other fleets' and b) frequency of VMS/AIS gaps can be extremely valuable in respect to evaluate compliance to agreements and requirements of ICCAT. This is though clearly not within the power of the operators to facilitate, which is why it cannot be an official OT. The FarFish consortium will explore the applicability of setting up such maps, which will then support the operators work in developing MRs and provide a tool for monitoring compliance. Such a tool can then also be valuable for the EU fleet to demonstrate "best practise".
- There is a need to Increase research into the socio-economic and ecological impacts of FADs. Although this is very important, the workload of such an investigation is too comprehensive to be addressed properly within the FarFish project. There are already ongoing initiatives on this that the FarFish project will follow and this is as well a topic that will undoubtedly be addressed in future research projects.

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5 Case Study: Senegal

5.1 Introduction

Main focus of MR

This document serves as a formal Management Recommendation (MR) invitation to the following European operators active in the Senegalese hake fishery under the current active SFPA: LDAC and OPROMAR. The Senegalese EEZ covers 159,000 km^2 and is broken into two parts that are separated by the EEZ of Gambia (Antonova, 2016).

Figure 4: The Senegalese EEZ covers 159,000 km^2 and is broken into two parts that are separated by the EEZ of Gambia

The EU vessels currently operating under the agreement are demersal vessels from Spain and France. Developing a case study specific MP0 covering all the target species targeted by EU fleet within Senegalese EEZ was considered unattainable. Therefore, the case study leader was asked to prioritize which fishery the MP0 should address based on main challenges. Consequently, the black hake fishery was selected, as ICCAT is assessing the tunas satisfactorily. Therefore, the main focus of the MR will lie with the black hake, which in fact are two different species: Tropical African hake (*Merluccius polli)* and Senegalese hake *(Merluccius senegalensis)*. Main challenges are due to the lack of distinction between the two hake species in reported catches and surveys, limiting reliable data for separate stock assessment. Currently, the two black hake species are assessed as a single stock, due to the lack of species differentiation in catch statistics.

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The case study objectives identified in MP0 are as follows:

1. Develop sustainable MR of the two hake species that will enable species discrimination, which will allow authorities to improve traditional stock assessment e.g. specify F and SSB for the two species. Species discrimination will potentially enable improvements in setting TAC/HCR as the two stocks have different characteristics (such as size of maturity). Improved species-specific knowledge and improved access to data will allow national management institutions to advance research on the hake species.
2. There is need to improve MCS in the area by for example utilizing latest available satellite systems and tools.
3. There are opportunities in utilizing onboard observers more efficiently e.g. by improving bycatch registration, improve monitoring of catches, registration of effort and sizes for hake as target and bycatch species, and developing self-sampling protocols.

Main characteristics of the fishery

The current SFPA covers the period from 20th November 2014 to 19th November 2019 and allows EU vessels from Spain (25 vessels) and France (13 vessels) to fish for tuna (14,000 reference tonnes/year) and black hake (2,000 reference tonnes/year) within Senegalese EEZ. Total catches of black hake in Senegal EEZ, both by EU vessels and Senegal, amounts to approximately 6,000 tons a year. The species are caught with deep-sea trawlers, at depths between 150 and 1000 m.

The authority

The competent authority in the Senegalese case study are MPEM and DG MARE. FarFish Work Package 3 representatives will act as a leading authority in the FarFish RFMS process, considering input from MPEM and DG MARE. The main contact person in this process is Jónas R. Viðarsson[17], as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC and OPROMAR, represented by Alexandre Rodriguez[18] (LDAC) and Francisco Teijeira[19] (OPROMAR).

Roles and responsibilities of authorities and operators

Once the MR invitation has been received by the operators, their representative within the FarFish consortium, Alexandre Rodriguez (LDAC) and Francisco Teijeira (OPROMAR), in cooperation with FarFish Work Package 4, will prepare a draft MR to be reviewed by the authorities (WP3, with input from MPEM and DG MARE). The authorities will evaluate the strategies and methodologies presented to achieve the OTs within the draft MR and will request a revised version, if needed. Once approved by authorities (foregoing a public hearing), the MR will enter the implementation stage, led by the

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operators. For further information on the RFMS process, please refer to the "first draft general guidelines for making MRs" presented in FarFish deliverable 3.1.

Time frame

An approved MR should be available by 31 January 2019 the latest.

5.2 MP0

Current state		**Reference**
This MP0 applies 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 operators 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** (*Merluccius polli),* **Senegalese hake (***Merluccius senegalensis)*. 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 deep-water 150-1000m, permitted fishing Zone given in SFPA. *Merluccius polli,* distributed between 8 °N and 26 °N and caught between 33°N and 10°N, at depth from 200 to 1000 m. *Merluccius senegalensis*, 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	**MPEM** and **DG MARE,**	Faro meeting, D2.1
Operators	**LDAC and OPROMAR**	CETMAR
Stakeholders (1) Supporting institutions	(1) CSRP, CECAF, COMAHFAT, ECOWAS, ISRA (2) FAO/CECAF, CRODT	FarFish D2.1

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(2) Scientists (3) Other industry (4) NGOs	(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)	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)
Case study objectives	1) Develop sustainable MR 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	Faro meeting
Harvest 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) = 1,657 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/CEFAC (2013), FarFish D2.1

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<table>
<tr><td></td><td><table>
<tr><td></td><td>M.senegalensis</td><td>M. polli</td></tr>
<tr><td>Size at maturity

Age at maturity</td><td>33 cm (females)
39 cm (males)
End of first year</td><td>37 cm (females)
44 cm (males)
During second year</td></tr>
<tr><td>Spawning</td><td>September-March</td><td>October - March</td></tr>
<tr><td>Depth distribution (common)</td><td>100-600 m</td><td>200–1000 m</td></tr>
<tr><td>Growth first year</td><td>Fast (1.12 mm day^{-1})</td><td>Fast (1.12 mm day^{-1})</td></tr>
</table></td><td>COREWAM, MD Fernández-Peraltza et al., (2011), Fall et al., (2016) Rey et al., (2016)</td></tr>
<tr><td>MCS</td><td>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.</td><td>FarFish D2.1, COREWAM (MD)</td></tr>
<tr><td>Preliminary value chain</td><td></td><td></td></tr>
<tr><td>A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (FarFish D3.4, December 2018).</td><td></td><td>NOFIMA</td></tr>
<tr><td>Port, transport, processing, marked</td><td>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 are primarily targeted by European vessels. Hake is partly landed in Dakar, but there are no domestic markets for hake, so it is more or less all exported. Processing is primarily done in Europe. The hake caught by EU vessels is frozen on-board and transported as such to EU. There is no local consumption of hake in Senegal, but over the past few years there have opened up markets in other African countries e.g. Cameroon and Côte d'Ivoire.</td><td>FAO/CECAF (2013). FarFish D2.1, Faro meeting minutes.

NOFIMA, (SE)</td></tr>
<tr><td>Challenges</td><td></td><td></td></tr>
<tr><td>Data collection</td><td>There are data limitations conserving the two hake species, as discrimination between the catches of the species is lacking. The biological knowledge on the two hake species within the Senegalese EEZ is also lacking. The fact that the two hake species are sold as one makes it challenging to collect data where discrimination is needed, since there is no demand from the market to do so.</td><td>COREWAM (MD) Fall et al., (2016)</td></tr>
<tr><td>Assessment</td><td>There is a need to improve assessment models as the species are currently assessed as one single stock. A recent study found 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 M.Senegalensis and during the second year for M.polli. This demonstrate that for management purposes there is a difference between the two species.</td><td>FarFish D2.1 Rey et al., (2016)</td></tr>
<tr><td>Fishery, Species/stock discrimination</td><td>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.</td><td>Fernández-Peralta et al., (2011, 2017) Faro meeting</td></tr>
</table>

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Management, sustainability	SFPA is set to 2,000 t, but the MSY is set to 1,657 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	FarFish can contribute to improved stock assessment by data collection and analysis	FarFish D2.1
Assessment	FarFish can contribute to improving stock assessment models and tools, developing networks, working groups and knowledge transfer. FarFish aim is to add value to present work in CECAF applying new models and tools.	FarFish D2.1,
Monitoring	FarFish will aim to contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools	CSIC

5.3 Outcome Targets

The following OTs were identified based on MP0 and input from key stakeholders (from both EU and Senegal) received at the MR kick off meeting in Vigo, held in June, 2018. The key issue to be addressed by FarFish in the Senegalese case study is to improve discrimination between the two species of black hake, through improved data collection and self-sampling. This should enable separate stock assessments for the two species, as well as contribution to separate TACs for both species, based on improved scientific background and data. For this to happen, both financial and scientific support is needed. In relation to this, the following OTs are set for this case study:

- **OT1:** Improved data collection and reporting from all operators in Senegalese waters where data on catches and landings of all species is reported via electronic reporting (including target- and bycatches and should ideally account for discards where applicable). **Obligatory OT.**
- **OT2:** Enhancing data collection to enable for more accurate estimations of the share of each black hake species in total catches. **Obligatory OT.**

Alternatives for enhanced data collection could for example include implementing a self-sampling programme, supporting national research initiatives, expanding on onboard observer tasks/coverage etc.

Among the case study objectives identified in the MP0 is the desire to contribute to better monitoring in the area by utilizing latest available satellite systems and tools. To enable this, it is important that

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all fleets operating in the area transmit VMS/AIS signals. The following OT is therefore set for this case study:

- **OT3:** Commitment to transmit VMS/AIS signals. **Obligatory OT.**

One of the main needs identified on a socio-economic level is the need to increase supply/demand and local markets, including those of neighbouring countries (and other African countries) such as Cape Verde, Côte d'Ivoire and Cameroon, and increase local prices for black hake. Currently, hake consumption in Senegal is limited, few markets exist for the species and the prices are low. Through increased effort in marketing activities, value-chain development and analysis, black hake could become an important contribution to local markets and social aspects (e.g. employment and revenues). Following is a related identified OT:

- **OT4:** Increase knowledge and data collection of all fleets operating in the Senegalese EEZ on trade flows to include for example catches, destination/landings, utilization/processing, exports, value etc. This could include providing copies of sales invoices (sales certificates) in order to verify what markets the catches enter. Major aim of this OT is to support efforts to increase local supply and demand and strengthen local markets for black hake. **Recommended OT.**

It is recognised that some of the data relevant for this OT can be confidential information (for example between fishing companies and their customers) and it is therefore expected that the MR draft will take that into consideration i.e. by suggesting what data can be provided, on what format, aggregation etc.

5.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in Senegal, a number of action points have been identified that could strongly support the case study objectives identified in the MP0. These action points have not been included in the list of OTs as they cannot be solely operationalised by the operators, as they require input/action from other relevant parties (authorities, scientific institutions, other international fleets, etc.). These are:

- Improved quality of current stock assessments for black hake, with separate stock assessments for the two species. FarFish will aim to contribute to this with collection of new data that enables separation between the two stocks. FarFish will as well build competences amongst relevant stakeholders to separate between the two species.
- Knowledge gap analysis is needed, in order to identify key knowledge and data gaps, especially for the black hake stocks. The responsibility for this cannot realistically be placed on the operators. This is at least partly to be addressed within the FarFish project.
- Effort should be put into increasing local demands and local markets for black hake, including those in other African countries e.g. Cape Verde, Côte d'Ivoire and Cameroon. Analysis of the

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Senegalese black hake value chains will be a part the FarFish project, which will potentially contribute to this.

- Develop user friendly, digital maps (VMS/AIS based) that supports monitoring of all fleets operating in the area could be valuable for this case study. The FarFish project will explore the applicability of such maps.

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6 Case Study: Mauritania

6.1 Introduction

Main focus of MR

This document serves as a formal Management Recommendation (MR) invitation to the following European operators conducting shrimp, black hake and small pelagics fishing under the current Mauritanian mixed fishery SFPA: LDAC and OPROMAR. The Mauritanian EEZ covers an area of 234,000 km^2 that is amongst the most productive fishing areas in the world.

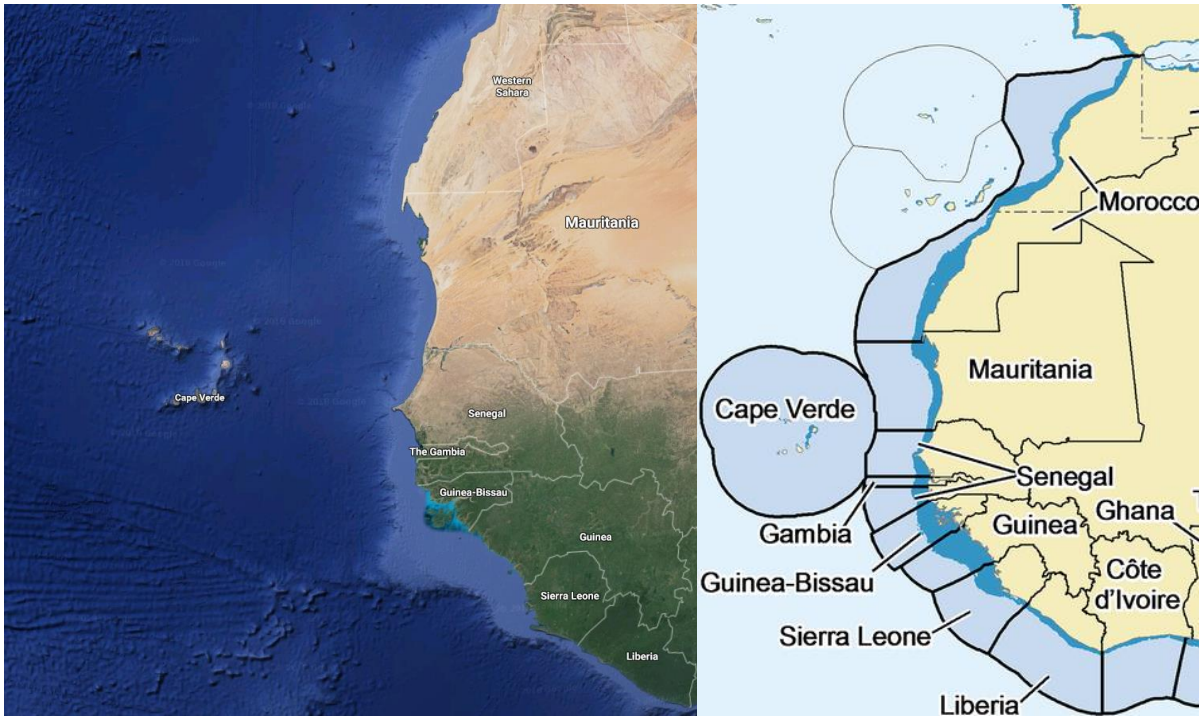

Figure 5: The Mauritanian EEZ covers an area of 234,000 km^2 that is amongst the most productive fishing areas in the world

Vessels operating under the agreement targeting shrimp are from Spain, Italy and Portugal; vessels targeting black hake are solely from Spain and vessels targeting small pelagics are from the Netherlands, Lithuania, Latvia, Poland, Germany, the UK, Ireland and France. Bottom trawls are used in the shrimp fishery; bottom trawls and bottom longlines in the black hake fishery; and the small pelagics fishery uses mid-water trawls and purse seins.

During the preparations for MP0 (deliverable 4.1, submitted in February 2018) the case study authorities expressed interest in focusing on the shrimp fishery under the SFPA when developing MR1 within the project. This is why MP0 placed emphasis on describing the current situation within the shrimp fishery. After MP0 was submitted the dialogue between authorities and operators revealed that there might be limited interest among the operators to develop MR for the fishery, as only a small part of the available fishing opportunities is being utilised after part of the fishing grounds were closed off for the EU fleet. At the same time the authorities came to the conclusion that development of MR within FarFish for black hake and small pelagics would be highly relevant. It was then decided at the

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MR kick off meeting, held in Vigo in June 2018 to include shrimp, black hake and small pelagics in the MR invitation. As black hake and small pelagics had not been included in MP0 (D4.1) the description of the current situation within those fisheries are not as detailed as for the shrimp fishery. This will though be worked on during the course of the FarFish project.
In addition, the 2016 EU-Mauritania Joint Scientific Committee recommendations highlighted the interest of research projects on the analysis of the link that may exist between environmental conditions, such as hydrological parameters, and the population trends of certain fish stocks such as shrimp and small pelagic species. The possibility of FarFish to contribute to this task is something that will be explored within the Mauritanian case study.

The EU vessels active in the shrimp fishery are from Spain, Italy and Portugal, with a total reference catch of 5,000 tonnes per year, but in recent years after the Mauritanian authorities closed off fishing grounds closest to the shore the EU fleets utilisation of the fishing opportunities have been below 20%. The case study objectives that have been identified by the authorities represented in FarFish are reduction of bycatches, improved registration of bycatches, the need to increase onboard observers, improving knowledge on the fluctuations in landings due to environmental forcing.

Spain is allocated the entire allowed catch of demersal fish, including the black hake quota, which amounts to 6,000 reference tonnage on non-freezer trawler catches and 3,500 tonnage of freezer trawler catches. These fisheries are as well allocated 25% of bycatch quotas. The black hake is in fact two different species i.e. tropical African hake (*Merluccius polli*) and Senegalese hake (*Merluccius senegalensis*). The SFPA does however not discriminate between the two species, even though they have different biological characteristics and should therefore preferably be managed separately (Fernándedz-Paralta, Quintanilla , & Rey, 2017). The fact that black hake is becoming increasingly important for the domestic market is also of significant importance within the context of FarFish.

Small pelagics constitute the bulk of the total EU catch volume under the Mauritanian SFPA, or 240,000 reference tonnage, where 225,000 tonnages are allocated to freezer trawlers and 15,000 tonnages to non-freezer trawlers. The Key species are mackerel, horse mackerel, sardines and sardinellas. The quotas are allocated mainly to the Netherlands, Lithuania, Latvia and Poland, with the rest distributed between Germany, the United Kingdom, Ireland and France. This fishery is by far the most important one within the SFPA, both in regard to volume and value. It is also quite heavily utilised by other foreign fleets, such as Russia, Ukraine and China. The small pelagics within the Mauritanian EEZ are vulnerable to environmental forcing, which needs to be further studied. There are also uncertainties around stock assessment and catch reporting/estimates that make this fishery highly relevant for FarFish. In addition, there have been significant changes within the value chain of small pelagics caught within Mauritanian waters in recent years, as fishmeal plants have in considerable numbers been established within the country.

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The authority

The competent authorities in the Mauritanian case study are the Ministry of Fisheries and Maritime Economy (MPEM), the National Office for Sanitary Inspection of Fishery and Aquaculture Products (ONISPA), the Directorate for the Management of Oceanic Resources (DARE), The Directorate of Industrial Fishing (DPI) and DG MARE. FarFish Work Package 3 representatives will act as a leading authority in the FarFish RFMS process, considering input from the above-mentioned authorities. The main contact person in this process is Jónas R. Viðarsson[20], as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC, represented by Alexandre Rodriguez[21] and Francisco Teijeira[22] on behalf of OPROMAR.

Roles and responsibilities of authorities and operators

Once the MR invitation has been received by the operators, their representative within the FarFish consortium, Alexandre Rodriguez (LDAC), in cooperation with FarFish Work Package 4, will prepare a draft MR to be reviewed by the authorities (WP3, with input from MPEM, ONISPA, DARO, DPI and DG MARE, where relevant). The authorities will evaluate the strategies and methodologies presented to achieve the OTs within the draft MR and will request a revised version, if needed. Once approved by authorities (foregoing a public hearing), the MR will enter the implementation stage, led by the operators. For further information on the RFMS process, please refer to the "first draft general guidelines for making MRs" presented in FarFish deliverable 3.1.

Time frame

An approved MR should be available by 31 January 2019 the latest.

6.2 MP0

Current state		
This MP0 applies (area, stocks, fleet, authority, and operators) to EU shrimp fishery, the EU black hake fishery and the EU small pelagics fishery in Mauritanian EEZ. Relevant fleet are demersal and mid-water trawlers (wet fish trawlers and freezer trawlers). Relevant authorities are MPEM, ONISPA, DARO, DPI and DG MARE, while the relevant operator is LDAC.		
Case study leader	IMROP Contact person: Khallahi Brahim, medfall_khall@yahoo.fr	
Fishery identification		
Species (target, bycatch)	**Shrimp fishery:** Target: two species of shrimp, **Langostino/Prawn** (*Farfantepenaeus notialis)* and **Gamba/Southern pink shrimp** (*Parapenaeus longirostris).*	FarFish D2.1 Faro meeting (Carmen-Paz Marti, 2018)

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	Other species*; Melicertus kerathurus, Aristeus varidens, Plesionika heterocarpus, Aristaeopsis edwardsiana.* Bycatch; 8% cephalopods, 10 % crabs, 15 % fish. **Black hake fishery:** Target: two species of black hake, **African hake** (*Merluccius polli*) and **Senegalese hake** (*Merluccius senegalensis*). Other species: squid and cuttlefish. **Small pelagics:** Target: Sardinella (*Sardinella aurita and Sardinella maderensis*), Atlantic horse mackerel (*Trachurus trachurus*), Atlantic Mackerel (*Scomber colias*). Other species: Anchovy and Sardine (*Sardina pilchardus*).	
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. The Mauritanian coast is part of one of the four major trade-wind driven continental margin upwelling zones in the world oceans, the north-western African upwelling system (or the Canary Current System). In the Eastern Central Atlantic, the dynamics of an eastern boundary current interacting with trade wind-driven upwelling control this marine ecosystem with exceptionally high primary and secondary productivity. The upwelling off Mauritania is a wind driven upwelling system restricted to a narrow strip along the coast. The two black hake species are overlaying in fishing areas, but African hake (*M.Polli*) accounts for about 90% of the catches. The black hake fishery is primarily conducted on muddy or soft bottom along the shelf (50 m - 200 m) and slope (200 m - 1000 m). The small pelagics caught within the waters of Mauritania, Morocco, Senegal and Gambia are all caught from the same stocks, but unfortunately a regional framework for the	FAO/CECAF (2013) Bouzouma et al., (2017) FAO/CECAF (2013) Bouzouma et al., (2017) (FAO, 2018) (Carmen-Paz Marti, 2018)

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	sustainable management of the stocks is missing. The EU catches are mostly concentrated on deeper waters, whilst the national small-scale fisheries (primarily sardinella) take place closer to shore.	(Carmen-Paz Marti, 2018) (CFFA, 2016)
EU fisheries (nations, gear, vessels, catch, quota)	**Shrimp:** Nations (SFPA); Spain, Italy, Portugal Total reference catch (SFPA): 5,000 t/year Vessels: Shrimp vessels/demersal trawlers According to data from the EU, the utilization rate is low (below 20% 2015-2016) with reported catch of 984 tonnes in 2016. The catch composition of P. *longirostris* and *P.notialis* vary between years, with *P.longirostris* being most abundant the last years. 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. **Black hake:** Nations (SFPA); Spain Total reference catch (SFPA): 6,000 t/year wet fish and 3,500 frozen at sea. Vessels: Demersal trawlers and bottom longliners (bottom longliners have however not been operated in the fishery since 2009). **Small pelagics:** Nations (SFPA); Netherlands, Lithuania, Latvia, Poland, Germany, the United Kingdom, Ireland and France. Other international fleets with significant presence include: Turkey, Russia, Ukraine and China Total reference catch (SFPA): 240,000 t/year. Vessels: Mid-water trawlers and seiners	SFPA (2015-2019) FarFish D2.1 (Carmen-Paz Marti, 2018) Bouzouma et al., (2017)
Other nations	Mauritania, Turkey, Russia, Ukraine and China	
Management		
Authorities	MPEM, ONISPA, DARO, DPI and DG MARE	Faro meeting, MR kick-off meeting, FarFish D2.1, CETMAR
Operators	LDAC	CETMAR
Stakeholders (1) Supporting institutions (2) Scientists	(1) DPI, CECAF, DARE (2) IMROP, FAO, CMR (3) ANAFCO-CECOPESCA, OPROMAR (4) PECHECOPS, Mauritanie 2000,	Faro meeting. FarFish D2.1, CETMAR

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(3) Other industry (4) NGOs		
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 Mauritania, and participate more actively in efforts to develop an inclusive blue economy source of wealth and employment. Management goals (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	FarFish D2.1
Case study objectives	**Shrimp:** reduction of bycatches, improved registration of bycatches, increased onboard observer coverage, improving knowledge on the fluctuations in landings due to environmental forcing. Assessment of vulnerabilities originated from the combined action of human exploitation and adverse oceanographic conditions and analyse alternatives to minimize risks. **Black hake:** Improved discrimination between the two hake species and value chain analysis to explore alternatives for increasing the importance of the black hake for national economy and employment. **Small pelagics:** The small pelagics within the Mauritanian EEZ are vulnerable to environmental forcing, which needs to be further studied. There are also uncertainties around stock assessment and catch reporting/estimates that make this fishery highly relevant for FarFish. In addition, there have been significant changes within the value chain of small pelagics caught within Mauritanian waters in recent years that needs to be studied, as e.g. fishmeal plants have in considerable numbers been established within the country.	Faro Meeting CSIC
Harvesting control Rules	Closed seasons, minimum size, minimum mesh size etc.	
Data collection (fishery catch	For the shrimp fishery the Sampling is based on an observer programme by IMROP. Catch and effort data for shrimp trawler are recorded in the database "Journal de pêche", information	FarFish D2.1 FAO/CECAF (2013)

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and bycatch), employment)	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. Mauritania is a part of the Fisheries Transparency Initiative (FiTI) and is currently working on its implementation. This means that Mauritanian authorities have committed to facilitating full transparency e.g. on agreements with all third-countries and to make public data on the fishing activities of all fleets in operation within Mauritanian waters.	www.fisheriestransperency.org
Assessment	Assessment provided by FAO/CECAF working group on the Assessment of Demersal Resources - Subgroup North. Projections and assessment for state of stocks are done using Schaefer dynamic production model P.*notialis*; 2013: Under-exploited with low Fishing mortality *P. longirostris*, 2013: Fully exploited (2002-2012), but with low Fishing mortality. *P. longirostris* 2015: Not fully exploited P.*notialis* 2015: Fully exploited	FAO/CECAF (2013) Bouzouma et al., (2016) Bouzouma et al., (2017)
MCS	Coast guard (GCM); The fisheries monitoring centre of the coast guard is Nouadhibou. 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.	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 enter the processing there. Majority of the black hake is not landed in Mauritania, but there is some part of the catches that are. Analysing of both national and international value chains, as well as opportunities for landing more in Mauritania is of interest to FarFish. The EU small pelagics are primarily entering international value chains, while there has been a significant increase in the landings of small pelagics in Mauritania by other fleets e.g. Turkey; supplying growing number of fishmeal/reduction plants in the county. Analysing of these value chains is of interest to FarFish.	Faro meeting (Carmen-Paz Marti, 2018)
Processing	Shrimp probably primarily landed in Spain, we have no info on the further processing of this, will have to be investigated. Frozen at sea black hake and much of the fresh hake black hake is entering international value chains (primarily Spanish). Part of the fresh black hake is landed in Mauritania and then either	NOFIMA (WP3)

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	consumed nationally, exported to other African countries and/or to Europe. FarFish is interested in investigating these value chains. National catches of small pelagics are primarily used for drying and smoking in Mauritania for national consumption. High capacity International fleets in cooperation with national companies e.g. joint venture, are landing catches in Mauritania to be processed in fishmeal/reduction plants. A total of 240,000 tons of small pelagics were processed into fishmeal in Mauritania in 2014. International freezer trawler fleets (including EU) are primarily supplying international markets.	(Corten, Braham, & Sedagh, 2017)
Market		
Challenges		
Fishery	High bycatch in shrimp fishery Discrimination between black hake species lacking Transparency in small pelagic value chains lacking	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 fleets.	CSIC (Carmen-Paz Marti, 2018)
Potential improvements	**Using new tools**	
Assessment, Early warning of risks	Advanced knowledge on how the signal of oceanographic processes affects the shrimp 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. Discrimination between the two black hake species, as they have different biological characteristics, such as different length at maturity that could justify different minimum landing size. Improved data on the proportion of the two stocks would as well improved stock assessment and valent separate TAC. Improved knowledge and transparency on the small pelagics will improve stock assessment and potentially increase value and benefits for Mauritania through value chain improvements.	CSIC

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6.3 Outcome Targets

The following OTs were identified based on MP0 and input from key stakeholders (from both EU and Cape Verde) received at the MR kick off meeting in Vigo, held in June 2018.

For the black hake fishery, the interest of the authorities is primarily to improve knowledge on the catches of the two hake species (species discrimination), bycatches and to get better understanding of the value chains of the black hake caught in Mauritanian waters. The OTs that have therefore been set are:

- **OT1:** Enhancing data collection to enable for more accurate estimations of the share of each black hake species in total catches. **Obligatory OT.**
- **OT2:** Improved data collection and reporting from all operators fishing for black hake in Mauritanian waters where data on catches and landings of all species is reported via electronic reporting (including target- and bycatches and should ideally account for discards where applicable). **Obligatory OT.**
- **OT3:** Increase knowledge and data collection of all fleets fishing for black hake operating in the Mauritanian EEZ on trade flows to include for example catches, destination/landings, utilization/processing, exports, value etc. This could include providing copies of sales invoices (sales certificates) in order to verify what markets the catches enter. Major aim of this OT is to support efforts to increase local supply and demand and strengthen local markets for black hake. **Recommended OT.**

It was acknowledged that there is probably little interest among operators to enter RFMS for shrimp, due to declining catches and effort after important fishing grounds were closed off for the EU fleet. It is nevertheless an interest of the authorities to explore the option of applying RFMS in this fishery. However, since the RFMS is based on the concept of voluntary participation, it is completely up to the operators if they want to enter into a development phase. The interests of the authorities is to reduce bycatches, improved registration of bycatches, increase onboard observers, improving knowledge on the fluctuations in landings due to environmental forcing. Meeting with some of these objectives is though not within the power of the operators, which makes it difficult to translate them into OTs. The OTs that have therefore been set are:

- **OT4:** Registration and reporting of all catches in the shrimp fishery, including bycatches. **Obligatory OT.**

Small pelagics constitute the bulk of the total catch volumes in Mauritanian waters. There are large international fleets, as well as national and joint venture fleets involved in the fishery and there are issues with transparency, reliability of catch statistics, understanding of the value chains and understanding in the effects of environmental forcing on the stocks. Some of these issues are not

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within the power of operators to be solved, but they can at least contribute to solving some of them. The OTs set for the small pelagic fishery are:

- **OT5:** Improved data collection and reporting from all operators fishing for small pelagics in Mauritanian waters where data on catches and landings of all species are reported via electronic reporting (including target- and bycatches and should ideally account for discards where applicable). **Obligatory OT.**
- **OT6:** Full onboard observer coverage on all high-capacity pelagic vessels**. Obligatory OT.**
- **OT7:** Increase knowledge and data collection of all fleets fishing for small pelagics operating in the Mauritanian EEZ on trade flows to include for example catches, destination/landings, utilization/processing, exports, value etc. This could include providing copies of sales invoices (sales certificates) in order to verify what markets the catches enter. **Recommended OT.**

It is recognised that some of the data relevant for OT4 and OT7 can be confidential information (for example between fishing companies and their customers) and it is therefore expected that the MR draft will take that into consideration i.e. by suggesting what data can be provided, on what format, aggregation etc.

6.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in Mauritania, a number of action points have been identified that could strongly support the case study objectives identified in the MP0. These action points have not been included in the list of OTs as they cannot be solely operationalised by the operators, as they require input/action from other relevant parties (authorities, scientific institutions, other international fleets, etc.). These are:

- Improved quality of current stock assessments for black hake, with separate stock assessments for the two species. FarFish will aim to contribute to this with collection of new data that enables separation between the two stocks. FarFish will as well build competences amongst relevant stakeholders to separate between the two species.
- Knowledge gap analysis is needed, in order to identify key knowledge and data gaps, small pelagics. The responsibility for this cannot realistically be placed on the operators. This is at least partly to be addressed within the FarFish project.
- Effort should be put into increasing local demands and local markets for black hake, including those in other African countries e.g. Cape Verde, Côte d'Ivoire and Cameroon. Analysis of the Mauritanian black hake value chains will be a part the FarFish project, which will potentially contribute to this.
- Socio-economic effects and conditions linked to small pelagics need to be analysed in more detail than has been done until now i.e. employment, human consumption and value. This will to a point be addressed in FarFish.

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- Develop user friendly, digital maps (VMS/AIS based) with the intention of: a) demonstrating the EU fleet's good compliance in reporting of activities and avoidance of identified VMEs (thus creating pressure on other international fleets to do the same), b) mapping fishing activities of other distant water fleets operating in Mauritanian waters, and c) visualise the frequency of VMS/AIS gaps.

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7 Case Study: Seychelles

7.1 Introduction

Main focus of MR

This document serves as a formal Management Recommendation (MR) invitation to the following European operators active in the Seychelles tuna fishery under the current active SFPA: LDAC, OPAGAC, ORTHONGEL and ANFACO-CECOPESCA. The EU vessels currently operating under the agreement are tuna seiners (40) and surface longliners (6) from Spain, France and Italy, with a total reference catch of 50 thousand tonnes per year under the active SFPA. Portugal is also allowed to employ two surface longliners in Seychelle waters, which have not been active in recent years.

The Seychelles EEZ covers an area of 1,374,000 km^2 of which only 50,000 km^2 is a shelf area. Seychelles has the largest EEZ in the west Indian ocean and majority of the fishery is conducted by foreign fleets.

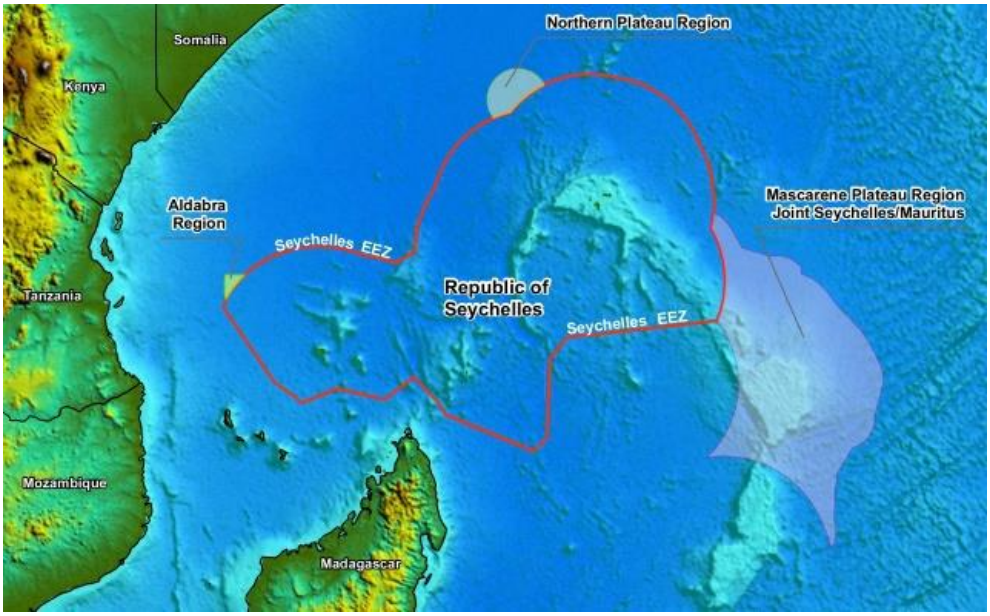

Figure 6: Seychelles have the largest EEZ in the west Indian Ocean, covering almost 1.4 million km^2

Some of the main challenges identified for the Seychelles case study is the limited knowledge on the ecological and economic effects of drifting FADs, as well as the relative lack of data to undertake stock assessments of bycatch species (e.g. sharks, dolphins, marine turtles). Issues involving limited monitoring activities have been raised as well as a need for further local institutional capacity development.

The case study objectives identified in MP0 are as follows:

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.

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3. Contribution to the assessment of the sustainability of non-target species included in the recent discard ban (IOTC resolution 17/04, 2017) that are not currently assessed (e.g. dolphinfish, wahoo, barracuda, rainbow runners).
4. Analysis of the economic and social impacts of the discard ban (IOTC resolution 17/04, 2017).

Main characteristics of fishery

The tuna SFPA is a 6 years renewable agreement and the current one covers the period from 2013-2019. The number of licenced vessels taken up every year vary. In 2016, Spain had 14 tuna seiners licenced and 11 supply vessels, France had 12 tuna seiners, 1 supply vessel and 1 longliner, and finally Italy had 1 tuna seiner. These vessels mostly target skipjack and yellowfin tuna, while the surface longliners (very few currently active) mainly target bigeye and yellowfin tuna. In 2017, total catches of the EU fleet amounted to 49,378 tonnes, mostly split between French and Spanish fleets, with Italy only taking around 3 thousand tonnes.

The authority

The ruling authority in the Seychelles case study are SFA and DG MARE. FarFish Work Package 3 representatives will act as a leading authority in the FarFish RFMS process, considering input from SFA and DG MARE. The main contact person in this process is Jónas R. Viðarsson[23], as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC represented by Alexandre Rodriguez[24] and ANFACO-CECOPESCA represented by Gonzalo Ojea[25] (ANFACO).;

Roles and responsibilities of authorities and operators

Once the MR invitation has been received by the operators, their representatives/coordinators within the FarFish consortium, Alexandre Rodriguez (LDAC) and Gonzalo Ojea, in cooperation with FarFish Work Package 4, will prepare a draft MR to be reviewed by the authorities (WP3, with input from SFA and DG MARE). The authorities will evaluate the strategies and methodologies presented to achieve the OTs within the draft MR and will request a revised version, if needed. Once approved by authorities (foregoing a public hearing), the MR will enter the implementation stage, led by the operators. For further information on the RFMS process, please refer to the "first draft general guidelines for making MRs" presented in FarFish deliverable 3.1.

Time frame

An approved MR should be available by 31 January 2019 the latest.

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7.2 MP0

Current state		Reference
This MP0 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 and ANFACO-CECOPESCA. EU vessels (purse seines and longliners) are from Spain, France and Italy		
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** (*Thunnus albacares*), **Bigeye tuna** (*Thunnus obesus*), **Skipjack tuna** (*Katsuwonus pelamis*). Bycatch: Bonito (*Euthynnus affinis*), Dolphin fish (*Coryphaena hippurus*), Rainbow runner (*Elegatis bipinnulata*), triggerfish (Balistidae) billfish Istiophoridae), wahoo (*Acantocybium solandri*)	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 do 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 www.Whofishesfar.org SFA, VL
Other nations	Purse seiners; South Korea, Seychelles, Japan, Mauritius Longliners: Taiwan (POC), Japan, China, Mauritius	SFA, VL FarFish D2.1 FiTI (2016)
Management		
Authorities	**DG MARE, SFA**	Faro meeting
Operators	**LDAC, ANFACO-CECOPESCA, OPAGAC**	CETMAR
Stakeholders (5) Supporting institutions (6) Scientists (7) Other industry	(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

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(8) NGOs		
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
Case study 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 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)	Faro Meeting SFA, VL IOTC IOTC (2017b) IOTC
Harvesting Control Rules (HCR)	**Yellowfin**; MSY: 422,000 t, **Skipjack**; MSY: 684,000 t, Not well determined models, new assessment in 2017 not published yet. **Bigeye**; MSY: 104,100 t. Quota applicable for yellowfin tuna and HCR have been established for Skipjack. **Other Species**: Holothurians; Limited entry/ Close season and quota. Spiny Rock Lobster Fishery: Limited entry and close season Industrial fishing vessels (Seychelles and foreign) vessels are prohibited from shallow banks and reefs. 17 MPAs as of 2008. Seychelles Marine Spatial Planning (SMSP) to establish more no-take zones.	IOTC (2017a) SFA, VL
Data collection (fishery; catch and bycatch, employment)	SFA; logbook, VMS data, catch, effort, length frequency, species composition, observer programme (IRD, IEO) Fishery independent surveys by SFA for demersal species.	FarFish D2.1

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	Seychelles is a part of the Fisheries Transparency Initiative (FiTI) and is currently working on its implementation. This means that Seychelles authorities have committed to facilitating full transparency e.g. on agreements with all third- countries and to make public data on the fishing activities of all fleets in operation within Seychelles waters.	www.fisherieestranspere ncy.org
Assessment	Indian Ocean Tuna Commission (IOTC) **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 % **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. **Bigeye**; Assessed using Stock Synthesis and ASPM software, bigeye is in relatively good state Catch rates of other species are declining, reflecting over-fishing pressure in open-access fisheries	IOTC (2015) IMF (2017) FarFish D2.1 IOTC (2015)
Monitoring, Control and Surveillance (MCS)	Seychelles participate in IOTC regional observer scheme to monitor trans-shipments at sea on carrier vessels for the industrial longline fleet. Transhipment only within Seychelles' ports. VMS, ERS, observers appointed by Seychelles authorities. 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). 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). Seychelles National Scientific Observer Programme; deployment of observers on-board industrial purse seiners. EMS pilot project to complement human observers.	SFA, VL SFPA, sec.4 SFA, VL Fisheries Act 2014. FarFish D2.1 IOTC (2015) SFA, VL
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	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. EU vessels land the majority of catches in Seychelles (92% of Spanish catch, 82% of French catch).	EU, SFPA, sec.3, chpt VI, FarFish DoA, p18
Processing	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	FarFish D2.1 (p. 44-45). NOFIMA

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	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)	
Market	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, trans-shipments/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. Understand the social and economic consequences under scenarios including a reduction in the number of FADs.	Faro Meeting
Management	There is a need to improve compliance with Conservation and Management Measures (CMM).	SFA, VL
MCS	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 resolution 17/04, 2017).	
Management, monitoring	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 very good 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 e.g. Visualisation, model scenarios. The dialogue is in progress.	IOTC (2008, 2015, 2015, 2017a, 2017b, 2017c)

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7.3 Outcome Targets

The following OTs were identified based on MP0 and input from key stakeholders (from both the EU and Seychelles) received at the MR kick off meeting in Vigo, held in June, 2018. The general agreement was that FarFish would not be able to add much value to the assessment and management of tuna, which is in good hands with IOTC. One of the key issues identified where FarFish would however potentially be able to contribute is in regard to bycatches in the tuna fishery. There is limited or complete lack of data and stock assessments of non-target species that are regularly caught as bycatch in the tuna fishery, e.g. dolphins, wahoo, barracuda and rainbow runners. In relation to this, the following OTs were identified:

- **OT1:** Mandatory e-logbooks and provision of data to be used for scientific and research purposes. **Obligatory OT.**
- **OT2:** Development of a protocol for registration of catches of non-target species in e-logbooks. **Obligatory OT.**
- **OT3:** Setting of conditions for a better coordination of observer programme: content (protocols, criteria), schedules, processes, sharing of information. This is an OT that will have to be worked on in collaboration between operators and authorities as it includes harmonisation of Seychelles, EU and ICCAT protocols on on-board observers. **Recommended OT.**

The IOTC is already working on various projects to estimating the ecological and economic impact of FADs, but there is still limited knowledge on the use of FADs within Seychelles EEZ and its ecological and economic effects. Thus, the following OT was identified:

- **OT4:** Provision of data on the use of FADs within Seychelles EEZ. This includes catch data, operating costs and other data relevant for estimating the economic advantages of using FADs (particularly drifting FADs). **Recommended OT.**

In order to ensure compliance and improve monitoring of all fleets fishing in the Seychelles EEZ it is important that all vessels transmit AIS signals. EU vessels are the example to follow, demonstrating responsibility and good practice. This is particularly important to guarantee that MPAs and no-take zones are respected. The following OT is therefore identified:

- **OT5:** Commitment to transmit VMS/AIS signals. **Obligatory OT.**
- **OT6:** Commitment to honour MPAs and no-take zones identified in the SMSP. **Obligatory OT.**

Finally, given the lack of knowledge within the value chain of tuna products and what markets these products enter, the final OT is as follows:

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- **OT7**: Mandatory provision of sales invoices (sales certificates) in order to verify the markets tuna derived from Seychelles EEZ ends up in (i.e. canning or others). **Recommended OT.**

Some potentials remain for setting more socio-economic OTs related to landing, processing and marketing of bycatches, which often are valuable species. At the moment, it is premature to set such OTs, as some research should take place prior to that.

7.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in Seychelles, a number of action points have been identified that could strongly support the case study objectives identified in the MP0. These action points have not been included in the list of OTs as they cannot be solely operationalised by the operators, as they require input/action from other relevant parties (authorities, scientific institutions, other international fleets, etc.). These are:

- Investigation (including trade-off analysis) of the economic impacts of using drifting FADs in Seychelles waters, and estimate the economic consequences of reducing the number of allowable FADs. This could lead to a conclusion on the optimal number and spatial distribution of drifting FADs.
- Analysis of the economic impacts of the discard ban (IOTC resolution 17/04, 2017)

The analysis of the distant water fleet might include some of the following variables that are used to measure the economic performance of the EU fleet by STECF at their annual economic reports (AER), they are called data requirements:

- Capacity: Number of vessels, Gross Tonnage and KWs
- Effort: Days at sea, fishing days, and energy consumption.
- Employment: FTE
- Income: Value of landings
- Cost: Gross Profit GVA, and, where possible, Net Profit
- Landing: weight of landing per species, and value per species
- Capital and Investment: Value Recovery Price

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8 Discussion

It should be taken into consideration that this initial MR invitation is a preliminary version that will be developed further within the FarFish project. The OTs are for example likely to be developed further during the course of the project. It does also have to be considered that the EU fleet is only a subset of the resource users in the case studies, which is likely to have effect on the MRs in respect to impact, coverage and issues concerning “level playing field”.

The operators are invited to start the process of developing MRs with this invitation. It is reasonable to assume that various issues and challenges will be identified during the development phase, which can then have effect on the OTs or the MRs. For this reason, the FarFish project has been structured according to the spiral model approach (Boehm, 1986), meaning that it will go through iterative prototyping loops before the final versions are developed. This will facilitate that the project will end up with the best available OTs and MRs.

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