

Deliverable No. 3.6

Project acronym:

FarFish

Project title:

Responsive Results-Based Management and capacity building for EU Sustainable Fisheries Partnership Agreement- and international waters

Grant agreement No: **727891**

Project co-funded by the European Commission within the
Horizon2020 Research and innovation programme

Start date of project: **1st June 2017**

Duration: **48 months**

Due date of deliverable:	31/07/2019
Submission date:	24/09/2020
File Name:	FarFish_D3.6 second MR invitations_2.0
Revision number:	02
Document status:	Final ¹
Dissemination Level:	PU ²

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)

Role	Name	Organisation	Date	File suffix ³
Authors/ Task Leaders	Jónas R. Viðarsson Ragnhildur Friðriksdóttir Sigurður Örn Ragnarsson	MATIS	24/09/2020	JRV
Authors	Karin Olsen Nina Mikkelsen Michaela Aschan	UiT	13/01/2019	KO
	Sonia Doblado Martín Alexandre Rodriguez	LDAC	13/01/2019	SDM AR
	Duarte F. Vidal Rosa Chapela Marta Ballesteros	CETMAR	13/01/2019	DFV
	Juliana Galvão	UPS	07/12/2019	JG
	Lidvard Grønnevet Arved Staby	IMR	07/12/2019	LG
	Benvindo Fonseca	INDP/IMAR	07/12/2019	BF
	Khallahi Brahim Elimane Kane	IMROP	07/12/2019	KB
	Mamadou Diallo	COREWAM	07/12/2019	MD
	Ndiaga Thiam Modou Thiaw	CRODT	07/12/2019	MF
	Yannick Roucou Vincent Lucas	SFA	19/12/2019	VL
	Karim Erzini Kim Stobberup	CCMAR	07/12/2019	KE
	Gonzalo Ojea	ANFACO	18/12/2019	GO
	Francisco Teijeira	OPROMAR	18/12/2019	FT
	Khalid Elkalay Khalil Karima	UCA	07/12/2019	KE
	WP leader	Petter Olsen	NOFMA	21/01/2020
Coordinator	Jónas R. Viðarsson	MATIS	24/09/2020	JRV
Administrative Coordinator	Oddur M. Gunnarsson	MATIS	24/09/2020	OMG

³ The initials of the revising individual in capital letters

Deliverable D3.6

Second MR invitations submitted to case studies

24/09/2020



Executive Summary

More than 20% of the European fishing fleets catches are taken from non-European waters. Access to these waters is often based on agreements with coastal states that allow the EU fleet to fish from surplus stocks in return for financial support. These agreements have been subjected to criticism, as these fisheries are sometimes poorly regulated and management decisions are often based on limited knowledge, compliance, and enforcement capabilities. It is also too often the case that trust between stakeholders is lacking. The aim of the FarFish project is to overcome these challenges. The FarFish project is designed around six case study areas, in which the European fleet is actively engaged in fishing activities. These are Cape Verde, Mauritania, Senegal and Seychelles, as well as the international high-seas areas in the southeast and southwest Atlantic.

This document contains the 2nd 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 “second draft general guidelines for making MRs” presented in FarFish deliverable 3.5 (D3.5). 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 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. This approach is likely to increase the sense of ownership, by 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 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 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 performance goals that the MRs are to meet.

It should be taken into consideration that this is the second MR invitations developed within FarFish, as the project is designed to go through two loops (iterations) when it comes to development and testing/validation of the RFMS approach. The project has already published “1st draft general guidelines for making MRs” (D3.1), “First MR invitations submitted to CSs” (D3.2), “1st MRs for each CS” (D4.3) and the “report on the audit of the 1st MRs for each CS” (D5.1). There have been important “lessons learned” from the first iteration, which are now implemented in updated versions of the MR guidelines and the MR invitations.

OTs are specific and measurable requirements that are set by authorities in the MR invitation, to reflect policy objectives in the given management context. OTs can be either *obligatory* or *recommended*. 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).

In the context of RFMS, it should be entirely up to the operators to identify how they can achieve the OTs set by the authorities. In the case of high-seas and SFPAs fisheries, it is however clear that operators cannot be made solely responsible for achieving many of the OTs. Some of them might for example be in form of policy recommendations, they might require changes in regulations or changes in requirements set by EU, Member state, flag state, coastal state or RFMOs. They can also be in the form of identification of necessary research and/or knowledge building needs. In such cases, the OTs have been translated into “*Other potential actions as supplement to the MR*”. This means that the MRs should address these issues as far as possible, but there is understanding that the operators cannot be made solely responsible for them.

The OTs and the “*Other potential actions as supplement to the MRs*” presented in this MR invitation are as follows:

South West Atlantic case study:

- **OT1:** A soft-law mechanism [International Conference] focused on sustainable management in ABNJ (FAO 41) available. Obligatory OT.
- **OT2:** All vessels transmit AIS signals. Obligatory OT.
- **OT3:** Theoretical frame for a Specific Control and Inspection Programme in FAO 41 as basis for a future pilot project on a joint deployment plan for this region available. Recommended OT.
- **Other potential action 1:** Compilation of knowledge on main stocks being targeted in the fishery is needed. This knowledge already exists to some degree at different scientific institutions e.g. knowledge on the two hake species as well as main targeted cephalopods.
- **Other potential action 2:** Development and testing of self-sampling protocol for fleets targeting the two hake stocks is advised. This should be done with the intention to facilitate discrimination of the two hake species in catch.
- **Other potential action 3:** Development of user friendly, digital maps (VMS/AIS based) would be beneficial; 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 adopt similar standards, b) mapping fishing activities of other distant water fleets operating in identified VMEs, and c) visualise the frequency of VMS/AIS gaps. This could facilitate improved compliance with the VMEs in accordance with UNGA 61/105 and FAO Guidelines for Management of Deep-Sea Waters in the High Seas, as well as Council Regulation No 734/2008.

South East Atlantic case study:

- **OT1:** Reporting of all catches via e-logbooks. Obligatory OT.
- **OT2:** All vessels transmit AIS or VMS signals. Obligatory OT.
- **OT3:** All vessels have on-board observers. Recommended OT.
- **Other potential action 1:** Compiling of existing knowledge on main stocks being targeted in the area is needed. This information exists to some degree at different scientific institutions and research programmes.
- **Other potential action 2:** Development of user friendly, digital maps (VMS/AIS based) with the intention of identifying fishing pressure of different fishing fleets is advised. This will potentially create pressure on international fleets to send uninterrupted AIS signals.

Cape Verde case study:

- **OT1:** A harmonized catch data protocol in place that facilitates improved reporting of swordfish and blue shark commercial and biological data. Obligatory OT.
- **OT2:** All vessels transmit AIS and/or VMS signals. Obligatory OT.
- **OT3:** Strengthened observer program in place. Recommended OT.
- **OT4:** Trade flow data provided. Recommended OT.
- **Other potential action 1:** There is a data gap when it comes to Information on trade flows within the value chains of Cape Verde i.e. catches of all fleets operating within the Cape Verde EEZ. There is good data available on catches landed in Cape Verde and within the EU, but data on catches landed in other African countries or transshipments is however lacking. Cape Verdean authorities have therefore very little overview 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. This is a gap that should be addressed.
- **Other potential action 2:** Capacity building is needed within Cape Verdean institutions in tuna stock assessment and management.
- **Other potential action 3:** A need for 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.
- **Other potential action 4:** 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.
- **Other potential action 5:** The development of VMS/AIS digital maps that clearly show fishing activities of both EU fleets and other fleets', and frequency of VMS/AIS gaps could be extremely valuable in respect to evaluate compliance to agreements and requirements of ICCAT.
- **Other potential action 6:** There is a need to Increase research into the socio-economic and ecological impacts of FADs. Analysis (including trade-off analysis) of the economic impacts of

using drifting FADs in Cape Verdean waters, and estimation of the economic consequences of reducing the number of allowable FADs, is needed. This could potentially lead to identification on optimal number and spatial distribution of drifting FADs.

Senegalese case study:

- **OT1:** Information on the proportion of the two species of black hake in catches provided. Obligatory OT.
- **OT2:** Bycatch data in black hake fishery available. Obligatory OT.
- **OT3:** VMS and/or AIS signals are transmitted. Obligatory OT.
- **OT4:** Trade flow data on black hake provided. Recommended OT.
- **Other potential action 1:** The need to increase supply/demand and local markets within the black hake fishery, including those of neighbouring countries, has been identified. 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.
- **Other potential action 2:** Improved quality of current stock assessments for black hake, with separate stock assessments for the two species is needed.
- **Other potential action 3:** Knowledge gap analysis is needed, especially for the black hake stocks.
- **Other potential action 4:** Development of user friendly, digital maps (VMS/AIS based) that support monitoring of all fleets operating in the area could be valuable for this case study.

Mauritanian case study:

- **OT1:** Information on the proportion of the two species of black hake in catches provided. Obligatory OT.
- **OT2:** Information on black hake caught as bycatch **provided. (Obligatory OT).**
- **OT3:** Increased on-board observer coverage on all high-capacity pelagic vessels in place. Obligatory OT.
- **OT4:** Data on all catches, discards and by-catches provided. Recommended OT.
- **OT5:** Trade flow data on small pelagics provided. Recommended OT.
- **Other potential action 1:** Collecting data of the black hake as bycatch by all operators in Mauritanian waters by observers (IEO/CECAF/IMROP) would be beneficial for stock assessment.
- **Other potential action 2:** Knowledge gap analysis is needed for small pelagics in Mauritanian waters.
- **Other potential action 3:** Effort could be put into increasing local demand and local markets for black hake, including those in other African countries e.g. Cape Verde, Côte d'Ivoire and Cameroon.

- **Other potential action 4:** 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.
- **Other potential action 5:** Development of user friendly, digital maps (VMS/AIS based) that support monitoring of all fleets operating in the area would be valuable for this case study.

Seychelles case study:

- **OT1:** Harmonized fisheries information system in place. Obligatory OT.
- **OT2:** Catches of non-target species registered in e-logbooks. Obligatory OT.
- **OT3:** MPAs and no-take zones identified in the SMSP are respected. Obligatory OT.
- **OT4:** Updated observer program in place. Recommended OT.
- **OT5:** Trade flow data provided. Recommended OT.
- **OT6:** VMS or AIS signals are transmitted. Recommended OT
- **Other potential action 1:** Analysis on opportunities for increasing landings, processing and marketing of by-catches is needed. By-catches from the EU tuna fleet (and other fleets operating in the area) are often valuable species which could potentially present business opportunities.
- **Other potential action 2:** Analysis of the economic impacts of the discard ban (IOTC resolution 17/04, 2017) is needed.
- **Other potential action 3:** Analysis (including trade-off analysis) of the economic impacts of using drifting FADs in Seychelles waters, and estimation of the economic consequences of reducing the number of allowable FADs, is needed. This could potentially lead to identification on optimal number and spatial distribution of drifting FADs.

Several OTs and “other potential actions” presented in this 2nd version MR invitation have changed from the 1st version. For the purpose of demonstrating full transparency, explanations and justifications for these changes are addressed in the discussion chapter and in appendices.

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Abbreviations

ABNJ	Areas Beyond National Jurisdiction
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-CECOPECA	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
CA	Convention Area
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
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 Oceanografía
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/IMAR	National institute for Fisheries Development / Instituto do Mar 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
MPEM	Ministry of Fisheries and Maritime Economy, Senegal
MSY	Maximum sustainable Yield
OCEANA	International organization focused solely on ocean conservation, NGO
OFCF	Overseas Fishery Cooperation Foundation, Japanese NGO
ONISPA	Office National d'Inspection des produits de la peche et aquaculture
OPAGAC	Organisation of associated producers of large tuna freezer vessels, representing the purse seine fleet
OPRPOMAR	Organization of Fresh Fish Producers of the Port and Ría de Marín, Spain
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 Garantia de Qualidade cpcp, Cape Verde
SIOTI	The Sustainable Indian Ocean Tuna Initiative
SMARTFISH	Regional fisheries programme managed by the Indian Ocean Commission, funded by the European Union and co-implemented by the Food and Agriculture Organization of the United Nations. IOC SmartFish
SMSP	Seychelles Marine Spatial Planning
TAC	Total Allowable Catch
TL	Total length
UNK area	Unknown area
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
WWF	Worldwide fund for nature

Key concepts and definitions

Authority	Organizational entity enacting authority in pursuit of the management objectives decided for a fishery e.g. a coastal state or the European Commission.
Auditor(s)	The auditor is an organization with a competence in evaluating the extent to which specific and measurable policy objectives, as pursued within management plans developed and implemented by operators, are met.
Indicator	A variable, pointer or index related to a criterion. Indicators are selected such that their variations reflect variations in key elements of the fishery resource, the social and economic well-being of the sector and the sustainability of the ecosystem. The position and trend of an indicator in relation to reference points or values indicate the present state and dynamics of the system. Indicators provide a bridge between objectives and actions
Management objectives	Fisheries management objectives are typically framed within the overall concept of sustainable development and may reflect one or more of the various dimensions and criteria that relate to it. Operators through setting and implementing management measures control OTs.
Management Recommendation (MR)	The management recommendation (MR) is a formal arrangement between a management authority and operators that specifies the partners in the fishery and their respective roles, the agreed objectives for the fishery, the management rules and regulations that apply, and provides other relevant details about the fishery.
MR1 & MR2	FarFish is organised to go through two loops within the RFMS process. First version Management Recommendations are called MR1 and second version MR2.
Operator	Organizational unit with delegated authority to develop management plans and oversee or conduct fishing operations within the standards decided by a management authority
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. OT can be a textual or mathematical statement that can be evaluated as "true" or "false", where "true" is the target value. Textual OT: A natural language statement that can be evaluated as "true" or "false", e.g. "stock assessment exists", "CAP has been developed" or "stakeholders have been consulted". Mathematical OT: Normally an inequality, where one of the terms is an indicator and the other one is a reference point or value. E.g. $Catch \leq MSY$, $catch \leq MEY$ or $emissions \leq limit$ (political reference point). The actual "true" or "false" value of the OT in question needs to be evaluated at specific times (e.g. once a year), e.g. based on the indicator and reference point value at that specific time.
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.

1 Introduction

This document contains the 2nd 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 “second draft general guidelines for making MRs” presented in FarFish deliverable 3.5 (D3.5). 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 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 provided in D3.5. According to those, the invitations are to include:

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. Explanations of rights and duties of both operators and authorities participating in the RFMS process.
7. Setting of Outcome Targets (OTs), which are specific and measurable requirements, set by the authorities leading the RFMs process, in order to reflect overall policy objectives in terms of biology, environment, economics and society.

Items 2 and 3 are presented in Management Plan Zero (MPO), which was produced for each case study (CS) and published in D4.1. The MR invitations follow up on “pre-invitation dialogues” that have already taken place to create mutual understanding of the RFMS process ahead. These dialogues have included discussions 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 now 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.

It should be taken into consideration that these are the second MR invitations developed within FarFish, as the project is designed to go through two loops (iterations) when it comes to development and testing/validation of the RFMS approach. The project has already published “1st draft general guidelines for making MRs” (D3.1), “First MR invitations submitted to CSs” (D3.2), “1st MRs for each CS” (D4.3) and “report on the audit of the 1st MRs for each CS” (D5.1). There have been important

“lessons learned” from the first iteration, which are now implemented in updated versions of the MR guidelines and the MR invitations.

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 SFPAs fishery, Senegalese SFPAs fishery, Mauritanian SFPAs fishery and the Seychelles SFPAs fishery (Figure 1).



Figure 1: FarFish focuses on six case studies, two in high-seas areas and four within SFPAs areas

The MR invitations presented for each case study includes three main sections: a) Introduction, b) the MPOs, and c) setting of Outcome Targets (OTs), which are specific and measurable requirements, set by the authorities⁴ 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*. 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).

⁴ In the FarFish project, Work Package 3 has the role of “authorities” within the RFMS process, although relevant authorities have been and/or will be consulted to the extent possible during the process.

In the context of RFMS, it should be entirely up to the operators to identify how they can achieve the OTs set by the authorities. In the case of high-seas and SFPAs fisheries, it is however clear that operators cannot be made solely responsible for achieving many of the OTs. Some of them might for example be in form of policy recommendations, they might require changes in regulations or changes in requirements set by EU, Member state, flag state, coastal state or RFMOs. They can also be in the form of identification of necessary research and/or knowledge building needs. In such cases, the OTs have been translated into “Other potential actions as supplement to the MR”. This means that the MRs should address these issues as far as possible, but there is understanding that the operators cannot be made solely responsible for them.

For further information on the structure and requirements of an OT, please visit “Draft 2 General Guidelines for making MPs”, presented in FarFish D3.5.

2 MR invitation for the South West Atlantic case study

2.1 Introduction

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 takes mainly place in sub-areas 41.3.1 and 41.3.2, in part of the Patagonian shelf and the slope (<300 m) that extends beyond the Argentinian EEZ and the Falkland Islands Outer Conservation Zone (FOCZ).

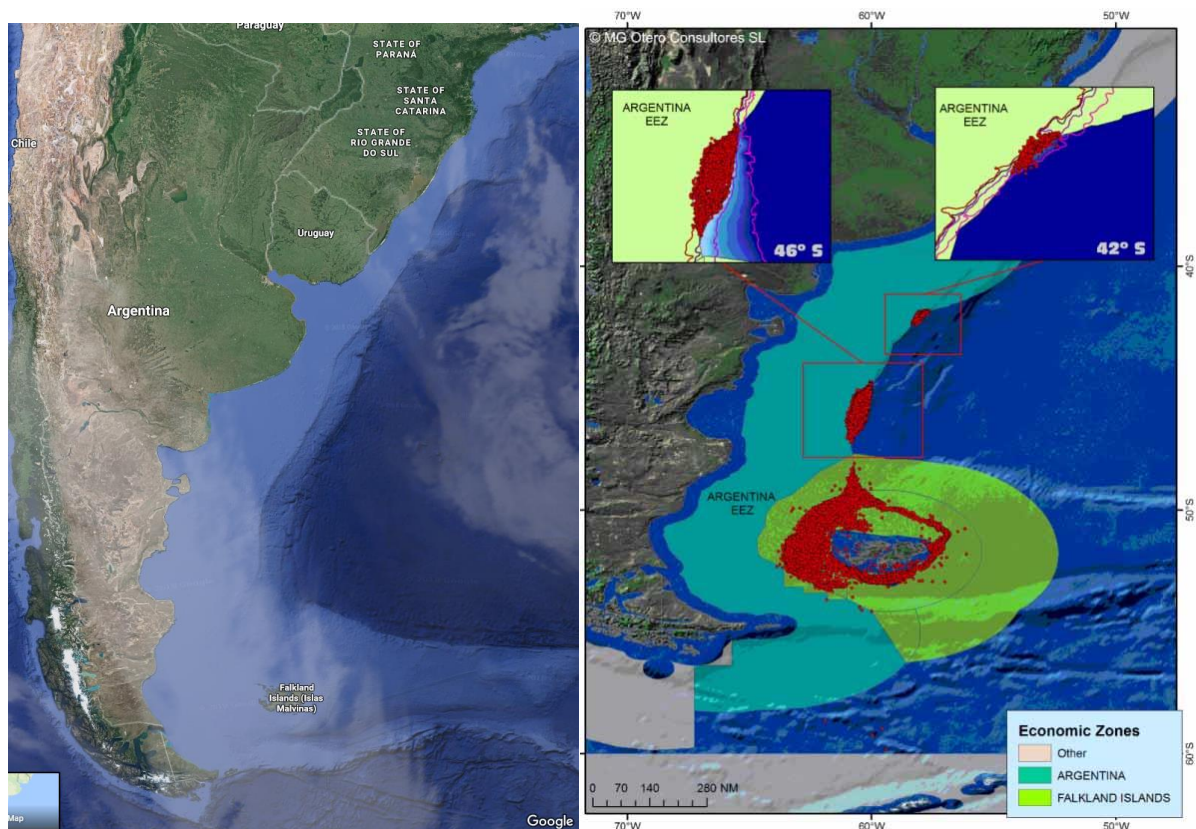


Figure 2: The fishery within the case study is mostly concentrated on international waters just outside the Argentinian EEZ and around Falklands islands (EC, 2008).

The EU fleet operating in this area primarily targets Argentine Hake (*Merluccius hubbsi*), Australian hake (*Merluccius australis*), Argentine shortfin squid (*Illex argentinus*), and southern blue whiting (*Micromesistius australis*), with current catches 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 eastwards, with the subsequent

reduction of the area available for fishing. Thus, the main fishery area for this fleet is located between 44° and 48° 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 recently seen an increase in profitability⁵.

The authority

In the absence of a Regional Fisheries Management Organisation (RFMO) there is no competent fisheries management authority in this area to take the lead in the RFMS process. FarFish WP3 representatives will therefore act as the leading authority in the case study, 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. Viðarsson⁶, 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 and Sonia Doblado⁷, from the executive Secretariat of LDAC. The FarFish project fully recognises that the EU operators 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 dialogue 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. A set of OTs are presented in this MR invitation 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. 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 May 2020 the latest.

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.

⁶ jonas@matis.is

⁷ alexandre.rodriguez@ldac.eu and Sonia.doblado@ldac.eu

2.2 MPO

Current state		Reference
	<p>This MPO applies to the international mixed fishery in FAO Area 41, mainly subarea 41.3.1 and 41.3.2, at the part of Patagonian shelf and slope (<300 m) that extends beyond the Argentina EEZ and the Falkland Islands Outer Conservation Zone (FOCZ). There are no RFMO or coastal states as authorities in this area. Potential authorities are DG MARE (EU), INIDEP (Argentina), CAFS (China), CGPOP (Brazil). The operators are LDAC and ARVI.</p>	
Case study leader	University of Sao Paulo (USP), Brazil Contact person: Juliana Galvão, jugalvao@usp.br	Revised JG 1.12.19
Fishery identification		
Species (target, bycatch)	<p>Main target Argentine Hake (<i>Merluccius hubbsi</i>), Australian hake (<i>Merluccius australis</i>), Argentine shortfin squid (<i>Illex argentinus</i>), southern blue whiting (<i>Micromesistius australis</i>), Longtailed souther cod (<i>Patagonotothen ramsayi</i>), wahoo (<i>Acanthocybium solandri</i>), blue shark (<i>Prionace glauca</i>).</p> <p>Bycatch Patagonian grenadier (<i>Macruronus magellanicus</i>), Patagonian toothfish (<i>Dissostichus eleginoides</i>), Rays mantas nei (<i>Rajjiformes</i>), Stingrays (<i>Dasyatis spp.</i>), Longtail southern cod (<i>Patagonotothen ramsayi</i>), Forkbeard (<i>Phycis phycis</i>).</p>	(EC, 2007a) (EC, 2007b) Eurostat FAO Fishery Facts Sheet
Geographical boundaries	<p>EU HSBG fleet mainly fish in the area between the Patagonian shelf and slope that extends beyond the Argentinean EEZ and the Falklands Islands Outer Conservation Zone (FOCZ) close to the 300 m contour, an area without seamounts or VMEs. Spanish trawling takes place mainly between the parallels 44°S and 48°S and secondarily in the fishing grounds around parallel 42°S. Southern Argentine hake is distributed between 41° and 55°S. Argentine shortfin squid is distributed between 30°S and 50°S with a depth range from the surface down to 800m and southern blue whiting is distributed from about 38°S to nearly 62°S.</p>	FarFish D2.1, FarFish D4.1 FarFish D4.3 FarFish D3.4 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)	<p>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.</p>	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 FarFish D4.3
Operators (EU fleet)	LDAC, ARVI	FarFish D2.1 FarFish D4.3
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 (<i>Merluccius hubbsi</i> , <i>Merluccius australis</i> , <i>Illex argentines</i> and <i>Micromesistius australis</i>) from Patagonian shelf that FarFish can relate to.	
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.	FarFish D2.1 FIG (2017), FarFish DoA

	<p>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. 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.</p>	
Assessment	<p>All species of commercial interest for EU fleet are straddling stocks, shared between Argentina, Falkland Islands and high seas. Southern blue whiting stock migrates between Argentine, Chilean and Falkland waters. The increasing stock of southern blue whiting in Falkland waters is possibly due to changes in migration pattern.</p>	<p>FIG (2017) Chang et al., (2016)</p>
MCS	<p>EU vessels fishing in subarea 41.3.1 and 41.3.2 need a special fishing permit (time limited, species, zone, fishing gear and depth)</p> <p>EU vessels 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.</p>	<p>Portela et al., (2012) FarFish DoA</p>
Value chain		
	<p>Value chain description has been published within FarFish (D3.4). A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (D3.9)</p>	<p>NOFIMA</p>
	<p>Deep sea fish species caught in HSBG are mainly landed in Spain (Vigo), but also in Uruguay (Montevideo) for transshipment. Most Spanish vessels land in Galician ports, either by freezing catches at sea or transshipping</p>	<p>MRAG, MG Otero and PoLEM (2008), FarFish D2.1 FarFish D4.3</p>
Processing	<p>Spain dominates catches by European vessels in this area (97% in 2015), with small quantities caught by UK and Portuguese vessels. All in all, European vessels are responsible for 9.4 % of total catch in these waters (2015) – with both shares and volume reduced from 2014. Argentine hake being the most important species. Catches enter the Spanish value chain by landings or transshipment</p>	<p>FarFish D2.1 FarFish D4.1 FarFish D3.4 www.fao.org/fishery/statistics/</p>
Market	<p>Global value chain – to be elaborated in D3.4</p>	<p>NOFIMA</p>

Challenges		
Data poor situation	Incomplete catch statistics on target and bycatch species (including bycatch species of non-commercial interest)	FarFish DoA FarFish D4.1 FarFish D3.4
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	FarFish D4.1 FarFish D3.3 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). If fishery activities expand into deeper water, there is an increased risk of interaction with VMEs There is a need for increased compliance, monitoring and control in this area	FarFish D4.1 FarFish D3.3 FarFish D3.4 FarFish D4.3
Potential improvements		
Data collection	Due to the limitations of information on catch statistics from non-EU nations, this issue is still under consideration.	FarFish D4.3
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.	FarFish D4.3
Monitoring	Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools	FarFish D4.3

2.3 Outcome Targets

The background concerning policy objectives and jurisdiction makes it difficult to apply the RFMS approach in the South West Atlantic mixed fishery. Identification of applicable and meaningful OTs is particularly challenging, yet exciting task in order to test the RFMS concept and process in an unrepresented environment. Applying the RFMS in this case study requires realistic expectations from all relevant parties, which is why the OTs identified in this MR invitation are somewhat moderate. Following are the three OTs identified for the South West Atlantic mixed fisheries case study:

- **OT1:** A soft-law mechanism [International Conference] focused on sustainable management in ABNJ (FAO 41) available. **Obligatory OT.**
- **OT2:** All vessels transmit AIS signals. **Obligatory OT.**
- **OT3:** Theoretical frame for a Specific Control and Inspection Programme in FAO 41 as basis for a future pilot project on a joint deployment plan for this region available. **Recommended OT.**

2.4 Other potential actions as supplement to the MR

Apart from the OTs identified for the EU fleet operating in South Western Atlantic, a number of action points have been identified that could strongly support the case study objectives identified in the MPO. 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:

1. 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 species as well as main targeted cephalopods. (*Authority comment: FarFish aims at contributing to this action*).
2. Development and testing of self-sampling protocol for fleets targeting the two hake stocks (*Merluccius australis* and *Merluccius hubbsi*). This should be done with the intention to facilitate discrimination of the two hake species 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 two species as environmental changes might facilitate increasing overlapping distribution of the stocks. (*Authority comment: It is recognised that this cannot realistically be addressed further within the FarFish project and the EU fleet cannot be made solely responsible for such an initiative. This is however an important issue which could be taken up on a voluntary basis by forward thinking operators and/or research institutions*).
3. 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 identified VMEs, and c) visualise the frequency of VMS/AIS gaps. This could facilitate improved compliance with the VMEs in accordance with UNGA 61/105 and FAO Guidelines for Management of Deep-Sea Waters in the High Seas, as well as Council Regulation No 734/2008. (*Authority comment: FarFish aims at contributing to this action*).

3 MR invitation for the South East Atlantic case study

3.1 Introduction

This document serves as a formal Management Recommendations (MR) invitation to the following European operators conducting mixed fisheries in FAO area 47 in the South East Atlantic: LDAC, ADAPI, ANFACO-CECOPECA, 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 3).

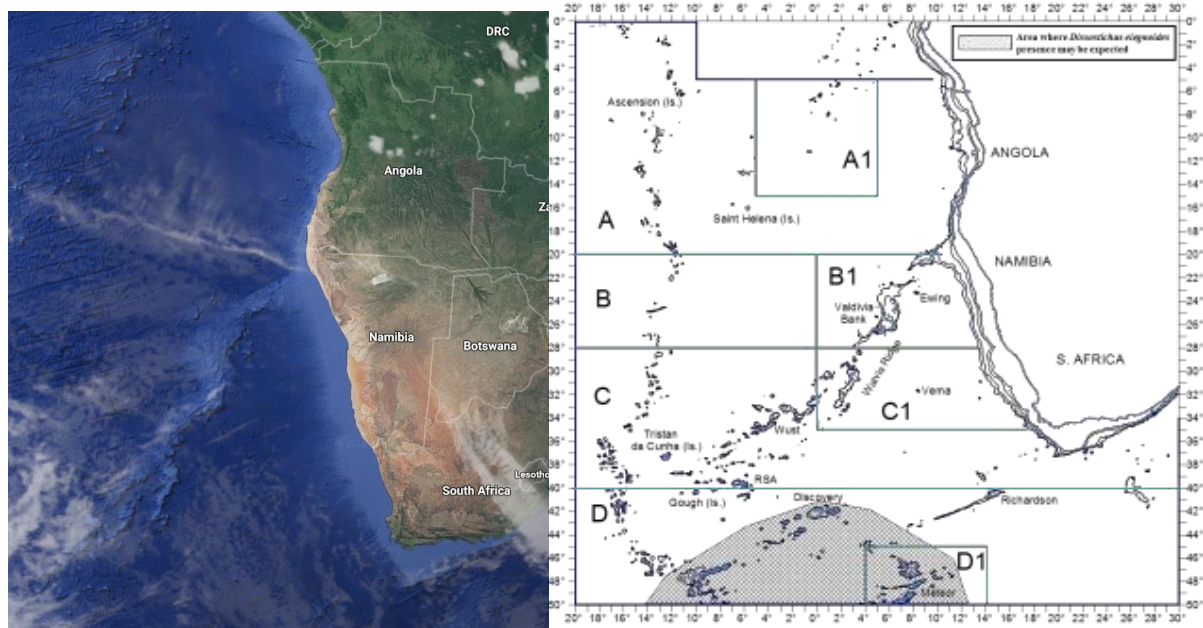


Figure 3: The case FarFish South East Atlantic case study area

Targeted species and their geographical 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 Valdivia 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 activity within the area, without reporting any catches. Other fleets operating in the SEAFO CA in 2017 were Japan and Namibia. According to the SEAFO 13th Scientific Committee Meeting Report⁸, the only targeted species in 2017 were Patagonian toothfish (Japan; 12 tonnes), alfonsino

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

(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 WP3 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. Viðarsson⁹, as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC, ADAPI, ANFACO-CECOPECA, OPAGAC and OPROMAR, coordinated by Alexandre Rodriguez and Sonia Doblado¹⁰, from the executive Secretariat of LDAC; and Gonzalo Ojea¹¹ 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 May 2020 the latest.

⁹ jonas@matis.is

¹⁰ alexandre.rodriguez@ldac.eu and Sonia.doblado@ldac.eu

¹¹ ojea@anfaco.es

3.2 MPO

Current state	Reference	
This MPO applies 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-CECOPECA, OPAGAC AND OPROMAR		
Case study leader	Institute of Marine Research (IMR), Norway Contact person: Lidvard Grønnevet (LG), lidvard.gronnevet@hi.no	Revised LG 28.11.19
Fishery identification		
Species (target, bycatch)	Target: Alfonsino (<i>Beryx splendens</i>), boarfish/pelagic armourhead (<i>Pseudopentaceros richardsoni</i>), orange roughy (<i>Hoplostethus atlanticus</i>), skates, sharks, deep-sea crab (<i>Chaceon erythraeae</i>), Patagonian toothfish (<i>Dissostichus eleginoides</i>), Wreckfish (<i>Polyprion americanus</i>), Grenadiers nei (<i>Macrourus</i> spp.), Blue antimora (<i>Antimora rostrata</i>), King crab (<i>Lithodidae</i> spp, <i>Lithodes ferox</i> , <i>Paralomis formosa</i>). Bycatch species: Warty dory (<i>Allocyttus verucossus</i>), Spiky oreo (<i>Neocyttus rhombiodalis</i>), Guinea oreo (<i>Allocyttus guineensis</i>), Smoot oreo dory (<i>Pseudocyttus maculatus</i>)	FarFish D2.1 FarFish D4.1 FarFish D3.4 SEAFO SC (2017)
Geographical boundaries	SEAFO convention area (Figure 3), 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. 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, FarFish D4.1 FarFish D4.3 FarFish D3.4 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.	FarFish D2.1, FarFish D4.1 FarFish D4.3 FarFish D3.4 www.whofis.hesfar.eu SEAFO SC (2017) appendix IV,

	<p>Most common gear is Spanish longline system and the trotline. Major bycatch of grenadiers is being discarded. 22% of TAC was taken in 2015 and 2016. TAC (2017) Subarea D: 266 t. Only Japanese catches since 2012. Catch Japan 2017: 12 tonnes, <1 tonne discard. Last reported IUU in 2012, but extent of IUU fishing at present is unknown.</p> <p>Orange roughy, no catch since 2006, very small catch by South Africa and maybe Portugal (FAO statistics). The most important fishing nation previously being Namibia. 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.</p> <p>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 (<i>Capros aper</i>), blackbelly rosefish (<i>Helicolenus actylopterus</i>), imperial blackfish (<i>Schedophilus ovalis</i>), oilfish (<i>Ruvettus pretiosus</i>), silver scabbardfish (<i>Lepidopus caudatus</i>).</p> <p>Deep-sea red crab, no catch by Spain since 2004 (Pots, UNK area), no catch Portugal since 2007 (Pots, area UNK). Fishing nations SEAFO 2017a, Japan (140 tonnes in 2017), Korea (only catch in 2015, 104 tonnes), Namibia (135-198 tonnes in period 2011-2014). 2014; 50% of TAC was caught. TAC: 200t in D0, 200t in remainder SEAFO CA.</p> <p>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.</p> <p>Wreckfish, no catch since 2007, Portugal (lonliners, area A) TAC=143 t.</p> <p>Grenadiers, no catch since 2010, Spain (lonliners, Area D0, D1)</p> <p>Blue antimora, no catch since 2010, Spain (longliners, Are D0, D1)</p> <p>King crabs, no catch since 2010, Spain (longliners, Area D0, D1)</p>	<p>Landings, discards and bycatch tables)</p> <p>SEAFO SC (2017) appendix V</p> <p>SEAFO SC (2017)</p> <p>SEAFO SC (2017)</p>
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Other nations	Japan (catch 2016, Patagonian toothfish, deep-sea crab). South Korea (Pelagic armourhead, midwater trawl), Namibia (catch 2016, some Alfonsino, some deep-sea crab, some Pelagic armourhead, orange roughy, bottom trawl area B1 and C0), South Africa, Norway, Ukraine, Russia	FarFish D2.1, FarFish D4.1 FarFish D4.3 FarFish D3.4
Management		
Authorities	SEAFO, DG MARE	FarFish D2.1 FarFish D3.3 FarFish D4.1 FarFish D4.3
Operators	LDAC, ADAPI, ANFACO-CECOPECA, OPAGAC AND OPROMAR	FarFish D1.1 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 (Suppackers processing plant), Nueva Pescanova (Nova Nam, Novagroup), Iberconsa, Marfrio Namibia Fishing, Pescapuerta (Tunacor), Pereira Fishing (4) EJF, OCEANA, WWF ADENA	FarFish, DoA, FarFish D2.1, FarFish D3.3 FarFish D3.4 FarFish D4.1 FarFish D4.3 CETMAR
Governance	SEAFO, (SEAFO area exclude EEZ of the coastal states (BCC=Namibia, Angola, South Africa))	FarFish D2.1, FarFish D3.3, FarFish D4.1
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 D2.1, FarFish D3.3, FarFish D4.1 SEAFO
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	FarFish D2.1, FarFish D3.3 FarFish D3.4 FarFish D4.1 FarFish D4.3 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.	FarFish D2.1, FarFish D3.3 FarFish D3.4 FarFish D4.1 FarFish D4.3

	<p>Deep-sea red crab: primarily utilized by Namibia and Japan. Commission adopted SC advice to apply HCR as for Greenland halibut in NAFO. TAC: 190 t for B1 and 200 t for the remainder of SEAFO CA.</p> <p>Pelagic armourhead: MSY= 128 t, no other reference points. TAC reviewed every two years. TAC=143 t</p> <p>Alfonsino: No biological reference points determined, SC suggest to use an empirical HCR to regulate fishery until the data situation is improved. ICES HCR category 5: data poor stocks.</p>	
Data collection (fishery, catch, bycatch, employment)	<p>Data collection by SEAFO, FAO and IMR (RV Dr Fritjof Nansen survey Jan-Feb 2015)</p> <p>Specific comments on Deep-sea crab; SEAFO SC, sampling is quite good. Specific comments on Pelagic armourhead; geo-referenced data on catch and effort from Korean fishery 2010-2013. Age/length data not available. Data on maturity, natural mortality, reproductive parameters. Alfonsino, Patagonian toothfish and Orange roughy; no specific comments currently.</p>	<p>FarFish D2.1 FarFish D4.1 IMR (2015)</p>
Assessment	<p>Scientific committee (SC) in SEAFO.</p> <p>Patagonian toothfish, no agreed stock assessment, lack knowledge on mortality, growth, reproduction, feeding and trophic role.</p> <p>Orange roughy, no assessment, no fishing lately and therefore no data. CPUE available (1995-2005), trawl data. Namibia conducted scientific survey in 2016. Lack of knowledge from this area on recruitment, length-weight relationships, growth, reproduction parameters, natural mortality, feeding and trophic relationships)</p> <p>Deep-sea crab, Good data, although short time series, lack of knowledge on growth parameters, no biological reference points presently, stock assessment and review every other year (last 2016)</p> <p>Pelagic armourhead, CPUE data as indicator for biomass and support analysis with CPUE trends. Depletion estimators used to estimate population abundance</p> <p>Alfonsino available, some scarce length frequency data and length /weight from Korean trawlers 2010-2013, reproductive parameters, and production. Lack of knowledge; natural mortality, feeding and trophic relationships. Nominal CPUE applied to derive a perception of the development of the fishery in the period 2010-2012.</p>	<p>FarFish D2.1 FarFish D4.1 FarFish D2.5 SEAFO SC (2017) SEAFO SC (2017)</p>
MCS	<p>All vessels are required to:</p> <ul style="list-style-type: none"> - be formally authorised to fish - report catches on a 5-day interval - report VMS positions on a 2-hourly interval - have an independent scientific observer onboard - comply with port inspection procedures; and - not make transshipments in the SEAFO CA <p>IUU list is managed by SEAFO.</p>	<p>FarFish D2.1, FarFish D4.1, SEAFO (2018)</p>

	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.	
Value chain		
	Value chain description has been published within FarFish (D3.4). A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (D3.9). The issue with this area is that there is little or no activity ongoing, and therefore no value chain to report on.	FarFish D3.4 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	Almost no activity ongoing in the area and therefore no markets to report on.	NOFIMA
Challenges		
Data poor situation	TAC is usually based on limited data.	FarFish D2.1, FarFish D4.1
Management	Maintain international framework for future work and protection. As fishing effort in the case study is currently low or non-existent, there is little that FarFish can add to the CS. FarFish will though attempt to further advance biological knowledge, improve monitoring and compliance in the SEAFO area, as applicable.	FarFish D2.1, FarFish D4.1
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		
Data collection	Improve quality of logbook data and its submission. Exploring the feasibility for a self-sampling programme.	FarFish DoA
Assessment	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

There are currently very little fishing activities taking place within the SEAFO CA and the EU fleet has shown little interest in the area for a number of years now. This severely limits the relevance and applicability of this RFMS approach within the CS. There is an active RFMO in the area, which is able to represent an authority within the context of the FarFish project. However, given the nature of the CS, expectations towards a 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:** All vessels transmit AIS or VMS signals. **Obligatory OT.**
- **OT3:** All vessels have onboard observers. **Recommended OT.**

The RFMS approach depends on operators being incentivised to develop MRs for a given fishery. There is however obvious that this incentive is missing from this CS, and therefore unlikely that any operator will be willing to put in the effort of developing a MR.

3.4 Other potential actions as supplement to the MR

Apart from the OTs above, a number of action points have been identified that could strongly support the CS objectives identified in the MPO. 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:

1. Compiling of existing knowledge on main stocks being targeted in the area, which exist to some degree at different scientific institutions and research programmes. (*Authority comment: FarFish is planning to contribute to this work*).
2. 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. (*Authority comment: FarFish is considering contributing to this work, but it is not high priority due to limited interest by operators in the CS*)

4 MR invitation for the Cape Verde Case Study

4.1 Introduction

This document serves as a formal Management Recommendations (MR) invitation to the following European operators active in the Cape Verde tuna fishery under the SFPAs: LDAC, ANFACO-CECOPECA, OPROMAR and OPAGAC. The vessels operating under the agreement¹² 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 extent (either as target or bycatch species).

The fishery takes place within the Cape Verde EEZ, which covers an area of 789,400 km², 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 km²

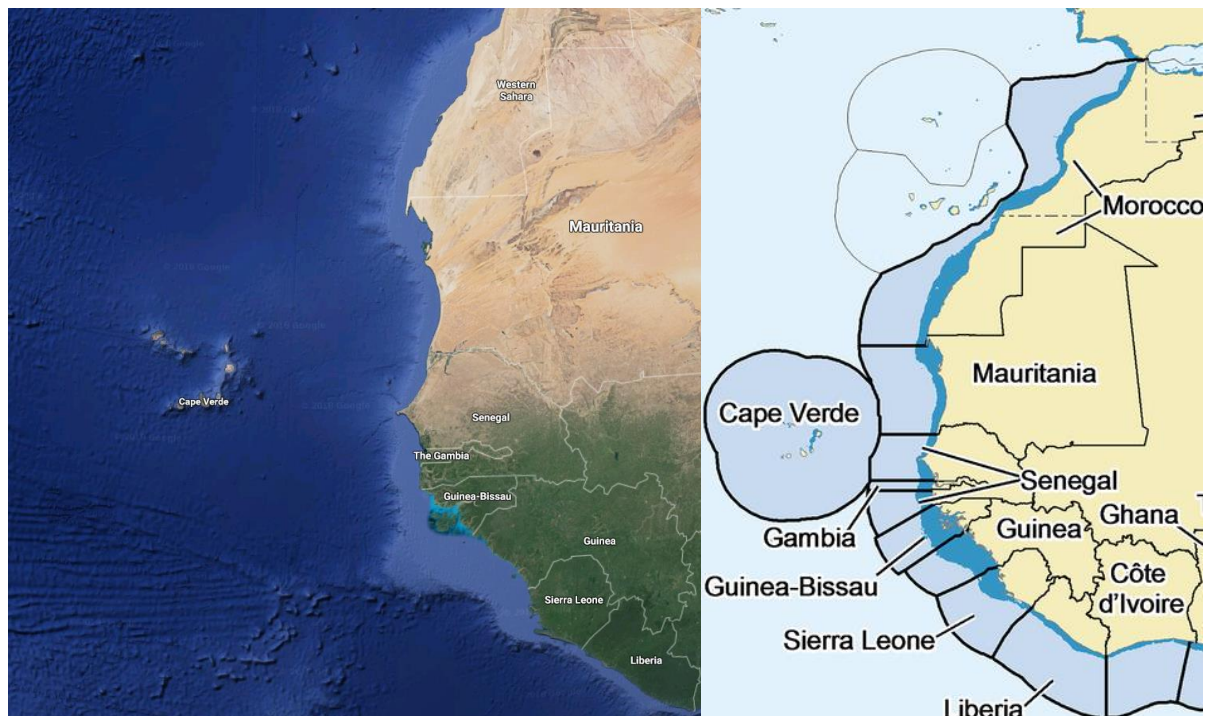


Figure 4: The Cape Verde EEZ covers an area of 789,400 km² but the continental shelves around the islands are only 5,394 km²

¹² On 20 May 2019, the EU and Cape Verde signed a new five-year protocol to implement the SFPAs (EC, 2019a). The new protocol is similar to the former one, with regard to reference tonnage per year, annual financial contribution and number of vessels. Unfortunately, the new agreement and the associated protocol was not yet made public in time for it to be included in this document. The “old” SFPAs and associated protocol is therefore referred to in this document. It should however be noted that the new protocol contains a number of new provisions reinforcing the monitoring of the EU fleet activities, including 350 000€ annually earmarked to promote the sustainable management of fisheries in Cape Verde, notably through measures aiming at reinforcing control and surveillance capacities and supporting local fishing communities.

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)¹³ showed that the north Atlantic stock was unlikely to be overfished. However, high levels of uncertainty were involved in this assessment. INDP/IMAR 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 MPO 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 fleet¹⁴. Pole and line are 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 were less active, catches of blue shark exceeded that of tuna. In 2017, total catches from EU tuna vessels amounted to just under 10,000 tons, 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 levels¹⁵. During the period 2014-2018, 21 EU tuna purse seiners and 14 surface longliners obtained fishing authorisations. Other fleets targeting the area, apart from the domestic fleet, consisted of Japanese and Senegalese vessels, both of which have fishing agreements with Cape Verde.

¹³ 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

¹⁴ See footnote on previous page

¹⁵ 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>

The authority

The competent authority in the Cape Verde case study are DNEM, DGRM and DG MARE. FarFish WP3 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. Viðarsson¹⁶, as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC, ANFACO-CECOPECA, OPROMAR, ORPAGU and OPAGAC, coordinated by Alexandre Rodriguez and Sonia Doblado¹⁷, on behalf of LDAC and Gonzalo Ojea¹⁸ 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 and Sonia Doblado (LDAC), Gonzalo Ojea (ANFACO), in cooperation with FarFish WP4, will prepare a draft MR to be reviewed by the authorities (WP3, with input from DNEM, DGRM, DG MARE if possible). 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.

Time frame

An approved MR should be available by 31 May 2020 the latest.

4.2 MPO

Current state		
This MPO applies to the 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. The vessels are from Spain, Portugal and France. Relevant authorities are DG MARE and DNEM, while operators are LDAC, OPROMAR, OPAGAC, and ANFACO-CECOPECA.		
Case study leader	National Institute for Fisheries Development (INDP/IMAR), 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 BF, 30.11.19
Fishery identification		
Species (target, bycatch)	Target: Yellowfin tuna (<i>Thunnus albacares</i>), Bigeye tuna (<i>Thunnus obesus</i>), Skipjack tuna (<i>Katsuwonus pelamis</i>),	FarFish D2.1 FarFish D4.1 FarFish D3.4

¹⁶ jonas@matis.is

¹⁷ alexandre.rodriguez@ldac.eu and Sonia.doblado@ldac.eu

¹⁸ ojea@anfaco.es

	Bycatch; sea birds, turtles, swordfish (<i>Xiphias gladius</i>), blue shark (<i>Prionace glauca</i>)	SFPA, appendix 2																																								
Geographical	<p>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.</p> <p>Yellowfin: cosmopolitan species distributed in the tropical and subtropical oceanic waters of the three oceans.</p> <p>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.</p> <p>Skipjack: Schooling in the tropical and subtropical waters of the three oceans. Predominant species aggregated to FADs.</p> <p>Swordfish: widely distributed in the Atlantic Ocean and Mediterranean Sea.</p> <p>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.</p>	<p>SFPA, appendix 2.</p> <p>ICCAT (2016)</p> <p>Domingo et al., (2008)</p>																																								
EU fisheries (nations, gear, vessels, catch, quota)	<p>Nations; Spain, Portugal, France Total reference catch (SFPA): 5,000 t/year</p> <p>Catch (tonnes) by foreign fleet in Cape Verde waters;</p> <table border="1"> <thead> <tr> <th>EU</th> <th>2014</th> <th>2015</th> <th>2016</th> </tr> </thead> <tbody> <tr> <td>Tuna</td> <td>5.334</td> <td>327</td> <td>7.924</td> </tr> <tr> <td>Sharks</td> <td>519</td> <td>2.700</td> <td>2.058</td> </tr> <tr> <td>Others</td> <td>21</td> <td>53</td> <td>0</td> </tr> <tr> <td>Total</td> <td>5.875</td> <td>3.080</td> <td>9.982</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>JAPAN</th> <th>2014</th> <th>2015</th> <th>2016</th> </tr> </thead> <tbody> <tr> <td>Tuna</td> <td>1.287</td> <td>1.110</td> <td>Unavailable</td> </tr> <tr> <td>Sharks</td> <td>463</td> <td>501</td> <td>Unavailable</td> </tr> <tr> <td>Others</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td>Total</td> <td>1.750</td> <td>1.611</td> <td></td> </tr> </tbody> </table> <p>Vessels: Tuna purse seiners: Spain (16), France (12), target species; Yellowfin, bigeye and skipjack. Bycatches in compliance with ICCAT and FAO recommendations.</p>	EU	2014	2015	2016	Tuna	5.334	327	7.924	Sharks	519	2.700	2.058	Others	21	53	0	Total	5.875	3.080	9.982	JAPAN	2014	2015	2016	Tuna	1.287	1.110	Unavailable	Sharks	463	501	Unavailable	Others	0	0		Total	1.750	1.611		<p>SFPA, appendix 2</p> <p>DGP/INDP provided by case study lead.</p>
EU	2014	2015	2016																																							
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	<p>Surface longline: Spain (23), Portugal (7), target species; swordfish, blue shark, yellowfin tuna, bigeye tuna. Bycatches in compliance with ICCAT and FAO recommendations.</p> <p>Pole and line tuna vessels: Spain (7), France (4), Portugal (2); target species; yellowfin tuna, bigeye tuna, skipjack tuna. Bycatches in compliance with ICCAT and FAO recommendations. Currently; 1 Portuguese and 15 Spanish vessels.</p>	http://www.whofishesfar.org
Other nations	Japan, Senegal, Cape Verde	
Management		
Authorities	DNEM, DGRM and DG MARE	FarFish D2.1, FarFish D3.3, FarFish D4.1 FarFish D4.3
Operators	LDAC, ANFACO-CECOPECA, OPAGAC	FarFish D1.1, FarFish D1.2 FarFish D2.1, FarFish D3.3 FarFish D3.4 FarFish D4.1 FarFish D4.3 LDAC, CETMAR
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	<p>(1) ICCAT, COSMAR, SIGQ, The Secretary of Maritime Economy, Ministry of Tourism, Transport and Maritime Economy</p> <p>(2) ICCAT, INDP, INE</p> <p>(3) UBAGO GROUP MARE S.L., FRESCOMAR S.A., ATUNLO cv (processing plant), FRIGROVE, CALVO ATLANTICO S.A</p> <p>(4) “Overseas Fishery Cooperation Foundation”, Japanese APESC- Cape Verde Fisheries Association</p>	FarFish D1.1, FarFish D1.2 CETMAR INDP, EDC
SFPA	2014-2018, 5000 t/year	SFPA
Governance	The management of the fishery sector is assured by the National Directorate of Maritime Economy, an institution of the Ministry of Transport, Tourism and Maritime Economy. The Secretary of Marine Economy is a new institution recently created by the government and it belongs to the Ministry of transport, tourism and Maritime Economy (situated in Sao Vicente Island). SIGQ is dependent on DNEM and has replaced ACOPECA.	FarFish D3.3 INDP
RFMO	ICCAT	FarFish D2.1, FarFish D3.3, FarFish D4.1
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	FarFish D2.1, FarFish D4.1

	vessels. However, in relation to tuna fishery done by foreign fleet the management measures applicable are the ones set by ICCAT.	
Case study objectives	<ol style="list-style-type: none"> 1. In conformity with ICCAT, collect and analyse data on bycatch of swordfish and blue shark by the EU fleet in the Cape Verde EEZ if the data, if the data is available. If sufficient data is accessible, model scenarios, which may add value to development harvest control rules for these bycatch species. 2. Contribute to better monitoring in the area by supporting enforcement by utilizing latest available satellite systems and tools. 	INDP, FarFish D2.1, FarFish D4.1
Harvest Control rules	<p>Skipjack tuna (ICCAT); MSY (143,000 – 170,000), current yield (2013): 203,500 t, Relative biomass (B2013/Bmsy): Probably >1, Fishing mortality (F2013/Fmsy): probably <1, seasonal moratorium FADs Jan.2013 (From African coast to 10°S and 5°W latitude to 5°E longitude during January-February)</p> <p>Yellowfin tuna (ICCAT); MSY (~144,600 t) (based on non-equilibrium production model (ASPIC) and age structured model (VPA), Relative biomass (B2013/Bmsy): 0.95 (0.71-1.36), Relative Fishing mortality (F2014/Fmsy): 0.77 (0.53-1.05). Time area closure for FAD associated surface fishing, TAC 110,000 t, authorization for vessels (>20 m), specific limits of number of longline and/or purse seine boats for a number of fleets</p> <p>Bigeye tuna MSY 78 824 t (67,725-85,009 t), Yield (2014): 72,575 t, Relative biomass (B2014/Bmsy): 0.67 (0.48-1.20), Relative Fishing mortality (F2014)/Fmsy: 1.38 (0.61-1.85), TAC (2012-2015): 85,000 t, restriction of longline boats, purse seine boats, no fishing with natural or artificial floating objects in January and February as for skipjack.</p> <p>Blue shark High uncertainty in Bmsy, Fmsy high uncertainty. F2013/Fmsy: 0.01-1.19, B2013/Bmsy: 0.78-2.03. Incomplete catch reports.</p> <p>Swordfish Catch limits, min size limits (125/119 cm LJFL), TAC no more than 15,000 t due to poor data. Catches below TAC since 2002 (by 2014).</p>	<p>ICCAT (2014) ICCAT (2016)</p> <p>ICCAT (2015b)</p> <p>ICCAT (2015a)</p> <p>FarFish D2.5</p>
Data collection (fishery (catch and bycatch), employment,	<p>INDP, data collection, compilation of fisheries statistics, research and assessment.</p> <p>DNEM, all EU vessels report catch statistic to Ministry responsible for fisheries in Cape Verde and electronically or by fax to the flag Member State.</p> <p>INDS National Fisheries Institute, collect data for commercial tuna fishery (catch, effort, supplemented with data from other sources).</p> <p>INE compiles socio-economic data on the fisheries.</p>	<p>FarFish D2.1, FarFish D4.1</p> <p>INDP</p>
Assessment	ICCAT stock assessment, INDP	FarFish D2.5,

	<p>Skipjack: Reference year 2013. Assessment based on catch only, and catch and effort data, Bayesian Surplus Production model (BSP). Problem with bycatch of juvenile bigeye and yellowfin tuna juveniles in FAD fishing for skipjack.</p> <p>Yellowfin: Reference year 2014. Considered as one stock whole Atlantic. Assessment based on age structured and a non-equilibrium production model. Most recent analysis in 2010 indicate overfishing, but annual catches 2012-2014 were below MSY. Concern FAD-related mortality of small yellowfin</p> <p>Bigeye: Reference year 2014. Considered as one stock. An assessment in 2015 using a variety of models, including non-equilibrium production models, age structured models (VPA) and integrated statistical assessment models. Bigeye is considered overfished and there is a concern FAD-related mortality of small yellowfin.</p> <p>Blue shark: Production models fitted to CPUE data, length-based age structured models, hierarchical 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.</p> <p>Swordfish: South Atlantic. TAC 15 000 t, Current yield (2014): 9,885 t, Bmsy 11 055 t, F: unknown, Relative Biomass (B2011/BMSY): unknown, but likely above 1, Relative Fishing Mortality (F2011/FMSY): unknown, but likely below 1. Not overfished, country specific TACs.</p>	<p>ICCAT (2014)</p> <p>ICCAT (2016)</p> <p>ICCAT (2015b)</p> <p>ICCAT (2015c)</p> <p>ICCAT (2017)</p>
<p>MCS</p> <p>IUU</p>	<p>As established in the SFPA Agreement, all vessels authorized to fish in Cape Verde waters shall be obliged to communicate their catches to the Ministry responsible for fisheries in Cape Verde within 30 days.</p> <p>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 Garantia de Qualidade (SIGQ).</p> <p>Maritime and Port Agency (AMP)</p> <p>Operations Centre for Maritime Safety (COSMAR) is under the command of the Coast Guard</p> <p>All data shall be reported to Directorate National of Maritime Economy (DNEM) and to INDP</p> <p>Inspections (sea, port), Observers</p> <p>VMS (80% of industrial fleet has installed VMS), AIS, ERS (from Sept.1 2015), but VMS is weakened by poor internet connectivity and electrical grid interruptions.</p> <p>All EU vessels shall keep fishing logbooks/Catch reports.</p>	<p>FarFish D2.1, SFPA</p> <p>Pramod (2017)</p> <p>Pramod (2017)</p>

Value chain		
Value chain description has been published within FarFish (D3.4). A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (D3.9).		FarFish D3.4, NOFIMA
Port	Cape Verde catches are landed in West Africa, long liners use Cape Verde as base. Cape Verde is usually used mainly through transshipment. 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 transshipment in Cape Verde.	FarFish D3.4 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.	FarFish D3.4
Market	Fish from seiners are processed in Abidjan 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 D3.4
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.	FarFish D3.4, FarFish D4.1 INDP
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 D4.1, INDP
MCS	Cape Verde has Insufficient control and monitoring capabilities. Noncompliance of PGRP by foreign vessels.	FarFish D4.1, INDP
Potential improvements		
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 D4.1
Management	Application of RBM principles and the RFMS framework to Cape Verde tuna fishery.	FarFish D2.5, FarFish D3.3, FarFish D4.1,
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 D2.4, FarFish D4.1

4.3 Outcome Targets

OTs set for the Cape Verde CS are based on MP0 (D4.1), MR1 (D4.3) and the audit of MR1 (D5.1); as well as lengthy and detailed consultation process with authorities, operators and other stakeholders in the fishery. These identified high level of uncertainty in the current data collection and that there is a need to improve data recording in order to improve stock assessment. The need to harmonize data and processes between EU/flag state, coastal state and ICCAT was as well noted. This particularly applies for data recording on bycatches, especially for blue shark caught by the EU fleet in large volumes. Challenges related to scheduling and logistics for onboard observers on EU vessels was also highlighted. This issue is seemingly largely caused by insufficient coordination and support. Availability and reliability of AIS and VMS data was as well flagged.

Lack of data on trade flows within the value chains of Cape Verde, for all fleets operating within the country's waters, was raised and discussed in considerable detail. This is a delicate matter that cannot easily be addressed by EU operators alone, as the most relevant data may include business sensitive information.

Based on the above, a total of four OTs have been set for the fishery, with two of them being obligatory and two recommended. The OTs are as follows:

- **OT1:** A harmonized catch data protocol in place that facilitates improved reporting of swordfish and blue shark commercial and biological data. **Obligatory OT.**
- **OT2:** All vessels transmit AIS and/or VMS signals. **Obligatory OT.**
- **OT3:** Strengthened observer program in place. **Recommended OT.**
- **OT4:** Trade flow data provided. **Recommended OT**

Regarding OT4, it is recognised that trade flow data can include business sensitive information and that it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so. This challenging matter is therefore to be primarily addressed as “other potential actions as supplement to the MR” within FarFish, but the operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen/canned) and destination. The operators are to formulise this in the MR, including frequency of data provision.

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 CS 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 national/international fleets, etc.). These are as follows:

1. There is a data gap when it comes to Information on trade flows within the value chains of Cape Verde i.e. catches of all fleets operating within the Cape Verde EEZ. There is fairly good data on catches landed in Cape Verde and EU, but limited in data on catches landed in other African countries or transshipments. Cape Verdean authorities have therefore very little overview 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. This is a gap that needs to be addressed. (*Authority comment: This is partly connected to OT4. FarFish will in addition contribute to this work within the value chain analysis task and D3.9*)
2. Capacity building is needed within Cape Verdean institutions in tuna stock assessment and management. This task cannot be delegated to operators and needs to be addressed at other level. (*Authority comment: With the aim of strengthening Cape Verdean administrative and scientific capacity, a number of FarFish partner representatives from INDP/IMAR have already taken part in capacity building initiatives or have been identified for upcoming capacity building within the project. These are:*
 - *The UNU-FTP six-month training program (from which two INDP/IMAR employees have already been graduated);*
 - *Regional training provided by FarFish (planned in Cape Verde in April 2020);*
 - *University diploma programme (arranged by UiT under the FarFish project in March 2020).*)
3. A need for increasing cooperation between Cape Verde national authorities, relevant RFMOs and EU has been identified. This includes for example the need to improve and/or harmonise data sharing between ICCAT, EU and Cape Verde authorities. (*Authority comment: this is partly addressed in OT1*).
4. 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/IMAR) 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. (*Authority comment: It is uncertain at this stage whether FarFish will be able to contribute to this action.*)
5. 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. (*Authority comment: the FarFish consortium will aim to 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".*)
6. There is a need to Increase research into the socio-economic and ecological impacts of FADs. Analysis (including trade-off analysis) of the economic impacts of using drifting FADs

in Cape Verdean waters, and estimation of the economic consequences of reducing the number of allowable FADs, is needed. This could potentially lead to identification on optimal number and spatial distribution of drifting FADs. *(Authority comment: 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.)*

7. There is a need for strengthening collaboration for the design and further implementation of an experimental pilot-plan for monitoring blue shark within the EEZ of Cape Verde. A first step has already been taken in the newly signed (2019) SFPA protocol, where blue shark is now identified as target species. This pilot-plan should be designed and implemented fairly soon, as it is needed to evaluate if Cabo Verdean authorities could assume responsibility for running it. *(Authority comment: FarFish partners INDP/IMAR and ORPAGU are interested in contributing to such pilot plan, and it is likely that such a pilot plan can be linked to the development of the “National action plan for the conservation and management of sharks in the Cape Verdean EEZ”. FarFish will potentially be able to contribute to this action through the organisation of “uptake meetings, where next steps in cooperation will be discussed.)*
8. The EU fleet, particularly the surface longliners, is involved in relevant actions that demonstrate good practices in supporting sustainable management. Their good practices should be disseminated and acknowledged beyond what is currently done in a credible and transparent manner. Potential pathways for cooperation between authorities, operators and the scientific community should therefore be expanded on, utilising for example the 30 years of data from scientific campaigns available, as well as a proven track-record on scientific cooperation. *(Authority comment: Initial contacts between the FarFish consortium (INDP/IMAR) and EU scientific teams (IEO) will be facilitated. FarFish will in addition potentially be able to contribute to this action through the organisation of “uptake meetings, where next this kind of voluntary cooperation will be discussed.)*
9. Complementary measures, e.g. tariff adjustments, should be integrated into an action plan to support the development, capacity and modernization of the national fishing fleet. This requires a transitioning process that includes technological development and capacity building, e.g. social organization, processing sector, commercial vision, etc. The capacity building could be linked to ‘Escola do Mar’ for fisheries and coastal navigation training. *(Authority comment: FarFish is contributing to capacity building within Cape Verde in a number of ways, including the UNUFTP programme, the regional training, the University diploma programme. The ability of FarFish to have an impact on any kind of complementary measures to support modernisation of the national fleet is however unclear. The work done within the value chain analysis (D3.9) and analysis on potential return of investment by EU fleet (D5.3) could though potentially serve as background for such work.)*

5 MR invitation for the Senegal Case Study

5.1 Introduction

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 SFPA¹⁹: LDAC and OPROMAR. The Senegalese EEZ covers 159,000 km² and is broken into two parts that are separated by the EEZ of Gambia (Antonova, 2016).



Figure 5: The Senegalese EEZ covers 159,000 km² and is broken into two parts that are separated by the EEZ of Gambia

¹⁹ On 19 July 2019, the EU and Senegal signed a new five-year protocol to implement the SFPA (EC, 2019b). The new protocol is similar to the former one, with regard to reference tonnage per year, annual financial contribution and number of vessels. The new 5-year protocol implementing the 2015 agreement is replacing the current protocol due to expire in November 2019. This new protocol allows EU vessels - a maximum of 28 tuna seiners, 10 pole-and-liners, 5 long liners and 2 trawlers - to fish tuna-like species and hake in the waters of Senegal. The EU yearly financial contribution is to be €1,700,000. Part of this contribution, €900,000 per year, is earmarked to promote the sustainable management of fisheries in Senegal, in particular through measures that reinforce control and surveillance capacities and the fight against illegal, unregulated and unreported fishing. Moreover, the EU funds will be used to promote the development of scientific capacities and to support the development of the artisanal fishing. In addition to this amount, ship owners will also contribute with approximately €1,350,000 per year. Unfortunately, the new agreement and the associated protocol was not yet made public in time for it to be included in this document. The “old” SFPA and associated protocol is therefore referred to in this document.

The EU vessels currently operating under the agreement are demersal vessels from Spain and France. Developing a case study specific MPO covering all the target species targeted by EU fleet within Senegalese EEZ was considered unattainable within the FarFish project. Therefore, the case study leader was asked to prioritize which fishery the MPO should address, based on the main challenges in place and the ability of FarFish to add benefit. Consequently, the black hake fishery was selected. A deciding factor for this selection is that ICCAT is believed to be assessing and managing the tuna fishery relatively successfully; whilst the black hake fishery has more challenges. The black hake fishery in Senegalese waters includes two different species, Tropical African hake (*Merluccius polli*) and Senegalese hake (*Merluccius senegalensis*), which are managed and reported as one. This lack of distinction between the two hake species in reported catches and surveys limit limits the availability of reliable data for separate stock/species assessment. The two black hake species are therefore assessed as a single stock, despite the fact that these are two species with different biology.

The case study objectives identified in MPO 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 SFPA²⁰ 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 WP3 representatives will act as a leading authority in the FarFish RFMS process, considering input from

²⁰ See footnote on previous page

MPEM and DG MARE, as far as possible. The main contact person in this process is Jónas R. Viðarsson²¹, as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC and OPROMAR, represented by Alexandre Rodriguez and Sonia Doblado²², on behalf of LDAC and Francisco Teijeira²³ on behalf of OPROMAR.

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/Sonia Doblado (LDAC) and Francisco Teijeira (OPROMAR), in cooperation with FarFish WP4, will prepare a draft MR to be reviewed by the authorities (in this case WP3). 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 the authorities (foregoing a public hearing), the MR will enter the implementation stage, led by the operators.

Time frame

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

5.2 MPO

Current state		Reference
This MPO applies to the EU fishery for Black Hake in Senegalese EEZ (shared with Guinea in the southern part). Relevant authorities are DG MARE and MPEM. The relevant operators are LDAC and OPROMAR.		
Case study leader	COREWAM, Contact person: Mamadou Diallo, mlsdiallo@gmail.com	Revised MD, 5.11.2019
Fishery identification		
Species (target, bycatch)	Target: Two species of black hake, Tropical African hake (<i>Merluccius polli</i>), Senegalese hake (<i>Merluccius senegalensis</i>). Bycatch; 7% cephalopods, 7% crustaceans, 15% other deep-water demersal fish (level of bycatch authorized according to the agreement).	SFPA, appendix 2 FarFish D4.1 COREWAM (MD)
Geographical boundaries	Fishing in deep-water 150-1000m, permitted fishing Zone given in SFPA. <i>Merluccius polli</i> , distributed between 8 °N and 26 °N and caught between 33°N and 10°N, at depth from 200 to 1000 m.	EU, SFPA, appendix 2, Fall et al., (2016)

²¹ jonas@matiss.is

²² alexandre.rodriguez@ldac.eu and Sonia.doblado@ldac.eu

²³ fcoteijeira@opromar.com

	<p><i>Merluccius senegalensis</i>, distributed between 12 °N and 33 °N caught between 25°N and 18.5°S, at depth from 100 to 600</p> <p>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).</p>	<p>FarFish D4.1</p> <p>COREWAM (MD)</p>
EU fisheries (nations, gear, vessels, catch, quota)	<p>EU nations; Spain.</p> <p>Total reference catch (SFPA) (both hake species): 2,000 tons/year.</p> <p>Vessels; Deep-sea trawlers. Catch of hake by EU + Senegal in Senegal EEZ is approximately 6,000 tons a year.</p>	<p>EU, SFPA</p> <p>COREWAM (MD)</p>
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,	FarFish D4.1, FarFish D3.3
Operators	LDAC and OPROMAR	FarFish D1.1 FarFish D1.2, FarFish D3.3 CETMAR
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	<p>(1) CSRP, CECAF, COMAHFAT, ECOWAS, ISRA</p> <p>(2) FAO/CECAF, CRODT</p> <p>(3) SOPERKA, Grupo Profand (Senefand), Grupo Eduardo Vieira S.A., Senevisa (freezer fleet), Amerger (processing plant)</p> <p>(4) GREENPEACE, APRAPAM (Association pour la Promotion et la Responsabilisation des Acteurs de la Pêche Artisanale Maritime)</p>	<p>FarFish, DoA,</p> <p>FarFish D2.1,</p> <p>FarFish D1.2,</p> <p>FarFish D3.3</p> <p>FarFish D3.4</p> <p>FarFish D4.1</p> <p>FarFish D4.3</p> <p>CETMAR</p>
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.	FarFish D2.1, FarFish D3.3, FarFish D4.1
RFMO	CSRP, CECAF	FarFish D2.1
MP (name, obj, area)	<p>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.</p>	<p>FarFish D2.1,</p> <p>FarFish D3.3,</p> <p>FarFish D3.4,</p> <p>FarFish D4.1,</p> <p>FarFish D4.2</p> <p>FarFish D4.3</p> <p>FAO/CECAF (2013)</p>

Case study objectives	<p>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.</p> <p>2) Contribute to better monitoring in the area by supporting the enforcement by utilizing latest available satellite systems and tools.</p> <p>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</p>	FarFish D2.1, FarFish D3.3, FarFish D3.4, FarFish D4.1, FarFish D4.2 FarFish D4.3	
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, FarFish D4.1 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 Farfish D2.5, FarFish D4.1,	
	Size at maturity	<i>M. senegalensis</i> 33 cm (females) 39 cm (males)	<i>M. polli</i> 37 cm (females) 44 cm (males)
	Age at maturity	End of first year	During second year
	Spawning	September-March	October - March
	Depth distribution (common)	100-600 m	200-1000 m
Growth first year	Fast (1.12 mm day ⁻¹)	Fast (1.12 mm day ⁻¹)	
MCS	VMS/AIS Inspections (landings and at sea), number of inspections are increasing (Maritime patrol operations, Air patrol operations) Observer embarkation on board Certification of catches for the EU marked.	FarFish D2.1, FarFish D4.1 COREWAM (MD)	
Value chain			
Value chain description has been published within FarFish (D3.4). A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (D3.9).		FarFish D3.4, NOFIMA	

Port, transport, processing, marked	<p>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.</p> <p>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.</p>	<p>FAO/CECAF (2013).</p> <p>FarFish D3.4</p> <p>NOFIMA, (SE)</p>
Challenges		
Data collection	<p>There are data limitations concerning 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.</p>	<p>COREWAM (MD)</p> <p>Fall et al., (2016)</p>
Assessment	<p>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 <i>M.Senegalensis</i> and during the second year for <i>M.polli</i>. This demonstrates that for management purposes there is a difference between the two species.</p>	<p>FarFish D2.5</p> <p>Rey et al., (2016)</p>
Fishery, Species/stock discrimination	<p>The species have overlapping distribution, are mixed in catches and are commonly marketed as <i>Merluccius</i> and evaluated as a single stock. Lack of knowledge on the two species of hake, bycatch registrations need to be species specific.</p>	<p>Fernández-Peralta et al., (2011, 2017)</p>
Management, sustainability	<p>SFPA is set to 2,000 t, but the MSY is set to 1,657 t.</p> <p>Overexploitation of particularly demersal species, but increasingly also coastal pelagic stocks.</p>	<p>Fall et al., (2016)</p> <p>FarFish D4.1</p>
MCS	<p>There is a need to increase controls of fishing vessels (observers and inspections)</p>	<p>FarFish D4,1</p>
Other concerns	<p>Coastal erosion, climate change, pollution, ecosystems degradation</p>	<p>FarFish D4.1</p>
Potential improvements		
Data	<p>FarFish aims to contribute to improved stock assessment by data collection and analysis</p>	<p>FarFish D2.1, FarFish D4.1</p>
Assessment	<p>FarFish aims to contribute to improving stock assessment 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.</p>	<p>FarFish D2.1, FarFish D4.1</p>
Monitoring	<p>FarFish will aim to contribute to better monitoring in the area by utilizing latest available satellite systems and tools.</p>	<p>CSIC</p>

5.3 Outcome Targets

OTs set for the Senegalese CS are based on MP0 (D4.1), MR1 (D4.3) and the audit of MR1 (D5.1); as well as lengthy and detailed consultation process with authorities, operators and other stakeholders in the fishery.

The key issue to be addressed by FarFish in this case study is to improve catch data and discrimination between the two species of black hake, through improved data collection and self-sampling. This should, among other things, enable for separate stock assessments for the two species, as well as contribute to the setting of separate TACs for both species. Improved data on bycatches in the black hake fishery is as well needed.

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 all fleets operating in the area transmit VMS/AIS signals.

Lack of data on trade flows within the black hake value chains of Senegal, for all fleets operating within the country's waters, was raised. This is a delicate matter that cannot easily be addressed by EU operators alone, as the most relevant data may include business sensitive information.

Taking the above into consideration, a total of four OTs have been set for the fishery, with three of them being obligatory and one recommended. The OTs are as follows:

- **OT1:** Information on the proportion of the two species of black hake in catches provided. **Obligatory OT.**
- **OT2:** Bycatch data in black hake fishery available. **Obligatory OT.**
- **OT3:** VMS and/or AIS signals are transmitted. **Obligatory OT.**
- **OT4:** Trade flow data on black hake provided. **Recommended OT.**

Regarding OT1, it has been suggested to apply self-sampling by fishermen to enable registration of catches of the two black hake species. Morphological method used by fishermen to separate between the two black hake species is currently being validated within FarFish by means of molecular techniques.

Regarding OT4, it is recognised that trade flow data can include business sensitive information and that it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so. This challenging matter is therefore to be primarily addressed as "other potential actions as supplement to the MR" within FarFish, but the operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products

(e.g. fresh/frozen) and destination. The operators are to formalise this in the MR, including frequency of data provision.

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 MPO. 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:

1. One of the main needs identified on a socio-economic level within the fishery 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. *(Authority comment: FarFish will analyse the Senegalese black hake value chains and suggest improvements, which will potentially contribute to this issue).*
2. Improved quality of current stock assessments for black hake, with separate stock assessments for the two species is needed. *(Authority comment: 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.)*
3. Knowledge gap analysis is needed, especially for the black hake stocks. The responsibility for this cannot realistically be placed on the operators. *(Authority comment: This is at least partly going to be addressed within the FarFish project within different tasks and WPs).*
4. Development of user friendly, digital maps (VMS/AIS based) that support monitoring of all fleets operating in the area could be valuable for this case study. *(Authority comment: The FarFish project will explore the applicability of such maps. This is partly linked to OT3).*

6 MR invitation for the Mauritanian case study

6.1 Introduction

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 SFPA²⁴: LDAC and OPROMAR. The Mauritanian EEZ covers an area of 234,000 km² that is amongst the most productive fishing areas in the world.

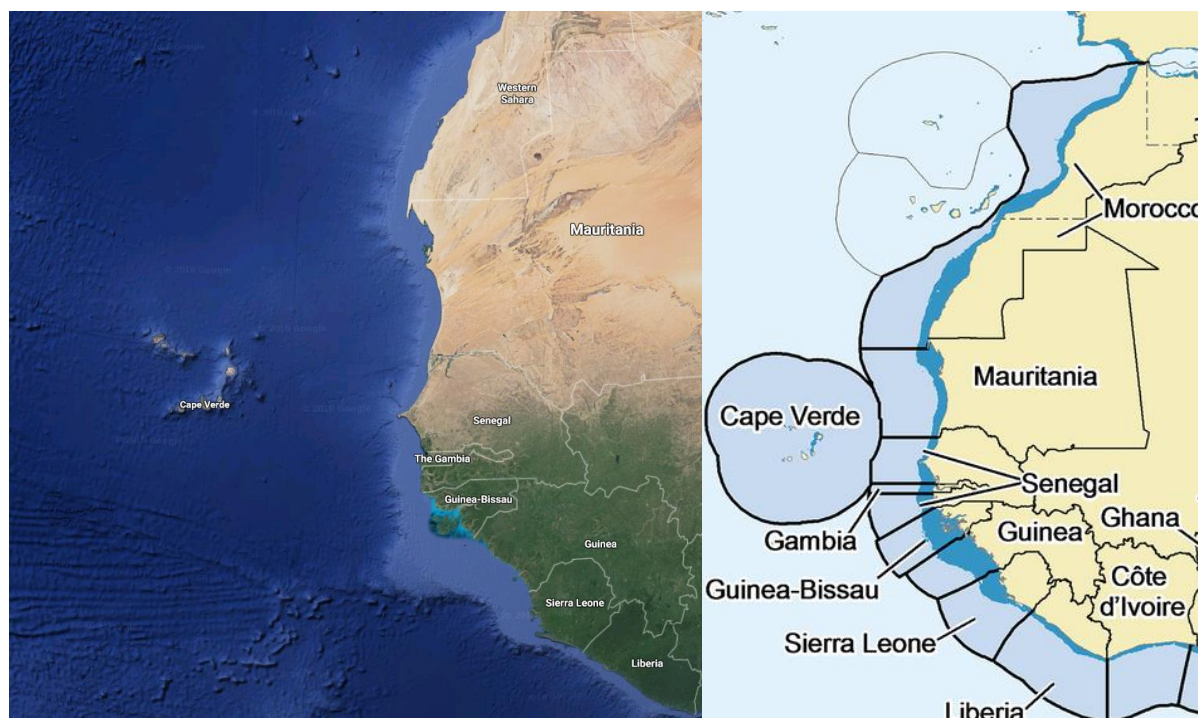


Figure 6: The Mauritanian EEZ covers an area of 234,000 km² that is amongst the most productive fishing areas in the world

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 seines.

²⁴ In September 2019 the EU and the Islamic Republic of Mauritania agreed to extend, for maximum one year (EC, 2019c). the protocol to the sustainable fisheries partnership agreement which was due to expire in November 2019. Under the protocol, the EU fleet can fish in Mauritanian waters for shrimp, demersal fish, tuna and small pelagic fish, up to a total of 287,050 tons a year. In addition to the fees paid by the European fleet, the EU pays a financial contribution of €61,625,000 per year, comprising of €57,500,000 for the access to waters and €4,125,000 for supporting local fishing communities in Mauritania and improving fisheries governance. This extension fully reflects the existing protocol and confirms its underlying principles. The two parties agreed on an exceptional procedure to tackle potential border blockages during the export transportation of fresh fish caught in Mauritanian waters.

During the preparations of MPO (D4.1) the case study authorities expressed an interest in focusing on the shrimp fishery under the SFPA within the project. Therefore, MPO placed emphasis on describing the current situation within the SFPA shrimp fishery. After MPO was submitted the dialogue between authorities and operators however revealed that there might be limited interest among the operators to develop MR for the shrimp fishery, as only a small part of the available fishing opportunities is being utilised. The authorities consequently came to the conclusion that development of MR within FarFish for black hake and small pelagics would be highly relevant. It was therefore decided at the MR kick off meeting, held in Vigo in June 2018 (see D4.2) to include shrimp, black hake and small pelagics in the MR invitation. 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 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 observer coverage, and 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 in Mauritanian waters consists of 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 (Fernández-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.

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 WP3 representatives will act as a leading authority in the FarFish RFMS process, considering input from the above-mentioned authorities, as far as possible. The main contact person in this process is Jónas R. Viðarsson²⁵, as the leader of Task 3.3 (authority role within RFMS).

The operators qualified to respond

LDAC, represented by Alexandre Rodriguez and Sonia Doblado²⁶, and Francisco Teixeira²⁷ 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/Sonia Doblado (LDAC), in cooperation with FarFish WP4, will prepare a draft MR to be reviewed by the authorities (WP3, with input from MPEM, ONISPA, DARE, DPI and DG MARE, where applicable). 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.

Time frame

An approved MR should be available by 31 May 2020 the latest.

²⁵ jonas@matiss.is

²⁶ alexandre.rodriguez@ldac.eu and Sonia.doblado@ldac.eu

²⁷ fcoteijeira@opromar.com

6.2 MPO

Current state		
<p>This MPO applies to the 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.</p>		
Case study leader	IMROP Contact person: Khallahi Brahim, medfall_khall@yahoo.fr	Revised KB, 19.11.2019
Fishery identification		
Species (target, bycatch)	<p>Shrimp fishery: Target: two species of shrimp, Langostino/Prawn (<i>Farfantepenaeus notialis</i>) and Gamba/Southern pink shrimp (<i>Parapenaeus longirostris</i>). Other species; <i>Melicertus kerathurus</i>, <i>Aristeus varidens</i>, <i>Plesionika heterocarpus</i>, <i>Aristaeopsis edwardsiana</i>. Bycatch; 8% cephalopods, 10 % crabs, 15 % fish.</p> <p>Black hake fishery: Target: two species of black hake, African hake (<i>Merluccius polli</i>) and Senegalese hake (<i>Merluccius senegalensis</i>). Other species: squid and cuttlefish.</p> <p>Small pelagics: Target: Sardinella (<i>Sardinella aurita</i> and <i>Sardinella maderensis</i>), Atlantic horse mackerel (<i>Trachurus trachurus</i>), Atlantic Mackerel (<i>Scomber colias</i>). Other species: Anchovy and Sardine (<i>Sardina pilchardus</i>).</p>	FarFish D2.6, FarFish D4.1 (Carmen-Paz Marti, 2018)
Geographical	<p>The southern pink shrimp/Gamba is distributed from Cape Spatel (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).</p> <p>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.</p> <p>In 2016 and in first half of 2017, Spanish vessels mainly fished between 20°N and south of Nouakchott to the border with Senegal. North of 20°N, the fishery was conducted in deeper waters.</p>	FAO/CECAF (2013) Bouzouma et al., (2017) FAO/CECAF (2013) Bouzouma et al., (2017)

	<p>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 (<i>M. Polli</i>) 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).</p> <p>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 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.</p>	<p>(FAO, 2018) (Carmen-Paz Marti, 2018)</p> <p>(Carmen-Paz Marti, 2018)</p> <p>(CFFA, 2016)</p>
<p>EU fisheries (nations, gear, vessels, catch, quota)</p>	<p>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 <i>P. longirostris</i> and <i>P. notialis</i> vary between years, with <i>P. longirostris</i> 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.</p> <p>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).</p>	<p>SFPA (2015-2019)</p> <p>FarFish D4.1</p> <p>(Carmen-Paz Marti, 2018)</p> <p>Bouzouma et al., (2017)</p>

	<p>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</p>	
Other nations	Mauritania, Turkey, Russia, Ukraine and China	
Management		
Authorities	MPEM, ONISPA, DARO, DPI and DG MARE	FarFish D4.1, FarFish D3.3
Operators	LDAC	FarFish D1.1 FarFish D1.2, FarFish D3.3 CETMAR
Stakeholders (1) Supporting institutions (2) Scientists (3) Other industry (4) NGOs	<p>(1) DPI, CECAF, DARE (2) IMROP, FAO, CMR (3) ANAFCO-CECOPECA, OPRMAR (4) PECHECOPS, Mauritanie 2000,</p>	FarFish, DoA, FarFish D2.1, FarFish D1.2, FarFish D3.3 FarFish D3.4 FarFish D4.1 FarFish D4.3 CETMAR
Governance	Management plan National Fisheries Management plan (MFMP)	FarFish D2.1, FarFish D3.3, FarFish D4.1
RFMO	The Fishery Committee for the Eastern Central Atlantic (CECAF)	
MP (name, obj, area)	<p>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</p> <ol style="list-style-type: none"> (1) Improve knowledge of fisheries resources and their environment (2) Optimize the management of the exploitation of fishery resources (3) Strengthen integration of the fisheries sector to the national economy (4) Develop maritime business (5) Promote the development of continental fishing and aquaculture (6) Strengthen good governance of fisheries 	FarFish D2.1, FarFish D3.3, FarFish D3.4, FarFish D4.1, FarFish D4.2 FarFish D4.3 FAO/CECAF
Case study objectives	Shrimp: reduction of bycatches, improved registration of bycatches, increased onboard observer coverage, improving	FarFish D2.1, FarFish D3.3,

	<p>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.</p> <p>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.</p> <p>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.</p>	<p>FarFish D3.4, FarFish D4.1, FarFish D4.2 FarFish D4.3</p> <p>CSIC</p>
Harvesting control Rules	Closed seasons, minimum size, minimum mesh size etc.	FarFish D2.5 FarFish D4.1,
Data collection (fishery catch and bycatch), employment)	<p>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 derived from the logbooks completed by the ships captains (quantities, number of hours, number of operations by boat, by species or groups of species and by geographical zone). Monthly catch data (by species) and effort data of Spanish shrimpers are provided by the National Association of Ship Owners of Fresh Fruit Freezer Vessels (ANAMAR) to the IEO.</p> <p>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.</p>	<p>FarFish D2.1, FarFish D4.1</p> <p>FAO/CECAF (2013)</p> <p>www.fisheriestransparency.org</p>
Assessment	<p>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> <p><i>P. notialis</i>; 2013: Under-exploited with low Fishing mortality <i>P. longirostris</i>, 2013: Fully exploited (2002-2012), but with low Fishing mortality.</p>	<p>FarFish D2.1 Farfish D2.5, FarFish D4.1,</p> <p>FAO/CECAF (2013)</p>

	<p><i>P. longirostris</i> 2015: Not fully exploited <i>P. notialis</i> 2015: Fully exploited</p>	<p>Bouzouma et al., (2016)</p> <p>Bouzouma et al., (2017)</p>
MCS	<p>Coast guard (GCM); The fisheries monitoring centre of the coast guard is Nouadhibou. Délégation à la surveillance des pêches et au contrôle en mer; surveillance operations of fisheries regulations at sea and ship control operations activities including illegal fishing and flags of convenience.</p>	<p>FarFish D4.1</p> <p>FAO/CECAF (2013)</p>
Value chain		
	<p>Value chain description has been published within FarFish (D3.4). A more comprehensive value chain analysis is to be elaborated within the lifetime of the FarFish project (D3.9).</p>	<p>FarFish D3.4</p> <p>NOFIMA</p>
Port	<p>The shrimp catches are not landed in Mauritania. It would be reasonable to assume they are landed in Spain and enter the processing there.</p> <p>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.</p> <p>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.</p>	<p>FarFish D3.4, FarFish D4.1</p> <p>(Carmen-Paz Marti, 2018)</p>
Processing	<p>Shrimp probably primarily landed in Spain, we have no info on the further processing of this, will have to be investigated.</p> <p>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 consumed nationally, exported to other African countries and/or to Europe. FarFish is interested in investigating these value chains.</p> <p>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.</p>	<p>FarFish D3.4, NOFIMA (WP3)</p> <p>(Corten, Braham, & Sedagh, 2017)</p>

Challenges		
Fishery	High bycatch in shrimp fishery Discrimination between black hake species lacking Transparency in small pelagic value chains lacking	FarFish D4.1
MCS	Problems with access for IMROP inspectors/observers on board EU vessels	FarFish D4.1, 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		
Assessment, Early warning of risks	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.	CCMAR NOFIMA, Syntesa

6.3 Outcome Targets

OTs set for the Mauritanian CS are based on MP0 (D4.1), MR1 (D4.3) and the audit of MR1 (D5.1); as well as lengthy and detailed consultation process with authorities, operators and other stakeholders in the fishery.

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.

For the shrimp fishery, the interest of the authorities is to reduce bycatches, improved registration of bycatches, increase onboard observer coverage, and improving knowledge on the fluctuations in landings due to environmental forcing. Meeting with most of these objectives is though not within the power of the operators, which makes it difficult to translate them into OTs. It is acknowledged that there is probably little interest among EU 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 a development phase.

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 within the power of operators to be solved, but they can at least contribute to solving some of them.

Taking the above into consideration, a total of five OTs have been set for the fishery, with three of them being obligatory and two recommended. The OTs are as follows:

- **OT1:** Information on the proportion of the two species of black hake in catches provided. **Obligatory OT.**
- **OT2:** Information on black hake caught as bycatch provided. **(Obligatory OT).**
- **OT3:** Increased on-board observer coverage on all high-capacity pelagic vessels in place. **Obligatory OT.**
- **OT4:** Data on all catches, discards and by-catches provided. **Recommended OT.**
- **OT5:** Trade flow data on small pelagics provided. **Recommended OT.**

Regarding OT1, it has been suggested to apply self-sampling by fishermen to enable registration of catches of the two black hake species. Morphological method used by fishermen to separate between the two black hake species is currently being validated within FarFish by means of molecular techniques.

Regarding OT5, it is recognised that trade flow data can include business sensitive information and that it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so. This challenging matter is therefore to be primarily addressed as “other potential actions as supplement to the MR” within FarFish, but the operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen) and destination. The operators are to formulise this in the MR, including frequency of data provision.

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 MPO. 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:

1. Collecting data of the black hake as bycatch by all operators in Mauritanian waters by observers (IEO/CECAF/IMROP) would be beneficial for stock assessment. (*Authority comment: FarFish can provide tools for discriminating between the two black hake species (OT1) and will attempt to improve data collection on black hake by-catches (OT2), but the project is most*

likely unable to contribute beyond that. There are no partners within the project that are able to do proof of concept for this action. Discussions have been ongoing with RG members (particularly PFA), but they have currently no operation in Mauritanian waters.)

2. Knowledge gap analysis is needed for small pelagics in this CS. *(Authority comment: The responsibility for this cannot realistically be placed on the EU operators. This can potentially, at least partly, be addressed within the FarFish project.)*
3. Effort could be put into increasing local demand and local markets for black hake, including those in other African countries e.g. Cape Verde, Côte d'Ivoire and Cameroon. 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. *(Authority comment: FarFish will analyse the Mauritanian black hake value chains and suggest improvements, which will potentially contribute to this issue).*
4. 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. *(Authority comment: This will to a point be addressed in FarFish, as part of value chain studies, governance analysis and suggestions for improvements.)*
5. Development of user friendly, digital maps (VMS/AIS based) that support monitoring of all fleets operating in the area would be valuable for this case study. *(Authority comment: The FarFish project will explore the applicability of such maps).*

7 MR invitation for the Seychelles case study

7.1 Introduction

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 SFPAs²⁸: LDAC, OPAGAC, ORTHONGEL and ANFACO-CECOPECA. The EU vessels 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. 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 km² of which only 50,000 km² is a shelf area. Seychelles has the largest EEZ in the west Indian ocean and majority of the fishery is conducted by foreign fleets.

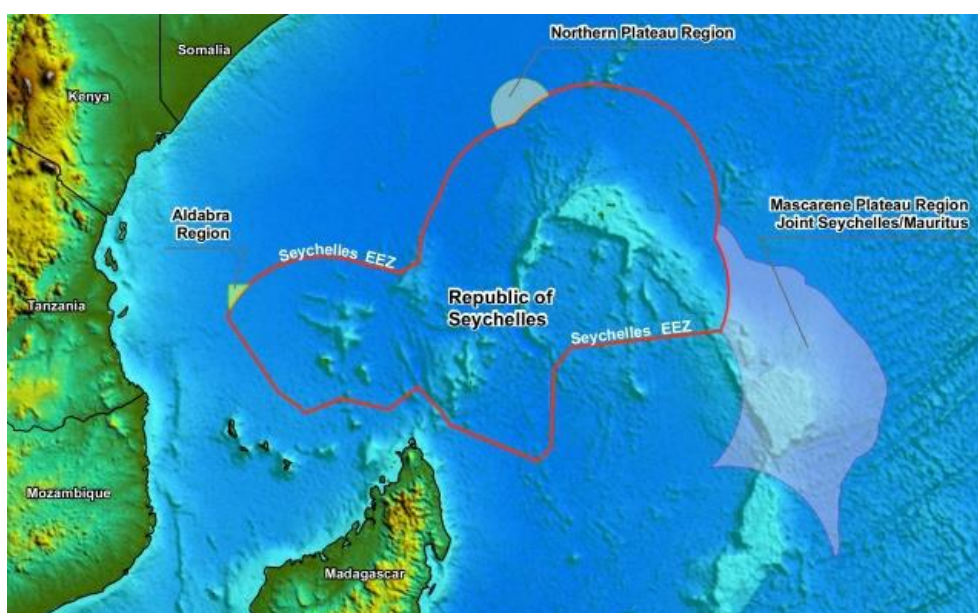


Figure 7: Seychelles have the largest EEZ in the west Indian Ocean, covering almost 1.4 million km²

²⁸ On 22 October 2019, the EU and the Seychelles concluded negotiations for a new six-year long SFPAs and a new protocol that will strengthen their cooperation in the fisheries field for the next six years (EC, 2019d). The new SFPAs is similar to the former one, with 50,000-ton reference tonnage per year, annual financial contribution of €5.3 million and 48 vessels. Unfortunately, the new agreement and the protocol was not yet signed or made public in time for it to be included in this document. The “old” SFPAs and associated protocol is therefore referred to in this document. It should however be noted that the new protocol contains a number of new provisions reinforcing the monitoring of the EU fleet activities (including through the Electronic Reporting System – ERS and Electronic Monitoring Device). Environmental protection is taken into account through clear provisions on the use and management of fish aggregating devices (FADs) and on support vessels, and the reinforcement of the role of observers. Such provisions take into account the creation of marine spatial planning areas in Seychelles waters. For the first time, EU ship-owners payments will also include a specific contribution to a dedicated fund that Seychelles will put in place to improve environmental management and the observations of marine ecosystems in its waters. It is therefore possible that issues discussed in this document have been addressed in the new SFPAs.

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 MPO are as follows:

1. Contribute to improving assessment of non-target species. This should include assessing the effects of the recent discard ban (IOTC resolution 17/04, 2017) on species such as dolphinfish, wahoo, barracuda, and rainbow runners.
2. Investigate the economic consequences of different FAD-number scenarios as emerging from the ad hoc IOTC working group. This should though be done in conformity with IOTC, which are monitoring the number of FADs in the Indian Ocean,
3. Contribute to better monitoring in the area by utilizing latest available satellite systems and tools.
4. Analyse 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 2013-2019²⁹. 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 competent 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, as far as applicable. The main contact person in this process is Jónas R. Viðarsson³⁰, as the leader of Task 3.3 (authority role within RFMS).

²⁹ See footnote on previous page

³⁰ jonas@matis.is

The operators qualified to respond

Operators invited to respond to this MR invitation are LDAC and ANFACO-CECOPESCA. LDAC represented by Alexandre Rodriguez and Sonia Doblado³¹, and ANFACO-CECOPESCA represented by Gonzalo Ojea³² (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/Sonia Doblado (LDAC) and Gonzalo Ojea, in cooperation with FarFish WP4, will prepare a draft MR to be reviewed by the authorities (WP3, with input from SFA and DG MARE if possible). 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 “2nd draft general guidelines for making MRs” presented in FarFish D3.5.

Time frame

An approved MR should be available by 31 May 2020 the latest.

7.2 MPO

Current state		Reference
This MPO applies to EU tuna fishery within Seychelles EEZ. Target species are skipjack, bigeye and yellowfin tuna. Authorities are SFA and DG MARE. Operators are LDAC and ANFACO-CECOPESCA. EU vessels, consisting of 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, YR/VL, 9.11.19
Fishery identification		
Species (target, bycatch)	Target species: Yellowfin tuna (<i>Thunnus albacares</i>), Bigeye tuna (<i>Thunnus obesus</i>), Skipjack tuna (<i>Katsuwonus pelamis</i>). Bycatch: Bonito (<i>Euthynnus affinis</i>), Dolphin fish (<i>Coryphaena hippurus</i>), Rainbow runner (<i>Elegatis bipinnulata</i>), triggerfish (Balistidae) billfish Istiophoridae), wahoo (<i>Acantocybium solandri</i>)	FarFish D4.1
Geographical boundaries	A third of all tuna catches in the West Indian Ocean are taken within the EEZ of Seychelles. There is a significant number of areas within Seychelles waters that are forbidden zones. The SFA protocol includes a list of fishing zones and MPAs.	EU, SFA FarFish D4.1
EU fisheries (nations, gear, vessels, catch, quota)	Nations; Spain, France, Italy, Portugal Total reference catch (SFA): 50,000 t/year ,	SFA FarFish D4.1 SFA, VL SFA (2016)

³¹ alexandre.rodriguez@ldac.eu and Sonia.doblado@ldac.eu

³² ojea@anfaco.es

	<p>Catch within Seychelles EEZ in 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%</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p>	EU, SFPA SFA (2015) www.Whofis-hesfar.org SFA, VL
Other nations	Purse seiners; South Korea, Seychelles, Japan, Mauritius Longliners: Taiwan (POC), Japan, China, Mauritius	SFA, VL FarFish D4.1 FiTI (2016)
Management		
Authorities	DG MARE, SFA	FarFish D4.1, FarFish D3.3
Operators	LDAC, ANFACO-CECOPECA, OPAGAC	FarFish D1.1 FarFish D1.2, FarFish D3.3 CETMAR
Stakeholders (5) Supporting institutions (6) Scientists (7) Other industry (8) NGOs	<p>(1) IOTC, contracting Parties and Cooperation Non-Contracting Parties of the IOTC</p> <p>(2) IOTC, SFA, IEO, IRD, IFREMER, AZTI</p> <p>(3) ORTHONGEL, INPESCA, Grupo Albacora S.A., SAPMER, DONGWON INDUSTRIES CO. Ltd., Thai Union</p> <p>(4) WWF, ISSF, FPAOI</p>	FarFish, DoA, FarFish D2.1, FarFish D1.2, FarFish D3.3 FarFish D3.4 FarFish D4.1 FarFish D4.3 CETMAR SFA, VL/YR
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/)	FarFish D2.1, FarFish D3.3, FarFish D4.1 WWF (2016) Huntington (2016) SFA, VL
RFMO	Indian Ocean Tuna Commission (IOTC)	FarFish D3.3, FarFish D4.1

<p>MP (name, obj, area)</p>	<p>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.</p> <p>IOTC Management plan for FADS</p> <p>Cooperating with Contracting Parties (Members) and Non-Contracting Parties of the IOTC with the aim of 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.</p>	<p>FarFish D2.1, FarFish D3.3, FarFish D3.4, FarFish D4.1, FarFish D4.2 FarFish D4.3</p> <p>IOTC (2008, 2017d)</p> <p>SFA, VL</p>
<p>Case study objectives</p>	<ol style="list-style-type: none"> 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) 	<p>FarFish D2.1, FarFish D3.3, FarFish D3.4, FarFish D4.1, FarFish D4.2 FarFish D4.3 SFA, VL</p> <p>IOTC</p> <p>IOTC (2017b)</p> <p>IOTC</p>
<p>Harvesting Control Rules (HCR)</p>	<p>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.</p>	<p>FarFish D2.5</p> <p>IOTC (2017a)</p> <p>SFA, VL</p>
<p>Data collection (fishery; catch and bycatch, employment)</p>	<p>SFA; logbook, VMS data, catch, effort, length frequency, species composition, observer programme (IRD, IEO) Fishery independent surveys by SFA for demersal species.</p> <p>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</p>	<p>FarFish D2.1 FarFish D4.1</p>

	transparency e.g. on agreements with all third- countries and to make public data on the fishing activities of all fleets operating within Seychelles waters.	www.fisheriestransparency.org
Assessment	<p>Indian Ocean Tuna Commission (IOTC)</p> <p>Yellowfin; Fox-form Bayesian biomass dynamics model, and integrated age-structured models. Yellowfin is overfished in the west Indian Ocean. IOTC has set limits to yellowfin tuna catches, which will make Seychelles quotas drop by 15 %</p> <p>Skipjack; difficult to assess due to rapid population dynamics, maybe continuous spawning, selectivity usually uninformative about year class strength and relative abundance indices derived from pole and line and purse seine fisheries are generally considered to be less reliable than those of longline fisheries. Recent models seem to have used stock synthesis. Skipjack is in relatively good state.</p> <p>Bigeye; Assessed using Stock Synthesis and ASPM software, bigeye is in relatively good state</p> <p>Catch rates of other species are declining, reflecting over-fishing pressure in open-access fisheries</p>	<p>IOTC (2015)</p> <p>IMF (2017)</p> <p>FarFish D2.1 FarFish D2.5, FarFish D4.1,</p> <p>IOTC (2015)</p>
Monitoring, Control and Surveillance (MCS)	<p>Seychelles participate in IOTC regional observer scheme to monitor trans-shipments at sea on carrier vessels for the industrial longline fleet. Transshipment only within Seychelles' ports.</p> <p>VMS, ERS, observers appointed by Seychelles authorities.</p> <p>Fisheries Monitoring Centre (FMC), makes annual vessel compliance, check logbooks, receives obligatory VMS data and conducts sea patrols, catch certificate scheme (ensuring no IUU fishing activity).</p> <p>Regional Fisheries Surveillance Project (RFSP) and IOC SmartFish (programme managed by the Indian Ocean Commission, funded by the European Union and co-implemented by the Food and Agriculture Organization of the United Nations).</p> <p>Seychelles National Scientific Observer Programme; deployment of observers on-board industrial purse seiners. EMS pilot project to complement human observers.</p>	<p>SFA, VL</p> <p>SFPA, sec.4</p> <p>SFA, VL Fisheries Act 2014.</p> <p>FarFish D2.1 FarFish D4.1</p> <p>IOTC (2015) SFA, VL</p>
Value chain		
	Value chain description has been published within FarFish (D3.4). A more comprehensive value chain analysis is to be published within the lifetime of the FarFish project (D3.9).	<p>FarFish D3.4</p> <p>NOFIMA</p>
Port	<p>Designated port for landing is Victoria, Mahé. All EU vessels are expected to source supplies and services required for their operations in the Seychelles.</p> <p>EU vessels land majority of their catches in the Seychelles (92% of Spanish catch, 82% of French catch).</p>	<p>EU, SFPA, sec.3, chpt VI,</p> <p>FarFish D3.4</p>
Processing	Indian Ocean Tuna (IOT), a branch of Union Thai /Seychelles Government (60/40), has a canning factory employing half the	FarFish D3.4

	fishery sector in the Seychelles (approx. 2,500 persons, of which 60% are foreign workers). IOT is responsible for 95 % of Seychelles manufacturing exports, and 45 % of imports, producing 1.6 million cans daily from 340 tons of tuna. IOT is the world's second largest tuna canning factory. Most tuna landings are transhipped, either fresh or frozen (64% in 2013). (www.sib.gov.sc/index.php/sectors/fisheries)	NOFIMA
Market	Canned tuna from the Seychelles enters the global market in a fully transparent way, while the destination final products of transhipped tuna are largely unknown. Europe is though the primary market for EU catches in Seychelles waters.	FarFish D3.4 NOFIMA
Challenges		
Data collection	Catch and landing reports are lacking or unreliable. Many longliners do not land domestically and transhipments are common, which makes it difficult to obtain data. Information on EU fleet landings in foreign ports is however generally provided.	FarFish D4.1
Assessment	Assessment of bycatch, non-target species, is lacking (e.g. dolphinfish, wahoo, barracuda, rainbow runners)	IOCT
Management	Effort regulation of DFADs is lacking. 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. It is a challenge to understand the social and economic consequences of reduction in the number of FADs.	FarFish D2.5, FarFish D3.3 FarFish D4.1
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) Promotion of regional cooperation to combat IUU is needed c) Control at sea is currently largely restricted to national fleet d) There is a lack of manpower and equipment for surveillance	FarFish D2.5 FarFish D3.3 FarFish D4.1
Potential improvements		
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 D4.1 CISC
Management, tools, model scenarios	The case study is covered by 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)

7.3 Outcome Targets

OTs set for the Seychelles CS are based on MP0 (D4.1), MR1 (D4.3) and the audit of MR1 (D5.1); as well as lengthy and detailed consultation process with authorities, operators and other stakeholders in the fishery.

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 to 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. This is partly due to lack of harmonised fisheries information systems e.g. EU, Member state, Flag State, IOTC and Seychelles.

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.

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. There are however security risks associated with transmitting AIS signals, due to piracy treats in the Indian Ocean, which make it difficult to demand constant transmission of AIS signals.

There is a severe lack of knowledge within the Seychelles value chain of tuna products regarding issues such as final products, what markets these products enter, prices, value added etc.

Taking the above into consideration, a total of five OTs have been set for the fishery, three of which are obligatory and three recommended. The OTs are as follows:

- **OT1:** Harmonized fisheries information system in place. **Obligatory OT.**
- **OT2:** Catches of non-target species registered in e-logbooks. **Obligatory OT.**
- **OT3:** MPAs and no-take zones identified in the SMSP are respected. **Obligatory OT.**
- **OT4:** Updated observer program in place. **Recommended OT.**
- **OT5:** Trade flow data provided. **Recommended OT.**
- **OT6:** VMS or AIS signals are transmitted. **Recommended OT**

Regarding OT5, it is recognised that trade flow data can include business sensitive information and that it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so. This challenging matter is therefore to be primarily addressed as “other

potential actions as supplement to the MR” within FarFish, but the operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen/canned) and destination. The operators are to formulise this in the MR, including frequency of data provision.

Regarding OT6, it is recognised that transmission of VMS/AIS can be a security risk, as piracy is an ongoing problem in the Indian Ocean. The OT is therefore classified as recommended.

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 MPO. 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:

1. Analysis on opportunities for increasing landings, processing and marketing of by-catches is needed. By-catches from the EU tuna fleet (and other fleets operating in the area) are often valuable species which could potentially present business opportunities. (*Authority comment: This will be addressed to some point in FarFish.*)
2. Analysis of the economic impacts of the discard ban (IOTC resolution 17/04, 2017) is needed. (*Authority comment: Likely to be to some extent addressed in FarFish.*)
3. Analysis (including trade-off analysis) of the economic impacts of using drifting FADs in Seychelles waters, and estimation of the economic consequences of reducing the number of allowable FADs, is needed. This could potentially lead to identification on optimal number and spatial distribution of drifting FADs. (*Authority comment: This is currently, to some extent at least, being addressed by IOTC, and therefore of little benefit for FarFish to award significant effort to this.*)

8 Discussions

It should be taken into consideration that this second MR invitation is based on inputs and results from multiple parts of the FarFish project, including MP0 (D4.1), MR1 (D4.3) and the audit of MR1 (D5.1); as well as lengthy and detailed consultation process with authorities, operators and other stakeholders in the fishery. It does also have to be considered that the EU fleet is only a subset of the resource users in the case studies, which has effect on the OTs and MRs in respect to impact, coverage and issues concerning “level playing field”. In addition, it needs to be kept in mind that the SFPAs and associated protocols in majority of the CSs are currently being renegotiated, which means that some issues raised in this document might be addressed in the new SFPAs.

The operators are invited to start the process of developing MRs with these invitations. It is reasonable to assume that various issues and challenges will be identified during the development phase, which can then be negotiated in consultation with the authorities. 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.

Several OTs presented in this second version MR invitation have changed from the first version. For the purpose of demonstrating full transparency, the reasoning for these changes are as follows:

South West Atlantic case study: In the MR1 invitation for the SW-Atlantic case study there were four OTs identified, two of which are now included in the MR2 invitation (with slight rewording but no change in content). One OT has however been removed, one added, and one moved to “other potential actions as supplement to the MR” category.

An OT that was to address discrimination between the two hake stocks (*Merluccius australis* and *Merluccius hubbsi*) involving self-sampling [OT2] is now believed to be too challenging and optimistic to be able to include as an OT. It has therefore been removed.

An OT that is to provide a theoretical frame for a Specific Control and Inspection Programme in FAO 41 as basis for a future pilot project on a joint deployment plan [OT3] has been added; but this links to an OT1 that is to facilitate an International Conference focused on sustainable management in ABNJ [OT1].

An OT from MR1 invitation, referred to closing off VMEs for bottom trawling, in accordance with UNGA 61/105, FAO Guidelines for Management of Deep-Sea Waters in the High Seas and Council Regulation No 734/2008. The reason for not including this as an official OT in the MR2 invitation is that there are already 11 areas closed for bottom trawling for the EU fleet (in accordance to UN Resolution 65/105 2006) and Spain closed off additional 9 areas for bottom trawling in 2011 due to identified VMEs. Two other areas are also closed for EU fleet due to existing trawling footprint. These restrictions currently apply for the EU fleet only and have not been adopted by other foreign fleets operating in the area.

This experience highlights that there is a need for collaborative efforts from authorities, operators, researchers and others to establish a consensus on the need for protecting these VMEs before this can be presented as an official OT. The soft-law mechanism, presented in OT1, is to partly address this. As “other potential actions as supplement to the MR” it is suggested that Development of user friendly, digital maps (VMS/AIS based) would be beneficial; 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 identified VMEs, and c) visualise the frequency of VMS/AIS gaps.

South East Atlantic case study: In the MR1 invitation for the SE-Atlantic case study there were three OTs identified, all of which are now included in the MR2 invitation (with slight rewording but no change in content). There is however little activity in this case study and unlikely that any operator will be interested in developing a MR.

Cape Verde case study: In the MR1 invitation for the Cape Verdean case study there were four OTs identified, all of which are now included in the MR2 invitation. The wording of some of the OTs have been changed to make them more detailed and precise. The content has however not changed much, with the exception of the trade flow OT [OT4]. As trade flow data can include business sensitive information and that it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so; it has been decided that this challenging matter is to be primarily addressed as “other potential actions as supplement to the MR”. The operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen/canned) and destination. The operators are to formulise this in the MR, including frequency of data provision.

Senegal case study: In the MR1 invitation for the Senegalese case study there were four OTs identified, all of which are now included in the MR2 invitation. The wording of some of the OTs have been changed to make them more detailed and precise. The content of an OT addressing improved data collection and reporting of catches and landings [OT1 in MR1 invitation] has been tailored to the FarFish case study, so it now focuses solely on the black hake fishery [OT2]. The OT on trade flow [OT4] has as well changed slightly in content. Trade flow data can include business sensitive information and it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so. It was therefore decided that this challenging matter is to be primarily addressed as “other potential actions as supplement to the MR”. The operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen/canned) and destination. The operators are to formulise this in the MR, including frequency of data provision.

Mauritanian case study: In the MR1 invitation for the Mauritanian case study there were seven OTs identified, which have been reduced to five in the MR2 invitation. The main reason for this reduction is that OTs addressing improved registration of catches, especially bycatches and discards, in the black hake- [OT2], shrimp- [OT4] and pelagic [5] fisheries, have been merged into one OT that addresses the issue in general for all fisheries [OT4]. Apart from that, the wording of some of the OTs have been changed to make them more detailed and precise but the content has not changed much, with the exception of the trade flow OT [OT5]. Trade flow data can include business sensitive information and it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so. It was therefore decided that this challenging matter is to be primarily addressed as “other potential actions as supplement to the MR”. The operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen/canned) and destination. The operators are to formulise this in the MR, including frequency of data provision.

Seychelles case study: In the MR1 invitation for the Seychelles case study there were seven OTs identified, which have been reduced to six in the MR2 invitation. The wording of the OTs have been changed to make them more detailed and precise but the content has not changed much, with the exception of the trade flow OT [OT5]. As trade flow data can include business sensitive information and that it is unrealistic to expect EU operators to provide such information, if other competing operators do not also have to do so; it has been decided that this challenging matter is to be primarily addressed as “other potential actions as supplement to the MR”. The operators are nevertheless expected to provide some trade flow data, which can be on aggregated level, on volumes, products (e.g. fresh/frozen/canned) and destination. The operators are to formulise this in the MR, including frequency of data provision.

The OT from MR1 invitation that has been removed addressed provision of data on the use of FADs within Seychelles EEZ [OT4 in MR1 invitation]. Research on FADs is a complex matter which is dealt with differently by tuna RFMOs around the world. Although a common vision is lacking, there have been considerable efforts in recent years to adopt a collaborative approach across tuna RFMOs in establishing a legal universal definition, identifying common indicators, improving tracking/monitoring tools, looking at where data gaps and research needs lie, and investigating mitigation measures for tuna stocks and the ecosystem adapted to the fisheries. An example of a joint Tuna RFMOs work is the first meeting hosted by ICCAT and held in Madrid on 14-17 April 2017, where all tuna RFMOs participated with the exception of WPCFC.³³ Also, independent stakeholder-led advisory bodies such as the LDAC and NGOs such as Pew or ISSF have developed guidelines on good practices on FAD management across the world.³⁴

³³ Report available at https://www.iccat.int/Documents/Meetings/Docs/2017_JFADS_REP_ENG.pdf

³⁴ See https://ldac.eu/images/EN_LDAC_Guidelines_on_Best_Practices_FADs_May2019.pdf

In terms of the Indian Ocean, in recent years the IOTC has adopted a number of management measures at its Annual Meetings including catch and effort limits for purse seine and other fisheries. As these measures are for highly migratory stocks, they apply not only to the high seas but also within the EEZ of Seychelles. For tropical tunas, the measures adopted include Harvest Control Rules for the skipjack tuna (e.g. Resolution 16/02 On harvest control rules for skipjack tuna in the IOTC area of competence), catch limits for the yellowfin tuna (e.g. Resolution 17/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of Competence), and measures to limit fishing effort for purse seine fisheries as a whole, through a plan to reduce support vessels in Resolution 17/01; Resolution 17/08 Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species. In addition, the IOTC adopted other measures to ban the use of lights to attract fish (e.g. Resolution 16/07 On the use of artificial lights to attract fish) and ban the use manned or unmanned aircraft to assist in the search of tuna schools (e.g. Resolution 16/08 On the prohibition of the use of aircrafts and unmanned aerial vehicles as fishing aids). The catch limits for the yellowfin tuna were set using a 15% reduction in catches as baseline and 2014 as reference year, meaning that, in 2017 and subsequent years, the EU fleet had to maintain catches as perm those level. In addition, the existing FAD limit was further reduced, to a maximum of 350 active FADs per vessel at any given time (500 in 2015 and 425 in 2016).

In addition, the EU adopted different levels of reduction for the Spanish, French and Italian purse seine fleets, with lower TACs for Italy and France, at the expense of Spain (21% reduction). The implementation of the catch limits had dire consequences particularly on the Spanish fleet, which was obliged to remain in port for the last two months of 2017, as a consequence of having reached its quota. For that reason, in 2018 some vessels decided to voluntarily stop fishing in May and remain in port. The drop in activity of purse seiners is having serious socio-economic consequences not only on the fleet but also to the economies and livelihoods of some coastal countries in the Indian Ocean through reduced access fees, lack of raw material at canning factories in the region, and economic loss due to a drop of services and economic activity in several coastal countries.

In view of the high demand of time and resources and considering that this topic is being covered at RFMO level by the CPCs including Seychelles, it has been decided to remove this OT from the MR2 invitation.

Appendix

Comparison between OTs and identified “actions as supplement” in MR1 and MR2 invitation and explanations on changes made between the two iterations

Case study 1: SW-Atlantic

OT	MR1 Invitation	MR2 Invitation	Explanations for changes
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	A soft-law mechanism [International Conference] focused on sustainable management in ABNJ (FAO 41) available. Obligatory	Same general content, slight change in wording to manage expectations
OT2	Compilation of existing knowledge and development and testing of methodology and (self-sampling) protocols to facilitate discrimination of the two hake stocks (<i>Merluccius australis</i> and <i>Merluccius hubbsi</i>). Obligatory	All vessels transmit AIS signals. Obligatory	Same as OT3 in RM1
OT3	Commitment to transmit VMS/AIS signals. Obligatory	Theoretical frame for a Specific Control and Inspection Programme in FAO 41 as basis for a future pilot project on a joint deployment plan for this region available. Recommended	OT2 and OT3 from MR1 partly combined into this recommended OT. The fact that this is ABNJ without RFMO had the affects that expectatons needed to be managed
OT4	Commitment to honour the VMEs in accordance with the Council Regulation (EC) No 734/2008. Obligatory		
	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. Action 1	Compilation of knowledge on main stocks being targeted in the fishery is needed. This knowledge already exists to some degree at different scientific institutions e.g. knowledge on the two hake species as well as main targeted cephalopods. Action 1	Same general content

	<p>Development and testing of self-sampling protocol for fleets targeting the two hake stocks (<i>Merluccius australis</i> and <i>Merluccius hubbsi</i>). This will be done with the intention to facilitate discrimination of the two hake stocks in catch. Although <i>M.hubbsi</i> largely dominate catches, due to an initially more northwards distribution of <i>M.australis</i>, 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.</p> <p>Action 2</p>	<p>Development and testing of self-sampling protocol for fleets targeting the two hake stocks is advised. This should be done with the intention to facilitate discrimination of the two hake species in catch.</p> <p>Action 2</p>	<p>Same general content</p>
	<p>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.</p> <p>Action 3</p>	<p>Development of user friendly, digital maps (VMS/AIS based) would be beneficial; 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 adopt similar standards, b) mapping fishing activities of other distant water fleets operating in identified VMEs, and c) visualise the frequency of VMS/AIS gaps. This could facilitate improved compliance with the VMEs in accordance with UNGA 61/105 and FAO Guidelines for Management of Deep-Sea Waters in the High Seas, as well as Council Regulation No 734/2008.</p> <p>Action 3</p>	<p>Same general content</p>

Case study 2: SE-Atlantic

OT	MR1 Invitation	MR2 Invitation	Explanations for changes
OT1	Reporting of all catches via e-logbooks. Obligatory OT	Reporting of all catches via e-logbooks. Obligatory OT	Same content
OT2	Commitment to transmit VMS/AIS signals. Obligatory OT	All vessels transmit AIS or VMS signals. Obligatory OT	Same content
OT3	Onboard observers. Recommended OT	All vessels have on-board observers. Recommended OT	Same content
	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. Action 1	Compiling of existing knowledge on main stocks being targeted in the area is needed. This information exists to some degree at different scientific institutions and research programmes. Action 1	Same general content
	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. Action 2	Development of user friendly, digital maps (VMS/AIS based) with the intention of identifying fishing pressure of different fishing fleets is advised. This will potentially create pressure on international fleets to send uninterrupted AIS signals. Action 2	Same content

Case study 3: Cape Verde

OT	MR1 Invitation	MR2 Invitation	Explanations for changes
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 harmonized catch data protocol in place that facilitates improved reporting of swordfish and blue shark commercial and biological data. Obligatory OT.	Similar content, but more specific on swordfish and blue chak, due to input from EU operators. Elements of OT2 in MR1 included/merged.
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.	All vessels transmit AIS and/or VMS signals. Obligatory OT.	Same as OT4 in MR1
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.	Strengthened observer program in place. Recommended OT.	Same general content as OT2 in MR1
OT4	Commitment to transmit VMS/AIS signals. Obligatory OT.	Trade flow data provided. Recommended OT.	Same general content as OT3 in MR1
	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. Action 1	There is a data gap when it comes to Information on trade flows within the value chains of Cape Verde i.e. catches of all fleets operating within the Cape Verde EEZ. There is good data available on catches landed in Cape Verde and within the EU, but data on catches landed in other African countries or transshipments is however lacking. Cape Verdean authorities have therefore very little overview of what happens to	OT4 is a recommended OT and it is clear that operators cannot be made solely responsible for filling trade flow data gaps, which is why this action is proposed.

		<p>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. This is a gap that should be addressed.</p> <p>Action 1</p>	
	<p>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. Action 2</p>	<p>Capacity building is needed within Cape Verdean institutions in tuna stock assessment and management. Action 2</p>	<p>Same general content as Action 1 in MR1</p>
	<p>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. Action 3</p>	<p>A need for 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. Action 3</p>	<p>Same general content as Action 2 in MR1</p>
	<p>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</p>	<p>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. Action 4</p>	<p>Same general content as Action 3 in MR1</p>

	and provide a tool for monitoring compliance. Such a tool can then also be valuable for the EU fleet to demonstrate “best practise”. Action 4		
	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. Action 5	The development of VMS/AIS digital maps that clearly show fishing activities of both EU fleets and other fleets’, and frequency of VMS/AIS gaps could be extremely valuable in respect to evaluate compliance to agreements and requirements of ICCAT. Action 5	Same general content as Action 4 in MR1
		There is a need to Increase research into the socio-economic and ecological impacts of FADs. Analysis (including trade-off analysis) of the economic impacts of using drifting FADs in Cape Verdean waters, and estimation of the economic consequences of reducing the number of allowable FADs, is needed. This could potentially lead to identification on optimal number and spatial distribution of drifting FADs. Action 6	Same general content as Action 5 in MR1

Case study 4: Senegal

OT	MR1 Invitation	MR2 Invitation	Explanations for changes
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.	Information on the proportion of the two species of black hake in catches provided. Obligatory OT.	Same general content as OT2 in MR1
OT2	Enhancing data collection to enable for more accurate estimations of the share of each black hake species in total catches. Obligatory OT.	Bycatch data in black hake fishery available. Obligatory OT.	Links with OT1 in MR1, but addresses black hake fisheries specifically, due to requests from EU operators and authorities in Senegal
OT3	Commitment to transmit VMS/AIS signals. Obligatory OT.	VMS and/or AIS signals are transmitted. Obligatory OT.	Same content as OT3 in MR1
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.	Trade flow data on black hake provided. Recommended OT.	Same general content as OT4 in MR1
	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. Action 1	The need to increase supply/demand and local markets within the black hake fishery, including those of neighbouring countries, has been identified. 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. Action 1	Same as action 3 in MR1. Wording slightly changed and emphasis increased by moving to action 1

	<p>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. Action 2</p>	<p>Improved quality of current stock assessments for black hake, with separate stock assessments for the two species is needed. Action 2</p>	<p>Same general content as action 1 in MR1 and is to support OT1 as this is an OT/action that operators cannot be made solely responsible for</p>
	<p>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 Senegalese black hake value chains will be a part the FarFish project, which will potentially contribute to this. Action 3</p>	<p>Knowledge gap analysis is needed, especially for the black hake stocks. Action 3</p>	<p>Same content as action 2 in MR1</p>
	<p>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. Action 4</p>	<p>Development of user friendly, digital maps (VMS/AIS based) that support monitoring of all fleets operating in the area could be valuable for this case study. Action 4</p>	<p>Same general content as in action 4 in MR1</p>

Case study 5: Mauritania

OT	MR1 Invitation	MR2 Invitation	Explanations for changes
OT1	Enhancing data collection to enable for more accurate estimations of the share of each black hake species in total catches. Obligatory OT.	Information on the proportion of the two species of black hake in catches provided. Obligatory OT.	Same content as OT1 in MR1
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.	Information on black hake caught as bycatch provided. Obligatory OT.	Dialogue between EU operators and Mauritanian authorities led to editing of this OT, as importance of data gaps on total catches of black hake was emphasised.
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.	Increased on-board observer coverage on all high-capacity pelagic vessels in place. Obligatory OT.	Same content as OT6 in MR1.
OT4	Registration and reporting of all catches in the shrimp fishery, including bycatches. Obligatory OT.	Data on all catches, discards and by-catches provided. Recommended OT.	OT expanded to registration of all catches in all fisheries, as EU operators and Mauritanian authorities did not see a reason to specifically address the shrimp fishery.
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	Trade flow data on small pelagics provided. Recommended OT.	Same general content as OT7 in MR1

	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.		
	Improved quality of current stock assessments for black hake, with separate stock assessments for the two species. Action 1	Collecting data of the black hake as bycatch by all operators in Mauritanian waters by observers (IEO/CECAF/IMROP) would be beneficial for stock assessment. Action 1	Same general content
	Knowledge gap analysis is needed, in order to identify key knowledge and data gaps, small pelagics. Action 2	Knowledge gap analysis is needed for small pelagics in Mauritanian waters. Action 2	Same general content
	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. Action 3	Effort could be put into increasing local demand and local markets for black hake, including those in other African countries e.g. Cape Verde, Côte d'Ivoire and Cameroon. Action 3	Same general content
	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. Action 4	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. Action 4	Same general content

<p>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. Action 5</p>	<p>Development of user friendly, digital maps (VMS/AIS based) that support monitoring of all fleets operating in the area would be valuable for this case study. Action 5</p>	<p>Same general content</p>
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Case study 6: Seychelles

OT	MR1 Invitation	MR2 Invitation	Explanations for changes
OT1	Mandatory e-logbooks and provision of data to be used for scientific and research purposes. Obligatory OT.	Harmonized fisheries information system in place. Obligatory OT.	OT1 & OT2 in MR1 & MR2 have overlap, but the overall content has not changed significantly from MR1
OT2	Development of a protocol for registration of catches of non-target species in e-logbooks. Obligatory OT.	Catches of non-target species registered 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.	MPAs and no-take zones identified in the SMSP are respected. Obligatory OT.	Same content as OT6 in MR1
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	Updated observer program in place. Recommended OT.	Same content as OT3 in MR1
OT5	Commitment to transmit VMS/AIS signals. Obligatory OT.	Trade flow data provided. Recommended OT.	Same content as OT7 in MR1
OT6	Commitment to honour MPAs and no-take zones identified in the SMSP. Obligatory OT.	VMS or AIS signals are transmitted. Recommended OT	Same content as OT5 in MR1
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		OT4 in MR1 on FADs was not included in MR1 due to request from EU operators and ongoing initiatives at IOTC (to avoid duplication of work)

	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. Action 1	Analysis on opportunities for increasing landings, processing and marketing of by-catches is needed. By-catches from the EU tuna fleet (and other fleets operating in the area) are often valuable species which could potentially present business opportunities. Action 1.	New action identified for MR2
	Analysis of the economic impacts of the discard ban (IOTC resolution 17/04, 2017). Action 2.	Analysis of the economic impacts of the discard ban (IOTC resolution 17/04, 2017) is needed. Action 2.	Same content

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