Overview of the state of data collection and scientific advice in the EU ORs, with case study on a roadmap towards regular stock assessment in French Guiana

EASME/EMFF/2018/011 Specific Contract No.2

Final Report

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LIST OF ABBREVIATIONS

Term	Description
AC	Autonomous Community
AFD	Agence française pour le développement (France)
ARDITI	Agência Regional para o Desenvolvimento da Investigação e Tecnologia e Inovação (Madeira)
ARM	Autonomous Region of Madeira
CINEA	European Climate, Infrastructure and Environment Executive Agency
CFP	Common Fisheries Policy
CC-RUP	Consejo Consultivo de las Regiones Ultraperféricas
CC-SUD	Consejo Consultivo para las Aguas Occidentales Australes
CECAF	Committee for the Eastern Central Atlantic Fisheries
CIIMAR	Centro Interdisciplinar de Investigação Marinha e Ambiental (Portugal)
CITES	Convention on International Trade in Endangered Species
CMM	Conservation Management Measure
CNSP	Centre national de surveillance des pêches (France)
COOPESCAMADEIRA	Coopescamadeira- Cooperativa de Pesca do Arquipélago da Madeira
COPEM	Collectif Pêche Martinique
CPAC	Code of Procedural in the Administrative Courts (Portugal)
CROSS	Centres Régionaux Opérationnels de Surveillance et de Sauvetage (France)
CRPMEM	Comité Régional des Pêches Marines et des Elevages Marins (Guadeloupe)
DCF	Data Collection Framework
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DGRM	Direção-Geral dos Recursos Naturais, Segurança e Serviços Marítimos (Portugal)
DM	Direction de la Mer (France)
DMSOI	Direction de la Mer South Indian Ocean (Réunion)
DOP	Departamento de Oceanografia e Pescas (University of Azores)
DPMA	Direction des Pêches Maritimes et de l'Aquaculture (France)
DRM	Direção Regional do Mar (Madeira)
DRP	Direção Regional das Pescas (Azores)
DSIC	Direção de Serviços de Inspeção e Controlo (Madeira)
EASME	Executive Agency for Small and Medium Sized Enterprises
EEZ	Exclusive Economic Zone
EMFAF	European Maritime, Fisheries and Aquaculture Fund (2021 – 2027)
EMFF	European Maritime and Fisheries Fund (2014 – 2017; 2018 - 2020)
EMODnet	European Marine Observation and Data Network
EMS	Electronic Monitoring System
ENSAM	Ecole Nationale de la Sécurité et l'Administration de la Mer (France)

Term	Description
ERDF	European Regional Development Fund
ERS	Electronic Reporting System
ETP	Endangered, Threatened and Protected
EU	European Union
EU-MAP	Multi-Annual Union Programme for data collection
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization
FAOSTAT	The Food and Agriculture Organization Corporate Statistical Database
GDP	Gross Domestic Product
GNR	Guarda Nacional Republicana (Portugal)
ICCAT	International Commission for the Conservation of Atlantic Tuna
ICES	International Council for the Exploration of the Sea
IEO-CSIC	Instituto Español de Oceanografía-Centro Superior de Investigaciones Científicas (Spain)
IFNC	Instituto da Conservação da Natureza e das Florestas, I.P. (Portugal)
Ifremer	Institut Français de Recherche pour l'Exploitation de la Mer (France)
IMBs	Intermediate Management Bodies
INE	Instituto Nacional de Estatística (Portugal)
IRPA	Inspeção Regional das Pescas dos Açores (Azores)
ISTAC	Instituto Canario de Estadistica (Canary Islands)
IPMA	Instituto Português do Mar e da Atmosfera (Portugal)
IRD	Institut de Recherche pour le Développement (France)
IUU	Illegal, Unreported and Unregulated
JSC	Joint Scientific Committees
LDAC	Long Distance Advisory Council
LEMNA	Laboratoire d'économie et de management de Nantes-Atlantique (France)
LOA	Length Overall
MAPA	Ministerio de Agricultura, Pesca y Alimentación (Spain)
MAC	Transnational Cooperation Programme 'Madeira-Azores-Canarias'
MCS	Monitoring, control and surveillance
MM	Ministério do Mar (Portugal)
MNHN	Muséum national d'histoire naturelle (France)
MPA	Marine Protected Areas
NEAFC	North East Atlantic Fisheries Commission
NEI	Not elsewhere included
NGO	Non-governmental organisation
OBSDEB	Observation des Marées au débarquement (France)
OFB	Office Français pour la Biodiversité (France)
OR	Outermost Region

Term	Description
OSPAR	Oslo-Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
PIC	Programa Indicativo de Cooperação (Portugal)
POPA	Programa de Observação para as Pescas dos Açores (Azores)
RFB	Regional Fisheries Bodies
RIM	Red de Información y Muestreo (Spain)
SCRS	Standing Committee on Research and Statistics (International Commission for the Conservation of Atlantic Tuna)
SFPA	Sustainable Fisheries Partnership Agreement
SGP	Secretaría General de Pesca (Spain)
SIH	Système d'information halieutique (France)
SIPA	Système d'information de la pêche et de l'aquaculture (France)
SMEFF	Sustainable Management of External Fishing Fleets
SPEA	Sociedade Portuguesa para o Estudo das Aves (Portugal)
SRMar	Secretaria Regional de Mar e Pescas (Madeira)
SSF	Small-scale fisheries
STECF	Scientific, Technical and Economic Committee for Fisheries (EU)
SWWAC	South West Waters Advisory Council
SWOT	Strengths, Weaknesses, Opportunities, Threats
TAC	Total allowable catch
VMS	Vessel Monitoring System
WECAFC	Western Central Atlantic Fishery Commission
WGDEEP	Working Group on the Biology and Assessment of Deep-sea Fisheries Resources

LIST OF SPECIES

Common name	Scientific name
Acoupa weakfish	*Cynoscion acoupa*
Albacore tuna	*Thunnus alalunga*
Alfonsino	*Beryx* spp.
Amberjack	*Seriola* spp.
Armoured sea fan coral	*Acanthogorgia armata*
Atlantic blue marlin	*Makaira nigricans*
Atlantic bluefin tuna	*Thunnus thynnus*
Atlantic bonito	*Sarda sarda*
Atlantic chub mackerel	*Scomber colias*
Atlantic mackerel	*Scomber scombrus*
Atlantic white marlin	*Kajikia albida*
Azorean limpet	*Patella aspera*
Barracuda	*Sphyraena* spp.
Barred hogfish	*Bodianus scrofa*
Basking shark	*Cetorhinus maximus*
Bigeye scad	*Selar crumenophthalmus*
Bigeye tuna	*Thunnus obesus*
Black scabbardfish	*Aphanopus carbo*
Blackbelly rosefish	*Helicolenus dactylopterus*
Blackspot seabream	*Pagellus bogaraveo*
Blacktip reef shark	*Carcharhinus melanopterus*
Blue jack mackerel	*Trachurus picturatus*
Blue shark	*Prionace glauca*
Bottlenose dolphin	*Tursiops spp.*
Brilliant pomfret	*Eumegistus illustris*
Carangids	Family Carangidae
Chub mackerel	*Scomber japonicus*
Clupeids	Family Clupeidae
Common dolphin	*Delphinus delphis*
Common dolphinfish	*Coryphaena hippurus*
Conch	*Lobatus gigas*
Coral shark	*Triaenodon obesus*
Cow shark	Family Hexanchidae
Crucifix sea catfish	*Arius proops*
Deep-water red crab	*Chaceon affinis*
Deep-water shrimp	*Plesionika edwardsii*
Diamond squid	*Thysanoteuthis rhombus*

Common name	Scientific name
Dogtooth tuna	*Gymnosarda unicolor*
Emperor	Family Lethrinidae
European pilchard	*Sardina pilchardus*
Filefish	Family Monacanthidae
Flying fish	Family Exocoetidae
Fusiliers	Family Caesionidae
Goatfish	Family Mullidae
Goldbanded jobfish	*Pristipomoides multidens*
Great white shark	*Carcharodon carcharias*
Green jobfish	*Aprion virescens*
Green weakfish	*Cynoscion virescens*
Grey reef shark	*Carcharhinus amblyrhynchos*
Grouper	Family Serranidae
Halfbeak	Family Hemiramphidae
Hammerhead shark	Family Sphyrnidae
Hexacorals	*Leiopathes* spp.
Horse mackerel	*Trachurus* spp.
Island grouper	*Mycteroperca fusca*
Indian mackerel	*Rastrelliger kanagurta*
Intermediate scabbardfish	*Aphanopus intermedius*
Killer whale	*Orca orca*
Kitefin shark	*Dalatias licha*
Spiny lobster	*Panulirus spp.*
Lane snapper	*Lutjanus synagris*
Loggerhead turtle	*Caretta caretta*
Limpet	*Patella* spp.
Lionfish	*Pterois* spp.
Mackerel scad	*Decapterus macarellus*
Madeiran sardinella	*Sardinella maderensis*
Mediterranean Parrotfish	*Sparisoma cretense*
Moray eel	Family Muraenidae
Mullet	Family Mugilidae
Needlefish	Family Belonidae
Northern prawns	*Plesionika* spp.
Oceanic whitetip shark	*Carcharhinus longimanus*
Offshore rockfish	*Pontinus kuhlii*
Pink dentex	*Dentex gibbosus*
Rainbow runner	*Elagatis bipinnulata*

Common name	Scientific name
Red porgy	*Pagrus pagrus*
Red snapper	*Lutjanus purpureus*
Red-tailed goby	*Sicyopterus lagocephalus*
Requiem sharks	Family Carcharhinidae
Risso's dolphin	*Grampus griseus*
Round sardinella	*Sardinella aurita*
Sailfish	*Istiophorus* spp.
Sea cucumbers	Family Holothuroidea
Seabream	Family Sparidae
Shortfin mako shark	*Isurus oxyrinchus*
Silky shark	*Carcharhinus falciformis*
Skipjack tuna	*Katsuwonus pelamis*
Snapper	Family Lutjanidae
Soft coral	*Callogorgia verticillata*
Spanish mackerel	Family Scombridae
Spanner crab	*Ranina ranina*
Squirrelfish	Family Holocentridae
Sun limpet	*Patella candei*
Surgeonfish	Family Acanthuridae
Sweetlips	Family Haemulidae
Swordfish	*Xiphias gladius*
Tawny nurse shark	*Nebrius ferrugineus*
Thresher sharks	Family Alopiidae
Topshells	*Phorcus sauciatus*
Tripletail	*Lobotes surinamensis*
Vermilion snapper	*Rhomboplites aurorubens*
Wahoo	*Acanthocybium solandri*
Whale shark	*Rhincodon typus*
White urchin	*Tripneustes ventricosus*
Whitetip reef shark	*Carcharhinus albimarginatus*
Wreckfish	*Polyprion americanus*
Yellowfin tuna	*Thunnus albacares*

EXECUTIVE SUMMARY

This study provides a detailed overview of the state of data collection and scientific advice in the European Union outermost regions (OR) within Macaronesia (Azores, Madeira and the Canary Islands), the Caribbean (Martinique, Guadeloupe, Saint Martin and French Guiana) and Indian Ocean (Réunion and Mayotte). Information was obtained from various sources, including literature reviews and stakeholder consultation, including site visits. The latter was disrupted due to the coronavirus pandemic, which prevented the majority of planned in-person meetings. This report considers the 2017-2019 EU-MAP and the 2020-2021 EU-MAP (consisting of two Commission Decisions). For 2022 onwards, the EU-MAP Commission decisions were published on 16 July 2021 but are not referred to in this report.

Relevant fish stocks and other marine organisms, and associated fishing activities for data collection and scientific advice in support of fisheries management advice in each OR

Small-scale fisheries constitute the main fisheries in the ORs. These fisheries are polyvalent and multispecies, utilising disperse landing sites, with the main fishing effort concentrated in coastal waters.

Although demersal (and in some instances small pelagic) species can numerically dominate catches, there is a lack of basic quantification of such landings throughout ORs; on average less than 5% of species comprising demersal and small pelagic catch have their landings assessed. Such low levels of quantification are likely due to the high diversity of species captured within ORs (e.g. up to 200 demersal species), a lack of staff resources to quantify such catch, and lack of capacity to adequately identify fish species. Despite this, the majority of ORs do have some form of landings assessment, which focus on the most abundant species landed, (i.e. numerically important) or quantify species into major groups (e.g. sharks, reef fish).

In line with low reporting of landings for demersal and small pelagic species, there is a near complete lack of formal assessment of the species comprising these groups, and a lack of understanding of stock boundaries. Réunion is the only OR which formally assesses some of their demersal stocks, which encapsulates only 6 demersal species. Despite this, the majority of ORs do collect limited biological data on a small number of demersal species, with data poor stock assessment models then used to model stock sustainability.

All ORs (except French Guiana) which target large pelagic species undertake formal stock assessment of a limited range of the species that are also covered by RFMOs (e.g. IOTC, ICCAT) conservation measures. These measures ensure that temperate and tropical tuna, as well as a range of 'tuna-like' species (e.g. blue marlin, black marlin, striped marlin, sailfish, wahoo, dolphinfish) are formally assessed and the stocks managed sustainably.

The structure of the fishing fleet is relatively similar throughout ORs, being dominated by small-scale fishing fleets that utilize a large range of different gears. These gears can include pelagic and demersal handlines and longlines, pole and line, a range of nets (including driftnet, static and circle nets) and cages (e.g. for lobster and crab). Such a diversity of métiers used within ORs aligns with the high diversity of species that are landed, but also reduce the ability for ORs to adequately collect sufficient data to assess the impact of such métiers on stocks.

Although the small-scale fishing fleet may numerically dominate the OR fleet, the large vessels that focus on a much smaller array of (predominantly) large pelagic fishes are by value much more important within the majority of ORs. These vessels may only form a small percentage of the fleet (up to 10%), but land a range of species that form a much more economically important (especially for export) resource for the OR. Despite this, for a number of ORs, these large vessels (e.g. purse seiners, longliners) may not be registered within the OR (i.e. Spanish and Portuguese vessels), or may not land all their catch within

the OR (e.g. Venezuelan boats within French Guiana), potentially reducing economic benefits to the OR.

Key institutional structures and arrangements in place for data collection, scientific advice, research, monitoring, control and surveillance (MCS) in support of fisheries management in each of the ORs

Within the Azores, institutional structures are well defined, though maritime management is complex and several layers of decision-making (as responsibilities for marine fisheries are shared among regional and national government bodies in partnership with the associations of fishing professionals) could make data collection and fisheries management burdensome. Collection of biological data in the Azores has also been in transition, resulting in some programmes (e.g. observers-at-sea) being reduced.

Uncertainty concerning the effectiveness of management measures implemented for some fisheries in the Azores has recently led to the regional administration supporting a new monitoring programmes for coastal resources. This is because existing information on commercially important marine resources is limited to specific studies. This new programme will help to assess the conservation status of coastal resources, allowing measures to be implemented to ensure sustainability of these fisheries.

Within Madeira the existing fisheries management infrastructure is adequate to implement the requirements of the DCF and necessary data collection activities, although (as in the Azores) management in the region is complex and several layers of decision-making could make data collection and fisheries management onerous. Infrastructure covers national and regional activities (organised by the Direção Regional do Mar/Regional Directorate for Sea), while at the local level the fishing sector is organised in producer organisations, which allow coordination and may cooperate with scientists in data collection.

Landings data from commercial fisheries, including from small-scale fishing vessels, are well documented in Madeira. This is because all vessels landing fresh fish are obliged to first sell on the auction markets. However, in support of such data collection, scientific studies are usually not structured and do not often result in effective new management measures.

Although there is a clear division of responsibilities within the Canary Islands, management can be complex as it encompasses several layers of decision making. The regional government has jurisdiction over interior waters, aquaculture, first sales and commercialisation, whereas the national government manages Spanish territorial waters and the EEZ (i.e. external waters). There are also two RFMOs (ICCAT and CECAF) for which the provision of scientific data and advice are mandatory under the national data programme. In addition, the Secretaria General de Pesca is responsible for the implementation of the national work plans for data collection, while IEO collects biological and fishing activity data and provides data and scientific advice for management decisions.

The Canary Islands sector participates in the Advisory Council for the outermost regions (CC-RUP) which started its activities in 2019. The CC-RUP's secretariat is located in Azores and the current chair is the president of the Regional Federation of Fishing Guilds of the Canary Islands. This Advisory Council gathers the nine ORs and is a key instrument in the process of fisheries regionalization of the EU, conveying the recommendations of fishing organisations and other interest groups in relation to management measures proposed by the EC and Member States. Members of CC-RUP include producer organisations that represent the interests of the ship owners and participate in the work of CC-RUP. In the Canary Islands there are three producer organisations, two of them devoted to small-scale tuna fishing activities and one dedicated to industrial fishing in third countries' waters.

Data collection within the French outermost regions is, in general, well-structured and there is a national framework and institutional structure in place, although the flow of data

is not considered as streamlined as in the mainland. Ifremer and IRD play a central role in the production of national scientific advice, with Ifremer responsible for 90% of all data collection, while IRD collects data on high seas fisheries for tuna and tuna-like species.

One of the main issues across all French ORs is high staff turnover and lack of human capacity in the form of local staff in the ORs. For example, IRD is currently running at full capacity and is therefore unable to deal with urgent requests if they have not been budgeted or planned for.

Funding and funding structures available and potentially utilised by ORs, including both EMFF and non-EMFF

For all ORs, the availability of EMFF funding adequately covers their respective needs. All ORs have applied for and received EMFF funding, with all stating the importance of such funding in supporting data collection activities.

Across the ORs, EMFF funding is not predominantly utilised for data collection (i.e. measures under Article 77). For all of the ORs, EMFF funding is structured mainly around funding for Union Priority 5, which is allocated as financial compensation for the conditions of insularity and remoteness. Such funding is utilised mainly in support of compensation of costs compared to mainland and to improve the marketing, diversification and valorisation of seafood products being exported by the OR. Where EMFF funding is utilised for data collection within the OR, such funding only encompasses a small percentage of the overall EMFF funds apportioned to the OR (i.e. up to 5%).

There is little evidence to suggest that access to EMFF funding (i.e. the application phase) is the limiting factor in the use of such funds for ORs; most difficulties are apparent within the OR regional government or national government. Within the Azores and Madeira, there are difficulties in EMFF implementation, linked to both internal and external management of the EMFF, low administrative capacity, and lack of adaptation of EMFF measures to the local context. In detail, as part of EMFF funding works on a project-basis versus the routine nature of data collection, despite issues with capacity within each OR (i.e. especially associated with lack of staff/resources to complete data collection obligations), ORs are unable to effectively utilise EMFF funding to cover such capacity issues. However, at least within the French ORs, DPMA has proposed that, for the new EMFAF, funding will be attributed for the whole cycle to secure data collection over the 6 year period. Lastly, in the French ORs, difficulties are related to the application (all EMFF funds are held by the national government, therefore such applications are an 'internal' procedure) and obtaining funds.

All ORs have a large base of non-EMFF funding (both from European Union funds, as well as national funds) to support data collection programmes. For example, funding for data collection in the Macaronesia ORs comes from national funds, and are focused on development of fisheries science and knowledge. In addition, for Macaronesia there is substantial funding of fisheries research by other EU structural funds, including the MAC programme. In parallel, under France's regular national budget funds can be provided under grant agreements between Ifremer and IRD, which are used to finance requests for studies, and provide financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan.

Current state of implementation of data collection obligations under the DCF for each OR

Data collection of fleet activity and landings of the major species targeted, are fairly well covered in all ORs. These data are collected in the framework of the Control Regulation and collected by regional and national governments. Such sampling is undertaken predominantly using on-site sampling, though methods differ between each region. In the Portuguese ORs sampling takes place at the auction, while in the Canary Islands and French Guiana sampling takes place at the buyer's premises.

There is limited biological sampling undertaken within all ORs, wholly encompassing tunas and tuna-like species to cover international obligations (i.e. RFMOs) and species in which the threshold of 200 tonnes per species is reached (Commission Implementing Decision (EU) 2019/909). However, such species-specific sampling imposes limitations to the range of stock assessments and subsequent management measures developed for the majority of species landed in the ORs. Biological data is in general limited in all ORs, only available for some key resources which have landings above 200 tonnes per year, e.g. tunas and small pelagics in the Canary Islands, and acoupa weakfish in French Guiana. In this respect, although ORs may land a number of economically relevant species, if their catches do not amount to a minimum of 200 tonnes a year then biological data is not collected by the OR. However, this is not fully applicable to parrotfish in the Canary Islands, where length sampling is undertaken, despite landings not reaching the 200 tonnes threshold every year.

There is a lack of data, both directly and indirectly connected with fisheries, collected throughout ORs. Both ecological and IUU fishing have limited or no data collection, whereas recreational fisheries data are collected in isolated cases in the framework of pilot studies. Socio-economic data has just started to be collected in the majority of ORs. Beyond the DCF there are fisheries where data is collected in the framework of routine and ad-hoc research activities, but these are relatively piecemeal and lack a strong temporal resolution.

There are limited data on understanding the impacts of fisheries activities on the ecosystem in all ORs, with no protocols for data collection in force. Nevertheless, some data are collected when bycatch of endangered, threatened and protected (ETP) species occurs during routine activities (e.g. within the Azores). However, as the ORs have a predominance of small-scale fishing, the likely negative impacts of fishing activities on ecosystems (i.e. bycatch) is considered to be limited due to the use of selective gear and bans on trawling.

Current fisheries management/ conservation measures implemented and scientific basis

All EU regulations apply within the ORs, and are implemented in national regulations. However, the implementation of large and complex bodies of legislation (European, National and regional, treaties with third countries) may not always be conducive to effective fisheries management .

The structure and content of EU legislations do not always take into account the specific fishery characteristics of the OR, and therefore how different the fishing industry is to their counterpart mainland industry. Such characteristics include the low ability to process discards, low incidence of bycatch due to the multi-gear and opportunistic nature of the fishery, the distinct geographical and/or bathymetric characteristics of the OR impacting the range of fishing activities that can be economically utilised within the region, as well as the local and regional socio-economics of the OR.

Throughout the ORs, there is good information on a limited number of stocks, with local commercial and recreational fisheries resources poorly known and lacking long-term assessment. Such a lack of understanding (i.e. lack of scientific background) is due to a

range of factors, including lack of monitoring, lack of coordination or data availability/ sharing between institutions, and lack of capacity for data collection and/or analysis. Such issues with understanding the status of a large range of stocks landed within the ORs, reduce the ability of ORs to provide viable measures to support sustainable management of resources. Overall, effective management is dependent on local knowledge, which is limited by local capacity.

Formal stock assessments are conducted predominantly for tunas (and tuna-like species) within the framework of ICCAT and IOTC and to lesser extent for demersal and small pelagic species in CECAF. For example, in the Azores, out of 138 species (recorded as landed between 2009-2019) a total of 22 species (18 fishes, 2 mollusc and 2 crustacean) are priority stocks for local assessment and monitoring. Twelve stocks have been classified as International Council for the Exploration of the Sea (ICES) category 5, i.e. stocks for which only landings or a short series of catches are available, while 10 stocks have been classified as ICES category 3, i.e. stocks for which survey-based assessments or exploratory assessments indicate trends. Therefore, local fisheries management is predominantly based on local fishing effort, which is poorly estimated.

Although international stocks have some sort of assessment, there is a near complete lack of monitoring of such stocks, with implementation of monitoring and control being one of the most important constraints in local and regional fisheries management throughout ORs. Therefore, monitoring and control should be increased (reorganised or managed via innovative solutions) for both recreational and commercial fisheries. This would entail further coordination between agents (national and regional institutions, fishing sector, and universities) by establishing clear roles and responsibilities through a Memoranda of Understanding (MOU) to enhance data/knowledge sharing; enhanced co-governance (cooperation: regional administrations, sector and science); strengthening of cooperation by creating institutional or structured forums to highlight the OR specificities (visualised in RFMOs or through CC-RUP); enhanced cooperation to create commitment on management implementation and on monitoring, control and surveillance.

Shortcomings or obstacles to the development and implementation of sound scientific advice for fisheries management in the ORs

There are substantial issues with regular data collection in terms of the DCF regulation between ORs. Overall, there is a lack of biological data for assessment purposes, limited information regarding ETP species bycatch, a lack of understanding of discard data (although this is expected to be relatively small), limited understanding of the unique ecosystems within ORs (e.g. habitat impacts, climate change, pollution, food webs) and how changes in the ecosystem may impact fisheries, and limited census and transversal data collected under the EU Control Regulation.

One of the biggest challenges to developing effective data collection programmes within the ORs is the lack of data and understanding (both ecological and socio-economic) of the impact of recreational fishing activities. The impact of such fisheries on stocks may be as important as commercial fisheries, leading to conflicts between fisheries, especially the small-scale fishing sector.

Long term funding to support substantial data collection programmes is still little developed. Although a range of funded projects (outside the DCF and not under the EMFF) have improved the knowledge for scientific advice on fisheries within the ORs, these projects predominantly have a limited duration, and there is little cohesion between these and routine monitoring programmes.

As the main funding for data collection by the ORs comes from EMFF funds, either managed regionally or nationally, it is essential to support not only the access to such funding (i.e. grant application) but also the management (i.e. on the ground use of funds) of such funding. This is due to the fact that although national institutes are involved in the data

collection programmes in some of the ORs, lack of coordination within ORs in utilising such funds (or between the national government and the OR regional government) is evident due to staff capacity limitations.

Throughout ORs, although important management measures are in place, there are some difficulties in implementing such measures, especially when implementing appropriate regional measures adapted to the ORs' needs. In this respect, control and enforcement within the ORs, and therefore assessment and reporting of IUU fishing, remains challenging for the majority of ORs.

SWOT analysis of each OR and recommendations on data collection and scientific advice in support of fisheries management

Individual SWOT analyses were undertaken for each OR to determine the state of data collection and scientific advice. Individual factors identified in the literature review and stakeholder consultation were analysed as positive or negative and internal or external. Once the four factors were analysed individually, linkages were identified in order to determine whether Strengths and Opportunities could be utilised to address and counter Weaknesses and Threats.

Synthesis SWOT analyses to bring together results from all ORs

The synthesis identifies those common elements between the ORs (limited to those with at least six references to a Strength, Weakness, Opportunity and Threat across the ORs), i.e. where common gaps (weaknesses) exist, but also identifying where strengths exist or common opportunities that may be exploited or common threats faced lie. A list of recommendations is included for one or more OR.

Pilot case study to develop a detailed roadmap for developing stock assessment of red snapper in French Guiana

Building on the overview of the state of fisheries data collection and scientific advice in support of fisheries management for French Guiana, a detailed roadmap of all necessary actions towards establishing a regular stock assessment of the red snapper fishery in French Guiana was developed. This work maps the science-policy circle from stock assessment to implementation of management measures, conducts a gap analysis to understand the shortcomings, obstacles and impediments in the science-policy process for this fishery, and identifies the necessary actions and tasks to support evidence-based decision-making for developing fisheries management measures.

According to results of the 2020 stock assessment conducted by Ifremer, the red snapper stock status in French Guiana is uncertain. However, previous assessments showed that the stock was being overfished. In particular, the stock is experiencing growth overfishing due to fishers targeting mostly small fish to supply restaurants with dinner plate-sized fish. The results of the stock assessment has therefore recommended the adoption of management measures such as a limit on fishing effort (number of days fished) and use of larger hooks.

At the moment, the stock is assessed as if it were not a shared stock, because there is lack of data from countries neighbouring French Guiana. The fact that catches by neighbouring countries are not taken into account means that the current assessment of the red snapper may not give the true picture of the resource. There is therefore a need to understand the stock structure and how it impacts the jurisdiction of the stock. Efforts towards research cooperation among the nations adjacent to French Guiana are required to enhance data and evidence towards the sustainable management of the stock.

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RESUME EXECUTIF

Cette étude fournit un aperçu détaillé de l'état de la collecte de données et des avis scientifiques dans les régions ultrapériphériques (RUP) de l'Union européenne au sein de la Macaronésie (Açores, Madère et les îles Canaries), des Caraïbes (Martinique, Guadeloupe, Saint-Martin et Guyane française) et de l'océan Indien (Réunion et Mayotte). Les informations ont été obtenues à partir de diverses sources, notamment des analyses documentaires et la consultation des parties prenantes, y compris des visites sur place. Ce dernier a été perturbé en raison de la pandémie de coronavirus, qui a empêché la majorité des réunions en personne prévues. Le présent rapport examine le EU-MAP 2017-2019 et le EU-MAP 2020-2021 (composé de deux décisions de la Commission). Pour 2022 et suivantes, les décisions de la Commission du MAP de l'UE ont été publiées le 16 juillet 2021, mais ne sont pas mentionnées dans le présent rapport.

Stocks halieutiques et autres organismes marins pertinents, et activités de pêche associées pour la collecte de données et les avis scientifiques à l'appui des avis de gestion de la pêche dans chaque RUP

Les pêches à petite échelle constituent les principales pêcheries dans les RUP. Ces pêcheries sont polyvalentes et multi-espèces, utilisant des sites de débarquement dispersés, l'effort de pêche principal étant concentré dans les eaux côtières.

Bien que les espèces démersales (et dans certains cas les petites espèces pélagiques) puissent dominer numériquement les captures, il y a un manque de quantification de base de ces débarquements dans l'ensemble des RUP; en moyenne, moins de 5 % des espèces comprenant des captures démersales et de petits pélagiques voient leurs débarquements évalués. Ces faibles niveaux de quantification sont probablement attribuables à la grande diversité des espèces capturées dans les RUP (p. ex., jusqu'à 200 espèces démersales), au manque de ressources humaines pour quantifier ces captures et au manque de capacité d'identifier adéquatement les espèces de poissons. Malgré cela, la majorité des RUP disposent d'une certaine forme d'évaluation des débarquements, qui se concentre sur les espèces les plus abondantes débarquées (c'est-à-dire numériquement importantes) ou quantifie les espèces en grands groupes (par exemple, les requins, les poissons de récif).

En ligne avec le faible rapport des débarquements pour les espèces démersales et les petits pélagiques, il y a une absence presque totale d'évaluation formelle des espèces composant ces groupes et un manque de compréhension des limites des stocks. La Réunion est la seule RUP qui évalue formellement une partie de ses stocks démersaux, ce qui n'englobe que 6 espèces démersales. Malgré cela, la majorité des RUP collectent des données biologiques limitées sur un petit nombre d'espèces démersales, les modèles d'évaluation des stocks pauvres en données étant ensuite utilisés pour modéliser la durabilité des stocks.

Toutes les RUP (à l'exception de la Guyane française) qui ciblent les grands pélagiques entreprennent une évaluation formelle des stocks d'une gamme limitée d'espèces qui sont également couvertes par les mesures de conservation des ORGP (par exemple, la CTOI, la CICTA). Ces mesures garantissent que les thons tempérés et tropicaux, ainsi qu'une série d'espèces "thonières" (par exemple, le makaire bleu, le makaire noir, le makaire rayé, le voilier, le wahoo, la coryphène) sont formellement évalués et que les stocks sont gérés de manière durable.

La structure de la flotte de pêche est relativement similaire dans toutes les RUP, dominée par des flottes de pêche à petite échelle qui utilisent une large gamme d'engins différents. Ces engins peuvent comprendre des lignes à main et des palangres pélagiques et démersales, des cannes, une gamme de filets (y compris des filets dérivants, des filets statiques et circulaires) et des cages (p. ex., pour le homard et le crabe). Une telle diversité de métiers utilisés au sein des RUP s'aligne sur la grande diversité des espèces débarquées,

mais réduit également la capacité des RUP à collecter de manière adéquate des données suffisantes pour évaluer l'impact de ces métiers sur les stocks.

Bien que la flotte de pêche artisanale puisse dominer numériquement la flotte des RUP, les grands navires qui se concentrent sur un éventail beaucoup plus restreint de grands poissons pélagiques (principalement) sont par valeur beaucoup plus importants dans la majorité des RUP. Ces navires ne représentent peut-être qu'un petit pourcentage de la flotte (jusqu'à 10 %), mais débarquent une gamme d'espèces qui constituent une ressource économiquement beaucoup plus importante (en particulier pour l'exportation) pour la RUP. Malgré cela, pour un certain nombre de RUP, ces grands navires (par exemple, les senneurs, les palangriers) peuvent ne pas être enregistrés dans la RUP (par exemple, les navires espagnols et portugais), ou peuvent ne pas débarquer toutes leurs prises dans la RUP (par exemple, les bateaux vénézuéliens en Guyane française), ce qui peut réduire les avantages économiques pour la RUP.

Principales structures et dispositions institutionnelles en place pour la collecte de données, les avis scientifiques, la recherche, le suivi, le contrôle et la surveillance (SCS) à l'appui de la gestion des pêches dans chacune des RUP

Aux Açores, les structures institutionnelles sont bien définies, bien que la gestion maritime soit complexe et que plusieurs niveaux de décision (les responsabilités en matière de pêche marine étant partagées entre les organismes gouvernementaux régionaux et nationaux en partenariat avec les associations de professionnels de la pêche) puissent rendre la collecte de données et la gestion des pêches fastidieuses. La collecte de données biologiques aux Açores a également été en transition, ce qui a entraîné la réduction de certains programmes (par exemple, les observateurs en mer).

L'incertitude concernant l'efficacité des mesures de gestion mises en œuvre pour certaines pêcheries aux Açores a récemment conduit l'administration régionale à soutenir un nouveau programme de surveillance des ressources côtières. En effet, les informations existantes sur les ressources marines commercialement importantes sont limitées à des études spécifiques. Ce nouveau programme contribuera à évaluer l'état de conservation des ressources côtières, permettant de mettre en œuvre des mesures pour assurer la durabilité de ces pêcheries.

À Madère, l’infrastructure existante de gestion des pêches est adéquate pour mettre en œuvre les exigences du DCF et les activités de collecte de données nécessaires, bien que (comme aux Açores) la gestion dans la région soit complexe et que plusieurs niveaux de prise de décisions pourraient rendre la collecte de données et la gestion des pêches onéreuses. L'infrastructure couvre les activités nationales et régionales (organisées par la Direção Regional do Mar/Direction régionale de la mer), tandis qu'au niveau local, le secteur de la pêche est organisé en organisations de producteurs, qui permettent la coordination et peuvent coopérer avec les scientifiques pour la collecte de données.

Les données sur les débarquements de la pêche commerciale, y compris des navires de pêche à petite échelle, sont bien documentées à Madère. En effet, tous les navires débarquant du poisson frais sont obligés de vendre d'abord sur les marchés à la criée. Cependant, à l'appui d'une telle collecte de données, les études scientifiques ne sont généralement pas structurées et n'aboutissent pas souvent à de nouvelles mesures de gestion efficaces.

Bien qu'il existe une répartition claire des responsabilités au sein des îles Canaries, la gestion peut être complexe car elle englobe plusieurs niveaux de prise de décision. Le gouvernement régional a compétence sur les eaux intérieures, l’aquaculture, les premières ventes et la commercialisation, tandis que le gouvernement national gère les eaux territoriales espagnoles et la ZEE (c’est-à-dire les eaux extérieures). Il existe également deux ORGP (CICTA et COPACE) pour lesquelles la fourniture de données et d'avis scientifiques est obligatoire dans le cadre du programme national de données. En outre, le

Secretaria General de Pesca est responsable de la mise en œuvre des plans de travail nationaux pour la collecte de données, tandis que l'IEO collecte des données biologiques et sur les activités de pêche et fournit des données et des avis scientifiques pour les décisions de gestion.

Le secteur des îles Canaries participe au Conseil consultatif pour les régions ultrapériphériques (CC-RUP) qui a commencé ses activités en 2019. Le secrétariat du CC-RUP est situé aux Açores et le président actuel est le président de la Fédération régionale des corporations de pêcheurs des îles Canaries. Ce conseil consultatif rassemble les neuf RUP et constitue un instrument clé dans le processus de régionalisation de la pêche de l'UE, transmettant les recommandations des organisations de pêche et d'autres groupes d'intérêt en ce qui concerne les mesures de gestion proposées par la CE et les États membres. Les membres du CC-RUP comprennent des organisations de producteurs qui représentent les intérêts des armateurs et participent aux travaux du CC-RUP. Aux Canaries, il existe trois organisations de producteurs, dont deux se consacrent aux activités de pêche thonière artisanale et une à la pêche industrielle dans les eaux de pays tiers.

La collecte de données dans les régions ultrapériphériques françaises est, en général, bien structurée et il existe un cadre national et une structure institutionnelle en place, bien que le flux de données ne soit pas considéré comme aussi rationalisé que sur le continent. L'Ifremer et l'IRD jouent un rôle central dans la production d'avis scientifiques nationaux, l'Ifremer étant responsable de 90 % de la collecte des données, tandis que l'IRD collecte les données sur les pêches hauturières de thon et d'espèces apparentées.

L'un des principaux problèmes dans toutes les RUP françaises est le roulement élevé du personnel et le manque de capacité humaine sous la forme de personnel local dans les RUP. Par exemple, l'IRD fonctionne actuellement à pleine capacité et n'est donc pas en mesure de traiter les demandes urgentes si elles n'ont pas été budgétisées ou planifiées.

Financement et structures de financement disponibles et potentiellement utilisés par les RUP, y compris le EMFF et le non-EMFF

Pour toutes les RUP, la disponibilité des financements du EMFF couvre adéquatement leurs besoins respectifs. Tous les RUP ont demandé et reçu un financement du EMFF, et toutes ont déclaré l'importance de ce financement pour soutenir les activités de collecte de données.

Dans l'ensemble des RUP, le financement du EMFF n'est pas principalement utilisé pour la collecte de données (c'est-à-dire les mesures relevant de l'article 77). Pour l'ensemble des RUP, le financement de l'EMFF s'articule principalement autour du financement de la priorité 5 de l'Union, qui est allouée comme une compensation financière pour les conditions d'insularité et d'éloignement. Ce financement est utilisé principalement pour soutenir la compensation des coûts par rapport au continent et pour améliorer la commercialisation, la diversification et la valorisation des produits de la mer exportés par les RUP. Lorsque le financement du EMFF est utilisé pour la collecte de données au sein de la RUP, ce financement ne représente qu'un petit pourcentage des fonds globaux du EMFF alloués à la RUP (c'est-à-dire jusqu'à 5 %).

Il y a peu d'éléments qui suggèrent que l'accès aux fonds EMFF (c'est-à-dire la phase de demande) est le facteur limitant l'utilisation de ces fonds pour les RUP ; la plupart des difficultés sont apparentes au sein du gouvernement régional ou du gouvernement national de la RUP. Aux Açores et à Madère, il existe des difficultés dans la mise en œuvre du EMFF, liées à la fois à la gestion interne et externe du EMFF, à la faible capacité administrative et au manque d'adaptation des mesures du EMFF au contexte local. Dans le détail, dans le cadre des travaux de financement du EMFF sur la base de projets par rapport à la nature routinière de la collecte de données, malgré les problèmes de capacité au sein de chaque RUP (c'est-à-dire en particulier associés au manque de personnel/de ressources pour remplir les obligations de collecte de données), les RUP ne sont pas en mesure d'utiliser

efficacement le financement du EMFF pour couvrir ces problèmes de capacité. Cependant, au moins au sein des RUP françaises, la DPMA a proposé que, pour le nouvel EMFAF, le financement soit attribué pour l'ensemble du cycle afin de garantir la collecte des données sur la période de 6 ans. Enfin, dans les RUP françaises, les difficultés sont liées à la demande (tous les fonds EMFF sont détenus par le gouvernement national, donc ces demandes sont une procédure "interne") et à l'obtention des fonds.

Toutes les RUP disposent d'une large base de financement non-EMFF (provenant à la fois de fonds de l'Union européenne et de fonds nationaux) pour soutenir les programmes de collecte de données. Par exemple, le financement de la collecte de données dans les RUP de Macaronésie provient de fonds nationaux et est axé sur le développement de la science et des connaissances halieutiques. En outre, pour la Macaronésie, la recherche halieutique bénéficie d'un financement substantiel par d'autres fonds structurels de l'UE, y compris le programme MAC. Parallèlement, dans le cadre du budget national régulier de la France, des fonds peuvent être fournis dans le cadre de conventions de subvention entre l'Ifremer et l'IRD, qui sont utilisées pour financer des demandes d'études, et fournir un soutien financier à des projets plus petits (comme la collecte de données) qui tendent à être progressivement inclus dans le plan de travail du DCF.

État actuel de la mise en œuvre des obligations de collecte de données en vertu du DCF pour chaque RUP

La collecte de données sur l’activité de la flotte et les débarquements des principales espèces ciblées sont assez bien couverts dans toutes les RUP. Ces données sont collectées dans le cadre du règlement de contrôle et collectées par les gouvernements régionaux et nationaux. Ce type d'échantillonnage est effectué principalement sur place, bien que les méthodes diffèrent d'une région à l'autre. Dans les RUP portugaises, l'échantillonnage a lieu à la criée, tandis qu’aux îles Canaries et en Français, l’échantillonnage a lieu dans les locaux de l’acheteur.

Il y a un échantillonnage biologique limité entrepris dans toutes les RUP, englobant entièrement les thons et les espèces apparentées pour couvrir les obligations internationales (c'est-à-dire les ORGP) et les espèces pour lesquelles le seuil de 200 tonnes par espèce est atteint (Décision d'exécution de la Commission (UE) 2019/909). Toutefois, un tel échantillonnage spécifique à l’espèce impose des limites à l’éventail des évaluations des stocks et des mesures de gestion ultérieures élaborées pour la majorité des espèces débarquées dans les RUP. Les données biologiques sont en général limitées dans toutes les RUP, disponibles uniquement pour certaines ressources clés dont les débarquements sont supérieurs à 200 tonnes par an, par exemple les thons et les petits pélagiques aux îles Canaries, et l'acoupa en Guyane française. A cet égard, bien que les RUP puissent débarquer un certain nombre d'espèces économiquement pertinentes, si leurs captures ne représentent pas un minimum de 200 tonnes par an, les données biologiques ne sont pas collectées par la RUP. Toutefois, cela n'est pas entièrement applicable au poisson-perroquet dans les îles Canaries, où l'échantillonnage de la longueur est entrepris, bien que les débarquements n'atteignent pas le seuil de 200 tonnes chaque année.

Il y a un manque de données, à la fois directement et indirectement liées à la pêche, collectées dans les RUP. La collecte de données sur la pêche écologique et la pêche INN est limitée ou inexistante, tandis que les données sur la pêche récréative sont collectées dans des cas isolés dans le cadre d'études pilotes. Les données socio-économiques commencent tout juste à être collectées dans la majorité des RUP. Au-delà du DCF, il existe des pêcheries où les données sont collectées dans le cadre d’activités de recherche de routine et ad hoc, mais celles-ci sont relativement fragmentaires et manquent d’une forte résolution temporelle.

Les données sur la compréhension des impacts des activités de pêche sur l'écosystème sont limitées dans toutes les RUP, et aucun protocole de collecte de données n'est en vigueur. Néanmoins, certaines données sont collectées lorsque des prises accessoires

d'espèces en danger, menacées et protégées (ETP) ont lieu au cours d'activités de routine (par exemple aux Açores). Toutefois, comme les RUP ont une prédominance de la pêche artisanale, les effets négatifs probables des activités de pêche sur les écosystèmes (c.-à-d. les prises accessoires) sont considérés comme limités en raison de l'utilisation d'engins sélectifs et de l'interdiction du chalutage.

Mesures actuelles de gestion/conservation des pêches mises en œuvre et base scientifique

Toutes les réglementations de l'UE s'appliquent au sein des RUP et sont mises en œuvre dans les réglementations nationales. Cependant, la mise en œuvre de législations vastes et complexes (européennes, nationales et régionales, traités avec des pays tiers) n'est pas toujours propice à une gestion efficace de la pêche.

La structure et le contenu des législations de l'UE ne tiennent pas toujours compte des caractéristiques de pêche spécifiques de la RUP, et donc de la différence entre l'industrie de la pêche et l'industrie continentale correspondante. Ces caractéristiques comprennent la faible capacité à traiter les rejets, la faible incidence des prises accessoires en raison de la nature multi-engins et opportuniste de la pêcherie, les caractéristiques géographiques et/ou bathymétriques distinctes de la RUP ayant un impact sur la gamme d'activités de pêche qui peuvent être économiquement utilisées dans la région, ainsi que la socio-économie locale et régionale de la RUP.

Dans l'ensemble des RUP, on dispose de bonnes informations sur un nombre limité de stocks, les ressources locales de la pêche commerciale et récréative étant mal connues et manquant d'évaluation à long terme. Ce manque de compréhension (c'est-à-dire le manque de connaissances scientifiques) est dû à une série de facteurs, notamment le manque de surveillance, le manque de coordination ou de disponibilité/partage des données entre les institutions, et le manque de capacité de collecte et/ou d'analyse des données. Ces problèmes de compréhension de l'état d'un large éventail de stocks débarqués dans les RUP réduisent la capacité des RUP à fournir des mesures viables pour soutenir la gestion durable des ressources. Dans l'ensemble, une gestion efficace dépend des connaissances locales, qui sont limitées par les capacités locales.

Des évaluations formelles des stocks sont réalisées principalement pour les thonidés (et les espèces apparentées) dans le cadre de la CICTA et de la CTOI et, dans une moindre mesure, pour les espèces démersales et les petits pélagiques dans le cadre du COPACE. Par exemple, aux Açores, sur 138 espèces (enregistrées comme débarquées entre 2009 et 2019), un total de 22 espèces (18 poissons, 2 mollusques et 2 crustacés) sont des stocks prioritaires pour l'évaluation et la surveillance locales. Douze stocks ont été classés dans la catégorie 5 du Conseil international pour l'exploration de la mer (CIEM), c'est-à-dire des stocks pour lesquels on ne dispose que de débarquements ou d'une courte série de captures, tandis que dix stocks ont été classés dans la catégorie 3 du CIEM, c'est-à-dire des stocks pour lesquels des évaluations fondées sur des enquêtes ou des évaluations exploratoires indiquent des tendances. Par conséquent, la gestion locale des pêches repose principalement sur l'effort de pêche local, qui est mal estimé.

Bien que les stocks internationaux fassent l'objet d'une sorte d'évaluation, il y a un manque presque total de surveillance de ces stocks, la mise en œuvre de la surveillance et du contrôle étant l'une des contraintes les plus importantes dans la gestion locale et régionale des pêches dans l'ensemble des RUP. Par conséquent, la surveillance et le contrôle doivent être renforcés (réorganisés ou rechercher des solutions innovantes), tant pour la pêche récréative que pour la pêche commerciale. Cela impliquerait une coordination accrue entre les agents (institutions nationales et régionales, secteur de la pêche et universités) en établissant clairement les rôles et les responsabilités au moyen d'un protocole d'entente (PE) afin d'améliorer le partage des données et des connaissances; renforcement de la cogouvernance (coopération: administrations régionales, secteur et science); le renforcement de la coopération par la création de forums institutionnels ou structurés pour

mettre en évidence les spécificités de la RUP (visualisés dans les ORGP ou par le biais de CC-RUP); une coopération renforcée pour créer un engagement en matière de mise en œuvre de la gestion et de suivi, contrôle et surveillance.

Lacunes ou obstacles au développement et à la mise en œuvre d'avis scientifiques solides pour la gestion de la pêche dans les RUP

Il y a des problèmes substantiels avec la collecte régulière de données en termes de réglementation DCF entre les RUP. Dans l'ensemble, il y a un manque de données biologiques à des fins d'évaluation, des informations limitées concernant les prises accessoires des espèces de PTE, un manque de compréhension des données sur les rejets (bien que celles-ci devraient être relativement faibles), une compréhension limitée des écosystèmes uniques au sein des RUP (par exemple, les impacts sur l'habitat, le changement climatique, la pollution, les réseaux trophiques) et de la façon dont les changements dans l'écosystème peuvent avoir un impact sur les pêcheries, et des données de recensement et transversales limitées collectées dans le cadre du règlement de contrôle de l'UE.

L'un des plus grands défis pour développer des programmes efficaces de collecte de données au sein des RUP est le manque de données et de compréhension (à la fois écologique et socio-économique) de l'impact des activités de pêche récréative. L'impact de ces pêcheries sur les stocks peut être aussi important que la pêche commerciale, ce qui entraîne des conflits entre les pêcheries (en particulier le secteur de la pêche artisanale).

Le financement à long terme pour soutenir d'importants programmes de collecte de données est encore peu développé. Bien qu'une série de projets financés (en dehors de la DCF et non dans le cadre de l'EMFF) aient amélioré les connaissances pour les avis scientifiques sur la pêche dans les RUP, ces projets ont principalement une durée limitée, et il y a peu de cohésion entre ceux-ci et les programmes de surveillance de routine.

Étant donné que le principal financement de la collecte de données par les RUP provient des fonds EMFF (gérés au niveau régional ou national), il est essentiel de soutenir non seulement l'accès à ces fonds (c'est-à-dire la demande de subvention) mais aussi la gestion (c'est-à-dire l'utilisation des fonds sur le terrain) de ces fonds. Ceci est dû au fait que, bien que les instituts nationaux soient impliqués dans les programmes de collecte de données dans certaines des RUP, le manque de coordination au sein des RUP dans l'utilisation de ces fonds (ou entre le gouvernement national et le gouvernement régional de la RUP) est évident en raison des limitations de capacité du personnel.

Dans l'ensemble des RUP, bien que d'importantes mesures de gestion soient en place, il existe certaines difficultés à mettre en œuvre de telles mesures, en particulier lors de la mise en œuvre de mesures régionales appropriées adaptées aux besoins des RUP. À cet égard, le contrôle et l'application au sein des RUP, et donc l'évaluation et la déclaration de la pêche INN, restent difficiles pour la majorité des RUP.

Analyse SWOT de chaque RUP et recommandations sur la collecte de données et les avis scientifiques à l'appui de la gestion des pêches

Des analyses SWOT individuelles ont été entreprises pour chaque RUP afin de déterminer l'état de la collecte de données et des conseils scientifiques. Les facteurs individuels identifiés dans l'analyse documentaire et la consultation des parties prenantes ont été analysés comme positifs ou négatifs et internes ou externes. Une fois les quatre facteurs analysés, des liens individuels ont été identifiés afin de déterminer si les forces et les opportunités pouvaient être utilisées pour traiter et contrer les faiblesses et les menaces.

Synthèse des analyses SWOT pour rassembler les résultats de toutes les RUP

La synthèse identifie les éléments communs entre les RUP (limités à ceux qui ont au moins six références à une force, une faiblesse, une opportunité et une menace dans les RUP),

c'est-à-dire où il existe des lacunes (faiblesses) communes, mais aussi où il existe des forces, des opportunités communes qui peuvent être exploitées ou des menaces communes. Une liste de recommandations est incluse pour une ou plusieurs RUP.

Étude de cas pilote visant à élaborer une feuille de route détaillée pour développer l'évaluation du stock de vivaneau rouge en Guyane française

S'appuyant sur l'aperçu de l'état de la collecte des données halieutiques et des avis scientifiques à l'appui de la gestion des pêches en Guyane française, une feuille de route détaillée de toutes les actions nécessaires à l'établissement d'une évaluation régulière des stocks de la pêcherie de vivaneaux rouges en Guyane française a été élaborée. Ce travail cartographie le cercle science-politique depuis l'évaluation des stocks jusqu'à la mise en œuvre des mesures de gestion, réalise une analyse des lacunes pour comprendre les carences, les obstacles et les entraves dans le processus science-politique pour cette pêcherie, et identifie les actions et les tâches nécessaires pour soutenir la prise de décision basée sur des preuves pour développer des mesures de gestion des pêcheries.

Selon les résultats de l'évaluation du stock 2020 menée par l'Ifremer, l'état du stock de vivaneau rouge en Guyane française est incertain. Cependant, les évaluations précédentes ont montré que le stock était surexploité. En particulier, le stock connaît une surpêche croissante due au fait que les pêcheurs ciblent surtout les petits poissons pour fournir aux restaurants des poissons de la taille d'une assiette. Les résultats de l'évaluation du stock ont donc recommandé l'adoption de mesures de gestion telles qu'une limitation de l'effort de pêche (nombre de jours de pêche) et l'utilisation d'hameçons plus grands.

Actuellement, le stock est évalué comme s'il ne s'agissait pas d'un stock partagé, en raison du manque de données provenant des pays voisins de la Guyane française. Le fait que les captures des pays voisins ne soient pas prises en compte signifie que l'évaluation actuelle du vivaneau rouge pourrait ne pas donner une image fidèle de la ressource. Il est donc nécessaire de comprendre la structure des stocks et son impact sur la juridiction du stock. Des efforts de coopération en matière de recherche entre les nations voisines de la Guyane française sont nécessaires pour améliorer les données et les preuves en vue d'une gestion durable du stock.

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1 INTRODUCTION

The Common Fisheries Policy (CFP) sets out the overarching framework for managing fish stocks within the European Union (EU), based on best available scientific advice. At the heart of the CFP is the Basic Regulation (Regulation (EU) No 1380/2013)[1] that is supplemented by a range of other instruments (regulations and decisions) that address specific aspects of fisheries management, including the data collection framework (DCF) (Council Regulation (EC) 2017/1004)[2].

The rules of the CFP apply to the territory of the nine outermost regions (ORs)[3] as well as to the waters over which they have sovereignty or jurisdiction, in other words their respective territorial seas and exclusive economic zones (EEZs). They also apply to fishing vessels based in an OR that fly the flag of the Member State (MS) concerned, as well as third-country vessels within the territorial sea/EEZ of an OR.

While Article 349 of the Treaty on the Functioning of the European Union (TFEU)[4] provides that due to the structural and economic situation of the ORs, specific measures can in certain circumstances be adopted for them, including in regard to fisheries policies, no such measures have been adopted as regards data collection.

It follows that the ORs are subject to Part V of the Basic Regulation, 'Scientific Base for Fisheries Management'. In particular, 'biological, environmental, technical, and socio-economic data necessary for fisheries management' in the ORs must be collected and those data must be made available to end–users, including bodies designated by the European Commission (EC). Data collection is subject to the principles set out in Article 25(2) of the Basic Regulation:

a) accuracy, reliability and timeliness of data collection
b) coordination mechanisms to prevent duplication of data
c) use of databases for effective storage
d) good availability of data whilst complying with data protection laws, and
e) access by the Commission to data stored within databases

Further to this, the DCF enables the Commission to enact Commission decisions to establish a multiannual Union programme (EU-MAP) for the collection and management of biological, environmental, technical and socio-economic data in the fisheries and aquaculture sectors. This report considers the 2017-2019 EU-MAP[5] and the 2020-2021 EU-MAP (consisting of two Commission Decisions)[6]. For 2022 onwards, the EU-MAP Commission decisions were published on 16 July 2021 but are not referred to in this report.

1 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22).

2 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

3 Azores, Canary Islands, French Guiana, Guadeloupe, Madeira, Martinique, Mayotte, Réunion and Saint Martin

4 Consolidated version of the Treaty on the Functioning of the European Union (OJ C 326, 26.10.2012, p. 47–390)

5 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

6 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March

While the DCF provides a legal framework, organisation and general obligations, the EU-MAP establishes the (minimum) data requirements to be collected and at what frequency. For example, biological variables associated with a métier[7] include length and discard data for pre-determined species to allow for quarterly evaluation of length distributions and discard volumes. These data must be recorded to "level 6" which includes data for levels 1 to 5, providing background information on the fleets in question.

Since 2014, the European Maritime and Fisheries Fund (EMFF) provides each MS financial support to implement the DCF. Articles 17 to 20 of the EMFF Regulation (EU) 508/2014[8] require participating MS to produce an 'operational programme' for the EMFF. The operational programme sets out how each MS intend to spend their EMFF budget and is subject to approval by the EC. In addition, under the DCF each MS must set out a work plan and submit an annual report describing the implementation of the DCF. The work plan contains a detailed description of the following:

a) data to be collected in accordance with the EU-MAP
b) the temporal and spatial distribution and the frequency by which the data will be collected
c) the source of the data, the procedures and methods to collect and process the data into the data sets that will be provided to end-users of scientific data
d) the quality assurance and quality control framework to ensure adequate quality of the data in accordance with Article 14
e) in what format and when data are to be made available to end-users of scientific data, taking into account the needs defined by the end-users of scientific data, where known
f) the international and regional cooperation and coordination arrangements, including bilateral and multilateral agreements concluded to achieve the objectives of this Regulation, and
g) how the international obligations of the Union and its Member States have been taken into account

Disparities between ORs and the mainland of the MS concerned in terms of fisheries and social and economic structure can result from a number of factors including, but not limited to, their remoteness and insularity, their small size, difficult topography and climate, and their economic dependence on a limited number of products. These factors can also result in impacts on the fisheries' data collection processes within the ORs, required by the CFP, resulting in terms of data deficiency and limiting the effectiveness of fisheries management within the regions.

Data collection obligations of the EU fleet also extends to vessels operating in third country waters within the framework of Sustainable Fisheries Partnership Agreements (SFPAs). In this study there is only one example of OR vessels operating in third country waters within the framework of an SFPA: a small number of small-scale boats operating in Moroccan waters. These Spanish vessels are part of the 10 authorised to fish demersal species (Sparidae, rubberlip grunt) using pole and line gear in accordance with the EU-Morocco

2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

7 A métier is a group of fishing operations targeting a specific assemblage of species, using a specific vessel and gear type, during a precise period of the year and/or within the specific area.

8 Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund and repealing Council Regulations (EC) No 2328/2003, (EC) No 861/2006, (EC) No 1198/2006 and (EC) No 791/2007 and Regulation (EU) No 1255/2011 of the European Parliament and of the Council (OJ L 149, 20.5.2014, p. 1–66)

SFPA protocol[9]. More recently, traps have been authorised as permitted fishing gear[10]. The quantity of fish caught by the Canary Islands fleet in Moroccan waters is below the threshold of 200 tonnes per year per species (Commission Implementing Decision (EU) 2019/909). Of particular note, data held by the Instituto Español de Oceanografía (IEO) indicates the total annual volume of landings by Canary Islands vessels have not historically surpassed that threshold (at least in the latest 14 years). Thus, IEO has not selected these fisheries for biological sampling under DCF. The monitoring of the compliance with this agreement for the Spanish fleet is conducted by the Secretaría General de Pesca (SGP) of the Ministerio de Agricultura, Pesca y Alimentación (MAPA). IEO provides information and scientific advice to them upon request.

Foreign fishing vessels from third countries operating inside Union waters are required to comply with the requirements under the Union Regulation on the Sustainable Management of External Fishing Fleets (SMEFF)[11]. Within French Guiana, foreign fishing vessels from Venezuela target red snapper and form part of a specific case study.

The main objective of this report is to provide an overview of the state of fisheries data collection and scientific advice and knowledge in support of fisheries management in the OR using a strengths, weaknesses, opportunities, threats (SWOT) analysis.

2 METHODOLOGY

2.1 General approach of the study

The methodology used a stepwise approach, first developing a series of key baseline tasks, which were then used to develop a number of outcomes under the remaining tasks. The first set of tasks reviewed all available literature to identify the stocks and fisheries within each OR that are relevant to the DCF (task 1), as well as the relevant managing authorities and fisheries institutions (task 2), and the funding resources utilised (task 3). At the same time a pilot case study was undertaken to develop a detailed roadmap of all necessary actions towards establishing regular stock assessment of red snapper in the waters of French Guiana (task 9). Stakeholder consultations were performed using questionnaire guidelines to verify information sources and help fill gaps. Various outcomes describe the current status of data collection in ORs (task 4), fisheries management measures and the science underpinning them (task 5), and finally the identification of any obstacles to sound scientific advice (task 6). The results were used to develop a chapter within an individual profile report for each OR (Annex 2). The reports were developed to ensure a consistent approach was adopted across all ORs.

Information obtained from all tasks were used to develop an individual SWOT analysis for each OR under task 7. A separate SWOT report was created for each OR (Annex 3). The findings from individual SWOT analyses were used to develop a synthesis of all country SWOTS under task 8. The outline of this report follows the step-wise approach and presents the outcome of each task 1-9.

9 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22019A0320(01)&from=EN

10https://ec.europa.eu/oceans-and-fisheries/publications/report-2020-meeting-joint-scientific-committee-eu-morocco-fisheries-partnership_en

11 Regulation (EU) No 2017/2403 of the European Parliament and of the Council of 12 December 2017 on the sustainable management of the external fishing fleet (SMEFF) and repealing Council regulation (EC) 1006/2008 (OJ L 347, 28.12.2017, p. 81–104)

2.2 A note on SWOT analyses

The main objective of task 7 is to develop a series of individual SWOT analyses for each OR to obtain information about the state of data collection and scientific advice in support of fisheries management. For each individual SWOT, a range of factors were analysed as either 'positive or negative' and 'internal or external'. The internal scope (strengths and weaknesses) are those related to the system under evaluation; the external scope (opportunities and threats) are those events and pressures that influence the system from the outside. For the purpose of this report, internal factors are defined as those within the OR or within the European Union (EU). External factors are outside of the OR or the EU. For example, funding coming from within the territory or from the EU (i.e. EMFF) would be considered as internal. Funding coming from international financial institutions such as the World Bank would be classified as external.

Once the four factors: strengths, weaknesses, opportunities and threats have been analysed individually, it is necessary to conduct a level-2 SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual strengths, weaknesses, opportunities and threats to take advantage of strengths based on specific opportunities and to reduce threats, combat any identified weaknesses by identifying opportunities and highlight where weaknesses and threats coincide so mitigation measures can be taken to reduce the potential negative impacts. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities ("Natural Opportunities"): Matching an ORs strengths with an opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the OR should be able to take advantage of easily due to utilisation of their existing strengths.

- Weaknesses-Opportunities ("Attractive Options"): Where a weakness has been identified but an opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These opportunities are likely to produce good returns if the basic level of capability and implementation are viable.

- Strengths-Threats ("Threats that can be defended"): Some threats that could be easy to defend and counter based on the ORs existing strengths. For many existing threats the current skills, funding and administrative requirements may already be in place to be able to meet these threats.

- Weaknesses-Threats ("High Risk Scenarios"): Where weaknesses and threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

3 RELEVANT FISH STOCKS, MARINE ORGANISMS AND FISHING ACTIVITIES

The aim of this task was to identify, define and describe all relevant fish stocks and other marine organisms (e.g. bycatch, endangered, threatened and protected (ETP) species), and associated fishing activities (both by EU and third country vessels) for data collection and scientific advice in support of fisheries management advice in each OR. Restrictions in the role of data collection for scientific advice will be discussed in section 8.

3.1 Macaronesia

3.1.1 Azores and Madeira

3.1.1.1 Fisheries

The waters surrounding the Azores and Madeira are deep, with low productivity limiting the potential catch. The ecosystem is characterised by seamounts and island slope, with fishing activities occurring from the coast to deep sea seamounts within each ORs EEZ, with an average fishing depth between 200 to 600 m.

The Azores fishery is relatively small-scale and dominated by pelagic (60% of landings by weight, 30% by value) and demersal fish species (33% of landings by weight, 60% by value), while crustaceans and molluscs comprise a very small section of the fishery (4% by weight, 6% by value). Within Madeira, similar to the Azores, there is a substantial small-scale fishery. Fishing activity is predominantly based on tuna species and black scabbardfish, although a range of large and small pelagics, demersal species and molluscs are landed. The majority of fishing gears operated in Madeira are selective, with discards considered almost null.

In both the Azores and Madeira, the diversity of fisheries and métiers, as well as the diversity of habitats utilised, constitute a challenge for data collection. For example, there is very limited to no biological information, assessment and quantification of total allowable catch (TAC) for the majority of demersal species. Such lack of data collection on these species is expected to be due to the paucity of scientific surveys and on-board observer programmes within both ORs. However, despite the need for additional monitoring, within both ORs the main target species and métiers are known and relevant data to manage such fisheries are collected.

Demersal: There exists a wide diversity of demersal species, some of which are endemic to Macaronesia, as well as being classified by the IUCN as vulnerable. Even though these demersal fish species constitute a very small proportion (in weight) of total commercial landings, they contribute a significant economic value to the archipelago.

Within the Azores, demersal fishing activities capture a range of species, but is mostly driven by the population dynamics of the main targeted, high-value species: the blackspot seabream. This fishery also catches adults of both blue jack mackerel and chub mackerel, as well as Mediterranean parrotfish, while species associated with seamounts are also targeted, including wreckfish, alfonsino and blackbelly rosefish.

There has been an increase in the level of discards from demersal fisheries in the Azores, including of blackspot seabream, wreckfish and alfonsino. Such discards may be due to recent management measures - particularly TAC/quotas and minimum size and fishing area restrictions - that has changed the target species. This is due to the expansion of fishing areas to more offshore seamounts and deeper strata during the last decade (ICES, 2018). Other bycatch occurs in areas subjected to greater bottom longline fishing effort,

especially at seamounts between 200 and 400 m depth; with benthic sessile species such as the armoured sea fan coral, soft coral and hexacorals predominantly impacted by such activities (Sampaio et al., 2012). However, the Azores fleets are prohibited from using other bottom gear types, such as trawling, that may impact benthic habitats.

The deep sea fishery is one of the main fishing activities in Madeira and targets the black scabbardfish (80% of the catch), and intermediate scabbardfish (20% of the catch) (Delgado et al., 2018). In addition, several commercial species targeted within this fishing activity, including red porgy and pink dentex, amberjack and parrotfish, do not have biological sampling.

Small Pelagic: The commercial Azores fishing industry is dominated by small pelagic species, with one of the most important species being the juvenile blue jack mackerel occurring in island shelf areas. In Madeira, the most important small pelagic fish are the blue jack mackerel and Atlantic chub mackerel (MM, 2020), while the European pilchard and the Madeiran sardinella are also caught in much smaller quantities. Small pelagic species are the main species used as live bait by the demersal/deep-water longline fleet, as well as the local bait boat fleet targeting large pelagic species. For the majority of small pelagic species caught, no biological information, assessment and quantification of TAC are undertaken.

Large Pelagic: Large pelagic fisheries in the region are highly seasonal and restricted to the period when tuna species migrate through the region. The majority of landings occur in the summer and last from April to October (Morato, 2012). Such fishing is generally concentrated around the islands, especially around the central and eastern groups of the archipelago, and around offshore seamounts.

In the Azores, large pelagic species, such as several tunas and swordfish are commercially targeted, while blue shark and shortfin mako shark are also retained. The Madeiran fishery is dominated by tropical tuna species including bigeye tuna and skipjack tuna, but in certain years there is also a considerable catch of albacore tuna (MM, 2020). The big game fishing fleet in Madeira has increased over the last decade, and is now estimated to be worth EUR 2 million annually. Atlantic blue marlin is the most targeted and frequently captured species, although other large pelagic fishes, such as the Atlantic white marlin are also caught. Lastly, there are opportunities for new fisheries to develop in Madeira, with recent interest in swordfish, although there is no stock assessment of this species.

Molluscs: In Madeira, limpets and topshells are subject to high levels of exploitation and are some of the most profitable economic activities in small-scale fisheries (SSF) (Sousa, 2019). Small quantities of squid and octopus are caught in Madeira, but form a substantial economic resource due to their high market price (MM, 2020). There is also a small catch of northern prawns, while within Madeira there is an interest in developing a fishery targeting the deep-water red crab and the Madeiran deep-water shrimp. For the latter species, recent fishing activities have been undertaken using highly selective semi-floating shrimp traps operating between 100 and 500 m depth. The development of this fishery has not been monitored and information on its impact on target and non-target species (in particular sharks) is not available (Pajuelo et al., 2018). Lastly, recreational spearfishing mainly targets finfish, with the catch complemented with limpets and octopuses. The total annual catch obtained by spearfishing in 2017 was of 517.7 tonnes, comprising 52 different fishes and invertebrates.

Other marine organisms: Kitefin shark remain a prominent bycatch of the black scabbardfish fishery. Historically, they formed an important component in the regional

economy, but are now required to be released at sea under Council Regulation (EU) 2021/91[12].

Incidental catches of marine birds, mammals and turtles have not been identified as a major concern in the Macaronesia area. Further to this, catches of Endangered, Threatened and Protected (ETP) species is considered low (Freitas et al., 2013). Despite this, there are records of sea turtles being impacted by pelagic longline fleets (Pham et al., 2013). However, this may be a consequence of the lack of on-board observation programmes. Dedicated observer programmes are needed to estimate the accuracy of bycatch mortality rates for ETP species[13]. For example, the programme's 'Consolidating Sea Turtle Conservation in the Azores' (COSTA) is now in place to assess catch rates; dolphin (bottlenose, Risso's, and common) and killer whales are the most commonly observed species in the vicinity of longline gear, though there is no evidence to suggest these species have been adversely affected by this fishery.

3.1.1.2 Fleet structure

Fisheries in the Azores and Madeira are characterised as small-scale and artisanal, with reduced vessel sizes with limited areas of operation, predominantly utilising traditional passive fishing gears such as drifting longlines.

There have been a number of recent changes to the Azores fishing industry. The majority of the regional fleet (70% of vessels) operate less than 6 nautical miles (nm) inshore, with only 18% of the fleet operating at distances greater than 30 nm from the coast. However, there has been an overall decline of 43% in the number of licensed vessels between 1991 and 2018, following regional incentives to restructure the fishing sector (reduction of fishing effort) and modernize the fleet (enhancement of living conditions). In addition, since 2000, the number of bottom longliners in the coastal areas has reduced, following the banning of this fishery up to 3 nm from shore. As a consequence, smaller boats that operate in the coastal areas have changed their fishing gear from bottom longline to several types of handlines, which may have increased the pressure on some demersal species (Morato, 2012). Lastly, in order to reduce effort on traditional coastal stocks, fishers have been encouraged to exploit deep-water habitats (> 700 m). Although the poor response of the market in purchasing such fishes has been limiting such expansion (ICES, 2018), this remains an opportunity to develop new fisheries within the Azores.

In Madeira, the fleet consists of approximately 90 active boats, with over 65% (2018 data) being < 10 m in length. Of the seven métiers utilised within Madeira, the predominant ones are: (i) drifting longlines targeting black scabbardfish between 800 - 1300 m depth; (ii) pole and line targeting tuna species; (iii) purse seine targeting small pelagic species; (iv) bottom longline targeting a large number of demersal species; and (v) the use of handlines to separately target tuna and demersal fish species. Destructive gear bottom trawling and trammel nets are banned from use in Madeira below 200 m.

Fishing capacity in Madeira has remained stable across the last few years, potentially associated with reductions in the purse seine fleet from 5 to 3 vessels to reduce capacity, while for other fleets there is likely a lack of new fishing opportunities and increasing difficulty in attracting new fishers into the fishery. There are a range of vessels that undertake a substantial part of their activity in the fishing grounds of the Madeira-Tore complex (i.e. seamounts south of Madeira). These fleets comprise vessels operating drifting longlines and pole and line bait boats fishing around the Lion and Seine seamounts,

12 Council Regulation (EU) 2021/91 of 28 January 2021 fixing, for the years 2021 and 2022, the fishing opportunities for Union fishing vessels for certain deep-sea fish stocks. (OJ L 31, 29.1.2021, p. 20–30).
13 https://misticseas3.com/en

targeting black scabbardfish and tuna (Campos et al., 2019). In addition, vessels from Madeira catch black scabbardfish in the waters of the Canary Islands under a bilateral agreement (see section 3.1.2). Lastly, Campos et al. (2019) report that vessel tracking from AIS-Sat (AIS-satellite data) show the presence of fishing vessels belonging to other EU fleets, as well as foreign vessels, operating near the seamounts in Madeira-Tore.

Hand-harvesting: This métier operates in the intertidal zone by free divers with hand devices to collect molluscs. In Madeira, this is the principal occupation of a limited number (6 to 9) of small vessels (< 10 m) with low tonnage and capacity, based predominantly on the north coast around the Desertas Islands. There are specific local regulations, daily limits to catches per vessel and a closure between 1st December to 28th February. This fishery is both recreational and professional (MM, 2020).

Purse seine: This métier is used to target coastal small pelagic fishes, and traditionally constitutes an inexpensive food resource for local populations. In Madeira, purse seiners target small pelagic fishes, which are then used for live bait for the tuna and black scabbardfish fishery (Tejerina et al., 2019). Currently three boats comprise this métier (18 - 24 m length) and operate year-round. Of the species caught by this métier, only blue jack mackerel has a TAC and landing obligation.

Handlines and anchored bottom longline: This is a multi-specific fishery in Madeira, targeting a large number of demersal species (locally designated as 'peixe-fino') with high commercial value. This fishery is operated year round, predominantly using small vessels (< 10 m) in the insular shelf (Morato, 2012; Shon et al., 2015). This fleet constitutes one unique segment, using handlines and anchored bottom longlines to catch species.

Handline: In Madeira, this métier comprises a large number of small vessels, < 10 m, using hand lines, all year round, fishing demersal fish species in the insular shelf, while there is a limited number of vessels that also target tuna.

Pole and line (with live bait): This métier targets large pelagic fishes, including tuna and tuna-like species. This fleet usually uses small pelagic species as live bait. In Madeira, the pole and line fishery operate mostly inside the EEZ, which is included as part of the Committee for the Eastern Central Atlantic Fisheries (CECAF) area 34.1.2. This fishery operates seasonally, mostly during the second and third quarters of the year. The fishing grounds are off the south coast of Madeira, the Desertas Islands and Porto Santo. However, the Madeira fleet may travel to the Azores, the Savage Islands or the Seine Bank (EP, 2017). Bait fish is normally captured by the tuna vessels themselves using small purse seines or lift nets, and consist of small pelagic fishes such as blue jack mackerel. However, there are no consistent and readily available bait fish catch data for the Madeiran pole and line fleet (Shon et al., 2015).

Longlines: The fleet registered in the Azores include operators from the Portuguese mainland and foreign vessels, predominantly using pelagic longline to target large pelagic species, including swordfish and blue shark. Portuguese and foreign fishing activities are not regionally monitored and do not enter local statistics. In Madeira, drifting longlines are used by vessels 12 - 18 m (68% of fleet) in the deep-water black scabbardfish fishery, while the remaining are < 10 m. In general, between 4 000 and 5 000 hooks are used per boat per day of fishing, remaining in the water for between 10 and 12 hours. This fishery operates year round, occurring predominantly inside the Madeira EEZ and adjacent international waters, but also under a fishing agreement in waters north of the Canary Islands (CECAF area 34.1.2). This métier is very specialized, with a small amount of bycatch and discards (Morato, 2012; Delgado et al., 2018; MM, 2020).

Recreational (multiple gears): In the Azores, recreational fisheries are described, well segmented, and regulated. Comprising spearfishing, recreational boat angling, shore

angling and hand collecting. This sector has a substantial impact on important stocks, utilising the same range of species targeted by commercial ventures (Pham et al., 2013), with the total catch (1950 - 2010) equating to 6% of official landing statistics reported by the commercial sector (between 300 to 950 tonnes per year: Pham et al., 2013). In addition, in terms of DCF species, spearfishing and recreational boat angling are estimated to catch annually approximately 2 tonnes of tuna species, such as Atlantic bonito, while also catching 1 tonne of wahoo[14]. In addition, there has been a game fishing/sport fishing industry targeting large pelagic fishes since the mid-1980s and still active today. This industry is based predominantly on catches of blue marlin but is now essentially a catch and release activity (Pham et al., 2013).

3.1.2 Canary Islands

3.1.2.1 Fisheries

The fisheries in the Canary Islands are based on a wide range of large and small pelagic, as well as demersal fish species. The 11 stocks listed in the 2017-2019 EU-MAP are those that are sampled and reported under the DCF when reaching 200 tonnes/year: bigeye tuna, yellowfin tuna, skipjack tuna, albacore tuna, Atlantic bluefin tuna, Atlantic chub mackerel, horse mackerel, European pilchard, round sardinella, parrotfish and limpet. Combined, these stocks represent 92% of the total landings (tonnes) and 78% of value. Despite this, there is overall no biological information, assessment and TAC for some commercially important species.

Vessels from Madeira catch populations of the demersal black scabbardfish in the Canary Islands within a bilateral agreement (May 2013[15]). This agreement stipulates an equitable exchange of fishing units between Madeira and Canary Islands fleets for black scabbardfish (Madeira vessels only) and tuna (both Madeira and Canary Islands vessels) within 12 nm from each respective region's coastline. The maximum number of vessels allowed to fish in each other waters is 38, and only ten by country can fish simultaneously in these waters.

Recreational fisheries predominantly include the majority of demersal species targeted by the artisanal fleet, accounting for 40% of total catches (MAPA, 2005, Jiménez-Alvarado, 2019; Pascual-Fernández et al., 2012). Compliance with minimum size limits for all species is mandatory, with all recreational activities regulated by a maximum weight captured (5 kg/person/day). Despite this, landings by species are not registered.

Demersal: Landings of demersal species in the Canary Islands include a large number of species, but only a small number of these are landed in significant quantities. The most important landings are of parrotfish, pink dentex, alfonsinos and red porgy. Other fish species (e.g. amberjack and moray eel) and invertebrates (e.g. deep-water shrimp and cephalopods) are landed, and of high value in local markets.

The total landings of demersal species amount to approximately 1 100 tonnes. At present, only parrotfish landings (some years exceeding >200 t) is relevant for DCF purposes as the stock is required to have data collected, although stock-specific sampling at markets is also conducted by IEO for other relevant species (e.g. porgy, pink dentex, grouper, alfonsino, amberjack and moray eel).

14 https://datacollection.jrc.ec.europa.eu/documents/10213/1341570/Portugal_Annual_Report_2019_Text.pdf/c0e20328-b631-4886-891b-4650682dfbc0

15 BOE-a-2013-6872. https://www.boe.es/eli/es/ai/2012/05/09/(2)

Small pelagic: Small pelagic species form an important fishery, comprising predominantly of jack and horse mackerel, Atlantic chub mackerel, European pilchard, round sardinella and Madeiran sardinella.

Large pelagic: The location of the Canary Islands and their oceanographic characteristics attract the majority of tuna and tuna-like species. This includes temperate tuna (albacore and Atlantic bluefin tuna) and tropical tuna (bigeye, skipjack tuna, yellowfin tuna). These migratory fish reach the Canary Islands at different times of the year and are the main fishery resource of the Canary Islands. The remaining landings are comprised of wahoo and swordfish. Swordfish and blue shark are fished by a few Andalusian vessels (not based in the Canary Islands) that carry out temporary fishing campaigns in the CECAF area 34.1.2 surrounding the Canary Islands waters every first two quarters of the year (usually from November to April). The value of tuna and tuna-like species amount to over EUR 15 million annually.

Other marine organisms: The majority of species caught by the Canary Islands fisheries are retained for commercial uses, with little bycatch registered. However, within the Canary Islands there is a small level of discarding due to the existence of minimum conservation reference sizes (MCRS) for some species. ETP species are recorded (as discarded bycatch) during on-board scientific observations performed by IEO.

3.1.2.2 Fleet structure

The Canary Islands fleet consists predominantly of vessels < 10 m in length (560 vessels, 78% of the fleet) (Spain Work Plan, 2019). Most of the artisanal vessels operate under "minor-gear"[16] licences, conducting daily trips and alternating between demersal and pelagic species. In this respect, the use of several fishing gears is allowed during the same trip (e.g. surrounding nets, seine nets, lift nets, gillnets, traps, hand lines, longlines, trolling lines). The Canary Islands fleet also comprises a range of boats > 10 m in length[17]: 10-12 m (38 vessels), 12–15 m (42 vessels), 15–18 m (12 vessels), 18-24 m (10 vessels), 24–40 m (35 vessels) and > 40 m (13 vessels).

The polyvalent artisanal fleet operating under "minor-gear" licence mentioned above include artisanal purse seiners (focused on small pelagics and performing daily trips, generally fishing at night with lights), and also a great number of vessels focused on demersal species using a range of gear types (e.g. traps, hooks and nets), and many of them alternating also with large pelagic fishing.

There is a specific licence for the artisanal "tuna bait boats" (35 licences in 2021), but a significant number of boats show polyvalence and opportunistic activities, alternating between demersal and pelagic species. The total number of vessels fishing tuna (e.g. 235 in 2019) includes the bait boats and a variable number of vessels conducting opportunistic fishing activities, alternating between demersal and pelagic species as mentioned above. There are different fishing strategies of this fleet, depending on the size of the vessels and the target species. For tropical tunas, "free school" fishing is the main fishery strategy especially on the smaller vessels. They use the vessel as a FAD on the medium-sized vessels, fishing in groups comprised of two or three vessels ("pesca a manchas"). The duration of the fishing trip is from one day to about ten or fifteen days for the largest

[16] Fishing modalities authorized under the "minor-gear" licences in the Canary Islands are traps, (fish traps, shrimp traps and drums for morays), lines (handlines, longlines, drifting longlines, trolling lines, handle jigging) and nets (surrounding nets, seine nets, lift nets, gillnets). The use of minor gears is polyvalent for vessels of <15 m length, being able to carry on board simultaneously and carry out the activity with several of these authorized gears. More information available at https://www.boe.es/boe/dias/2015/12/01/pdfs/BOE-A-2015-13003.pdf

17 https://orfish.eu/data/activities/data/orfish_2016_CANARIAS.pdf

vessels. They use ice to conserve the fish and land fresh fish normally. In this fleet, the number of crew members is variable and depends on the size of the vessels and the period of seasonal fishing.

The Sustainable Fisheries Partnership Agreement between the EU and Morocco[18] has established demersal fishing opportunities (Fishing Category 3, Artisanal Fishing of the South), with permission for 10 licenses of EU vessels operating with pole and line; traps have also recently been authorised[19]. Only 2 artisanal vessels are operating under this fishing category, with no sampling obligations due to its low level of landings and effort.

Recreational fishing (multiple gears), which includes fishing from boats using surface trolling; spearfishing and hand collection, which is allowed in specific areas of the coastal (inland) waters; and recreational fishing on the surface, carried out from land or from boat without using surface trolling. The total number of recreational fisheries licences (including fisheries from a boat, diving or from the coast) was 31 172 in 2020[20].

3.2 Caribbean

3.2.1 Martinique, Guadeloupe and St Martin

3.2.1.1 Fisheries

Unlike the volcanic islands in Macaronesia, the Caribbean islands of Martinique, Guadeloupe and St Martin are characterised by their inshore lagoon and coral reef areas, enabling fishers to exploit fish in the relatively shallow nearshore waters.

Within these inshore regions, fisheries in Martinique and Guadeloupe retain a large variety of demersal species, creating a number of challenges for data collection. For example, in Martinique up to 180 demersal species or species groups are caught, of which around 41 are targeted. In addition to issues surrounding species identification, the small-scale nature of the fisheries allow fishers to land and sell their catch at numerous beaches, prohibiting a comprehensive sample-based data collection strategy.

In Martinique, both small and large pelagics represent around 30% of the catch, while the remaining 70% predominantly comprise demersal fishes, including reef fish and crustaceans (Blanchard et al., 2018; Weiss et al., 2019). Similarly, fisheries in Guadeloupe exploit a range of small and large pelagic species (together comprising 40% of catches), as well as demersal fishes and crustaceans (60% of the catch). A total of 59 stocks are monitored, which includes demersal and small and large pelagics. Of the main demersal species landed only 12 species have biological data collected.

Of the species caught in Martinique, 65 stocks (predominantly demersal) are monitored regularly (at least landings). However, the majority of such fishes are not formerly assessed. Despite this, Institut Français de Recherche pour l'Exploitation de la Mer (Ifremer) indicate that information collected on 12 main fished species in Martinique and Guadeloupe (including snapper, lobster, conch) is sufficient to implement data-limited models to undertake stock assessments (Froehlicher et al., 2019; Pawlowski, 2021). For these 12 species, using the current knowledge of such fisheries (e.g. catch and effort data, as well as some biological parameters) data-limited models provided reliable stock

18 EU-Morocco SFPA: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22019A0320(01)&from=EN

19 2020 Joint Scientific Committee to the EU-Morocco SFPA: https://ec.europa.eu/oceans-and-fisheries/publications/report-2020-meeting-joint-scientific-committee-eu-morocco-fisheries-partnership_en

20 https://www.gobiernodecanarias.org

assessment information. For all other exploited species in Martinique and Guadeloupe, the basic biological data needed for such assessments (e.g. breeding rate, natural mortality rate, mortality by predation) have not been collected to undertake stock assessment.

From 2020, in both Martinique and Guadeloupe Ifremer began to collect biological data using funds from the Agence Francaise de Developpement (AFD) to buy fish directly from fishers) to fill gaps in the biological knowledge of the main fished species. This work was started to conduct and improve stock assessments of the main fished species.

There is no literature that describes the different stocks fished within St Martin waters. However, discussions with a fisheries expert who has worked in St Martin (from Comité de la Pêche Maritime et des Elevages Marins (CRPMEM) in Guadeloupe) indicated that the exploited species with St Martin are the same as those caught in Guadeloupe. In this respect, this fishery comprises a range of small, medium and large pelagic species, as well as demersal fishes and crustaceans.

Demersal: There is a large range of demersal fishes targeted within the region (e.g. 41 species or species groups in Martinique), dominated by species associated with coral reef habitats. This varied list contains not only bony fishes, but rays and skates, as well as a range of invertebrates (e.g. crabs, lobster).

Small pelagic: Across all three ORs, small pelagics include species such as needlefish, carangids, clupeids, flying fish, halfbeak, mackerel scad, barracuda, seerfish, Spanish mackerel, rainbow runner and a range of small coastal shark species.

Large pelagic: In both Martinique and Guadeloupe large pelagics including marlin, sailfish, common dolphinfish and a range of tuna species are the focus of both commercial and recreational fisheries. Despite this, only 5 species are formerly assessed. Such assessment is associated with the EU being an International Commission for the Conservation of Atlantic Tuna (ICCAT) Contracting Party, therefore France has to comply with the European Commission regulations and recommendations. Although there is no data collected within St Martin on the recreational or sports fishery, as the island is highly touristic the impacts of such fishing activities on stocks are expected to be measurable and to be focused on large pelagic species.

Other marine organisms: The fleet do not target specific species, therefore all fishes caught are landed and sold or kept for personal use, with no bycatch. In addition, no data is available on ETP species fished within Martinique, likely associated with the local ban on the catch of sea turtles, mammals and corals. Despite this, Ifremer statistics shows that several species with conservation measures are part of the catch, including conch (closed season), lobster (ban on breeding lobster) and white urchin (1 or 2 weeks associated with the protection of the spawning population, as urchins are harvested when they are fecund, (i.e. hold a high biomass of gonads or eggs), with the very limited opening period enforced to preserve the spawning stock).

There is no data available on ETP species within Guadeloupe fisheries. This is due to Guadeloupe regulations banning the catch of sea turtles, mammals and corals. However, recent work has quantified the impact of fisheries on turtles, and found that turtles represented 2% of total catches, with an overall 49% mortality rate, including a majority of juveniles. Lastly, due to the diversity of catch, there is little (if any) evidence to show that bycatch is prevalent in this fishery.

3.2.1.2 Fleet structure

The fishery in both Martinique and Guadeloupe is predominantly multi-gear artisanal, encompassing up to 18 and 17 different métiers respectively. Each métier targets a large range of species, are relatively opportunistic and are structured by daily shifts in gears. The typical Martinique vessel is the 'Yole' (79% of the fleet), which is an undecked fiberglass hull between 6-9 m in length, with one or two 150 - 200 HP outboard engines. Some are equipped with a small cabin. The larger vessels, (i.e. 11-12 m), are decked with on-board diesel engines. No vessels in Martinique are above 12 m. As of August 2021, only 4 large vessels predominantly harvest red snapper within French Guiana, or catch offshore pelagic fish around local FADs. Overall, the majority of vessels within Martinique (65%) operate within 12 nm of the coast. Of the rest of the fleet, 20% operate on a regular basis outside this limit, while the others move between the two regions. In Guadeloupe, all fishing vessels are below 12 m in length (96% ≤10 m), with no foreign vessels operating. On average, the fleet is comprised of vessels that are 7.7 m long, have motors of 175 HP, a gross tonnage of 3 tonnes, are 17 years old and have 1.8 crew. There are larger vessels of 11-12 m length, decked with on-board diesel motors, but these are limited in number and as they are slower than the smaller vessels, are not popular. The majority of vessels (64%) operate within 12 nm of the coast, while 23% operate on a regular basis outside the 12 nm limit.

Given the high level of pollution from the pesticide 'chlordecone' within the inshore waters of both Martinique and Guadeloupe, the proportion of vessels operating outside the 12 nm limit has been shown to increase. Over the past 20 years, Martinique has faced several issues with pollution related to the use of chlordecone (Dromard et al., 2016). As in Guadeloupe, this organochlorine pesticide was utilised between 1972 and 1993 in banana plantations to reduce banana weevil infestation, and resulted in substantial local (and now regional) soil and water pollution. Ifremer's work has enabled protection measures related to fish consumption within Martinique to be instigated. These have resulted in no fishing zones being placed within the eastern part of Martinique and in the Bay of Fort-de-France, in addition to the fishing zones off the southern coast of Basse Terre in Guadeloupe[21]. For Guadeloupe there is a need to adapt legislation to accommodate such regional specificity. During interviews within the project, the CRPMEM General Secretary recalled Article 349 of EU treaty[22], recognizing the specificity of fishing activities within the ORs, and the urgent need to have a tailored legislation framework developed for the ORs, including the Guadeloupe fisheries sector.

As a consequence of the inshore no-fishing zones, fishers are encouraged to operate further from the coast, and/or fish deeper than what was previously undertaken. Fishers from Fort-de-France in Martinique have to change from fishing in the bay to deep fishing. In the East Coast, fishers have to go further, hence are therefore likely to spend a night at sea. Such changes in fishing activities have two impacts: the need to renew the fleet with modern vessels to ensure more safety at sea, and offering facilities on boats for fishers to stay at sea overnight. Collectif Pêche Martinique (COPEM), a professional fishers association has initiated studies to create a modern Yole, which combines the two new emerging needs: fishing deeper and further from the coast. In Martinique, the proposed boat design will remain below 12 m to continue ensuring resilience of the fisheries sector to extreme events and to stay adapted to the variety of exploited stocks. A similar exercise is currently being implemented in Guadeloupe to modernise their fleet. As a result of changes in vessel design, a new trend is emerging to target pelagic species and explore new opportunities. In this respect, CRPMEM in Guadeloupe is currently conducting a study

21 http://guadeloupe-peches.org/reglementation-chlordecone/

22 https://eur-lex.europa.eu/summary/glossary/outermost_regions.html

on the likely opportunities to fish diamond squid, (personal communication, January 2021).

There is no literature describing the vessels operating in St Martin. However, fisheries in St Martin have a similar topology to Guadeloupe, with a predominance of multi-gear vessels, operating a variety of gears (e.g. pots, a range of nets, and both hand and bottom lines) with a shift of gear every day. There are 15 to 20 vessels which are registered in St Martin on a yearly basis. Lastly, no industrial or foreign vessels fish in St Martin waters.

Free diving: Conch free diving only target conch; Urchin and Echinoderms free diving only target white sea urchin.

Pots: Miscellaneous fish pots which target mainly demersal reef-associated fishes, including filefish, grouper, parrotfish and lobster; In Guadeloupe, deep pots target deep demersal species, including snapper and lionfish.

Coastal and offshore trolling lines: Targeting large pelagic species including dolphinfish, wahoo, and carangids. This métier can also be associated with Fish Aggregating Devices (FAD), which can result in yellowfin tuna, blue marlin and dolphinfish being targeted. This métier is also associated with recreational fishing charter boat fishery, which also utilise handlines to catch shark and snapper.

Circling driftnet: In Guadeloupe, clupeidae circling nets which target herring and sardine; Halfbeak circling nets which only target halfbeak; bigeye scad circling nets which target bigeye scad; and needlefish circling nets which target only needlefish.

Drifting longline, Bottom longline: Dependent on the depth at which longlines are set, these can target both large species, including dolphinfish, yellowfin tuna and filefish and small pelagics (if the line is set in the water column), but also demersal fishes that are reef-associated, such as snapper and sweetlips.

Fixed gillnet: In Martinique these predominantly target small pelagics such as halfbeaks, flyingfish and needlefish whereas in Guadeloupe they target specifically a range of small and large pelagic fishes.

Bottom gillnet, circling gillnet: These target demersal fish species, including parrotfish, and carangids.

Seines (including beach seines): Dependent on the depth of the net, these can target a range of scad as well as parrotfish, snapper, carangid, and grunts/sweetlips.

Trammel (net): Either set on the surface to target small pelagic fishes, or set on the seabed to target demersal reef-associated species, including lobster, parrotfish and conch.

Handline (with or without pole): This métier predominantly targets reef-associated species (both demersal and pelagic), including snapper, grouper and barracuda.

Conch net: Used in Martinique, these are exclusively used to target conch.

3.2.2 French Guiana

3.2.2.1 Fisheries

There is a diverse range of fishes captured within French Guiana, including a variety of demersal species, sharks and rays (Blanchard et al., 2018; Weiss et al., 2019). The exploited stocks well identified and information on these published (SIH, Système d'Informations Halieutiques).

Demersal: The vast majority of fisheries within French Guiana is based on demersal resources. Catch composition is largely dominated by coastal species, with acoupa weakfish, and the green weakfish representing more than 65% of landings, followed by tripletail and crucifix sea catfish.

Within the demersal fishery, the penaeid shrimp fishery, which has historically been an important fishery, has experienced a strong decline since 2007. This is due to a combination of diminishing stocks and a strong decrease in the number of boats in the fishery for a range of commercial reasons (Baulier et al., 2017). Lastly, according to DPMA the various weakfish species are likely to be at higher risk of illegal, unreported and unregulated (IUU) fishing due to a high demand from Asian markets for their swim bladders, which have value in traditional medicine.

Within the commercial demersal fishery only 43 species (or species groups) are formally monitored in terms of landing data. Such quantification of catch composition is made more challenging by a lack of formal species identification. The majority of landed catch is reported as species groups by multi-specific fisheries. Of the 43 monitored species within the commercial fishery, only 2 species are formally assessed. These are the penaeid shrimp and the red snapper, which are both assessed by Ifremer. This is due to the EU being a Contracting Party to ICCAT, and therefore France has to comply with this Regional Fisheries Management Organisation's (RFMOs') CMMs and report on fisheries catching species under their respective mandates. No monitoring or data collection occurs in the recreational fishing sector targeting demersal species.

Pelagic: The local industry (fish processors and vessel owners) has expressed interest in developing a high seas fishery, targeting tuna and tuna-like species, to alleviate fishing pressure on coastal resources. However, there are no data on the potential target resources in the region, and no boats that are suited to offshore fisheries or fishers skilled in the required fishing techniques. Also, due to strong regional currents, there is also no way to deploy anchored FADs, which are often used when developing small offshore fisheries, while there is also a risk of competition with tuna caught by other French RUPs in the region, especially as these pelagic species are shared stocks under management of ICCAT.

Other marine organisms: The French Guiana fleet land all that is caught, with expert knowledge from local institutions (samplers, scientists, fisheries administration) stating that there is little to no bycatch associated with this fishery. Despite this, IUU fishing is likely a major issue, with catches roughly estimated to be at least equal to, if not higher than, reported catches. This is likely to arise from (i) local "informal" boats, (i.e. vessels that are 'non-commercial' as they are not registered as professional fishing vessels, but still fish and sell (a part of) their catch) not declaring their catches, and (ii) from boats coming from adjacent countries (Brazil and Suriname), though there is no formal assessment of IUU fishing and the data remain highly uncertain.

3.2.2.2 Fleet structure

Operations are split between SSF operating in the coastal areas that do not target specific species, and commercial vessels from Venezuela targeting red snapper, as well as a small number of commercial shrimp trawlers. The majority of vessels (82%) operate within the 12 nm limit, and are thus considered coastal. Within the wider fleet, 11% operate on a regular basis outside 12 nm and are thus fishing offshore, while a small percentage (7%) operate both in the coastal and offshore areas.

The informal sector is very important in French Guiana, but it is very difficult to collect data on this sector as the coastline is extensive, and fishers land their catches at the beach closest to where they can sell them. As it is not covered by DCF, the study of the informal sector is mostly based on requests by local/regional authorities to answer on specific issues. According to Ifremer, there are very few coastal fishing boats that declare their catches and the data are of very poor quality. For the SIH, a comparative study was completed on observer data vs logbook data which concluded that logbooks have a very low reliability for this sector. In conclusion, SIH only uses observer data.

Gillnets (drifting or set): The vast majority of the fleet is comprised of an artisanal fleet operating in coastal areas using drifting or set gillnets. This is comprised of boats between 9 to 12 m in length, and encompass the "pirogue" (undecked, used in estuaries), the "canot créole" and an 'improved' version with decking ("decked canot créole"), and the "tapouille" (a typical boat from the Amazonian region of Brazil, fully decked with an inboard engine). Overall, the average artisanal vessel in French Guiana is 11 m, has 105 kW motors, is 15 years old and holds 3 crew (Weiss et al., 2019).

Demersal trawler: There are 13 industrial vessels larger than 12 m operating exclusively on the high seas trawling for penaeid shrimps. This fishery used to be much more developed, with more than 60 vessels operating, but it quickly shrank due to reduced stock availability, from about 2007 to reach the current levels.

Trap fishing/Longliners: A small number of trap fishing boats and longliners infrequently come from Martinique to fish red snapper and land their catches in Martinique. However, these are classified as "French catches" and are thus not technically foreign. The total catches from these vessels are exceptionally small compared to those taken by the Venezuelan fleet.

Longliners: A fleet of up to 45 Venezuelan longliners operate in French Guiana waters. These vessels target mainly red snapper (95% of catch) using non mechanized handline, with up to 15 fishers per boat . This fishery is currently operating under an access agreement with the EU, which limits the number of boats allowed to operate (currently 45) and mandates that 75% of catches must be landed in French Guiana and sold to designated processing companies (currently 3)[23]. However, according to DM and Ifremer, the reality is that catches for 1 trip out of 10 are not landed locally. Contracts run for 12 months-trips/year, with the last catch of the year usually landed in neighbouring countries. Consequently, no data are reported to Ifremer for the last trip, which prohibits a full understanding of the level of fishing effort on red snapper stocks. This fishery has existed since at least 1980, and since 2020 vessels are equipped with e-logbooks.

23 European Council, 2012/19/EU: Council Decision of 16 December 2011 on the approval, on behalf of the European Union, of the Declaration on the granting of fishing opportunities in EU waters to fishing vessels flying the flag of the Bolivarian Republic of Venezuela in the exclusive economic zone off the coast of French Guiana, vol. 006. 2012. Accessed: Mar. 27, 2020. [Online]. Available: http://data.europa.eu/eli/dec/2012/19(1)/oj/eng

3.3 Indian Ocean

3.3.1 Mayotte and Réunion

3.3.1.1 Fisheries

Fisheries in Mayotte catch a large variety of fish: there are about 700 fish species in Mayotte, of which about 300 are fished (ca. 50 monitored). Although the majority of these fishes are demersal, there are also a range of small and large pelagic species which are landed. Overall, however, this predominantly multi-gear artisanal fishery does not target specific species and is structured as an opportunistic fishery.

Exploited stocks in Réunion are a mixture of a limited number of large pelagic species and a large number of small coastal species (Blanchard et al., 2018; Weiss et al., 2019), with a predominance of demersal species associated with shallow and deep coral reef habitats. Of these species, Réunion is unique across the French ORs (and indeed across the majority of EU ORs) in having 89 species with their landings monitored (which includes demersal, small and large pelagics). Of the 89 monitored species, 16 are formally assessed by Ifremer – 6 of these are small demersal or pelagic species, while the remaining 12 are assessed under the mandate of the Indian Ocean Tuna Commission (IOTC)[24] (as they are large pelagic species). Similarly in Mayotte, of the approximately 50 species in which catch is monitored, only 5 (10%) are formally assessed. There is no formal stock assessment for non-tuna like species in Mayotte.

Demersal: In Réunion, fisheries retain a large range of demersal species, mainly associated with the reef structure, and including a range of snapper, grouper and emperor species. This fishery also utilises a range of invertebrates, including lobster and crab, while also landing small reef sharks, moray eels, rays and skates. A similar group of demersal species are landed in Mayotte, including parrotfish and octopus caught predominantly within the main lagoon of the island.

Small pelagic: There are a range of small pelagic fish landed in Mayotte, including needlefish, scad, Indian mackerel, fusiliers and clupeoids. Within Réunion, small coastal pelagic species represent only a very small fraction (less than 10%) of catches, predominantly composed of bigeye scad. This species is also used as bait in the longline fisheries for large pelagic species.

Large pelagic: A variety of species are landed in Mayotte, including carangids, green jobfish, barracuda, dogtooth tuna, common dolphinfish and various large pelagic sharks. In addition, there is an interest locally in developing fisheries away from overexploited and fragile lagoon/reef stocks to further utilise pelagic resources (e.g. tuna and tuna-like species). In this respect, a project funded by the Marine Park is developing new artisanal boats (<12 nm) to move fishing pressure out of the lagoon and towards anchored FADs around 20 nm offshore. The composition of catches within Réunion is dominated by large pelagic species, including swordfish and yellowfin tuna, followed by albacore, dolphinfish, bigeye tuna and blue marlin.

Other marine organisms: The fisheries in Mayotte and Réunion do not predominantly target specific fish species, and in consequence there is little or no bycatch. In addition, although diverse and likely overexploited, there has been little highlighted loss of specific fisheries. However, fisheries targeting sea cucumbers which developed in Mayotte after

24https://www.iotc.org/science/status-summary-species-tuna-and-tuna-species-under-iotc-mandate-well-other-species-impacted-iotc

the mid-1990s, had little local regulation in place (Eriksson et al., 2015), and permanently closed in 2004[25]. A number of shark species are protected in both Myoote and Réunion with exception to several species caught within the Mayotte lagoon, including blue shark, oceanic whitetip shark and shortfin mako shark, as well as silky shark (Arrêté préfectoral n°08/UTM/2015 interdiction commercialisation requin).

According to local stakeholders (Ifremer and DMSOI), there are no new stocks or fisheries that could be developed within Réunion. However, there is a trend towards increasing use of "mini-longliners" to target large pelagic species, as these vessels are more cost effective than current longliners. In addition, Ifremer discussed the potential for the development of an octopus fishery (at present this is mostly recreational/informal), but there are not any plans for doing so.

3.3.1.2 Fleet structure

The fleet within Mayotte is composed of two segments: ≤10 m (encompassing boats ≤7 m and those between 7–10 m) and those ≥ 40 m. The first segment comprises the artisanal fleet, which is multi-gear (9 different métiers) and predominantly an opportunistic fishery, with targeted species and métiers utilised potentially varying daily. The majority of these vessels (74%) operate within the 12 nm limit and are thus considered coastal. In addition, 21% of vessels fish offshore, operating on a regular basis outside the 12 nm limit, while a small percentage (4%) operate both in the coastal and offshore areas. The most recent frame survey found the artisanal vessels were on average 6-7 m long, held outboard motors of 25-50 kW, were 18-23 years old and held 2-2.5 crew (Weiss et al., 2019). There are currently 143 professional artisanal boats declared and licensed, with an estimated total of approx. 500 boats in Mayotte, with 300 - 400 being unlicensed boats (termed the 'informal sector', predominantly comprising very small sized boats, more akin to pirogues or canoes, used for recreational and subsistence fishing), which often belong to owners of licensed boats.

Similar to Mayotte, there are two segments in the Réunion fleet: artisanal and industrial fleets. The artisanal fleet is ≤12 m in length, with 79% comprising vessels operating within the 12 nm limit, and do not target specific species. A total of 19% of the artisanal vessels operate in offshore areas (outside the 12 nm limit), where large pelagic species are targeted (e.g. longline fishery targeting swordfish). Only a small percentage (2%) operate both in the coastal and offshore areas. There are approximately 211 professional artisanal boats declared and licensed, with 176 actually active. On average, artisanal vessels in Réunion are 5-10 m long, have outboard motors of 30-200 kW, are 20 years old and hold 1-2 crew (Weiss et al., 2019). The informal sector, (i.e. unlicenced vessels) is almost non-existent in Réunion. However, recreational fishers are known to sell their catches, although as this is not monitored there is little understanding of the impact of this catch on stocks.

Free diving: In Mayotte, this encapsulates spearfishing activities, which predominantly target demersal reef-associated fishes.

Gillnets: In Mayotte, set gillnets are used to retain demersal reef-associated fishes (10 boats in the fleet) whereas encircling gillnets, target small pelagic fish (6 boats in the fleet).

25 Prefecture de Mayotte. 2004. Portant interdiction de l'exploitation des holothuries sur le territoire de la Collectivité Départementale de Mayotte. Arrete No 32 SG/DAF 12004.

Beach seines: In Réunion, this métier almost exclusively targets clupeiods (over 90% of the catch), but also lands a range of demersal soft-sediment dwelling species, including mullet, porgies, seabream and goatfish (23 boats in the fleet).

Set nets: In Réunion, this métier predominantly targets a large range of demersal reef-associated finfishes, though with high landings of surgeonfish, squirrelfish and mullets. However, this métier also is used to target spiny lobster and carangids (13 boats in the fleet).

Spanner crab cale (circular net that can be lifted to form a cage): In Réunion, this métier is 100% targeted at spanner crab (12 boats in the fleet).

Demersal handlines, pole and line (manual): These can be utilised to target reef-associated demersal fish such as snapper and grouper (83 boats within the fleet), small pelagic fishes (33 boats within the fleet) or large pelagic fishes (3 boats in the fleet). This is likely to also partially encompass the recreational fishery. However, there is little data on recreational fisheries although there is a strong recreational fisheries sector in Mayotte (though no sport fisheries). Estimates of up to 548 vessels (203 vessels active all year / 136 vessels inactive all year / 209 vessels unknown), with an average length of 5.1 m are known for Mayotte (Biodiversity French Institute (Office Français pour la Biodiversité, OFB)/Marine Park[26]). This segment is currently not monitored, but there is a working group on this topic created within OFB to work on targeted surveys to evaluate recreational fishing. Within Réunion, vessel retain a large range of predominantly reef-associated fishes, with landings dominated by carangids, several snappers, jobfish and grouper species (98 boats in the fleet).

Demersal handlines, pole and lines (mechanised): In Mayotte, this métier retains demersal fish, including deep-water snapper (2 boats in the fleet). In Reunion, this métier targets a large range of demersal species associated with deep habitats, (i.e. deep reef), including brilliant pomfret, as well as a range of snapper, jobfish and grouper species (66 boats in the fleet).

Set longline for demersal species: In Réunion, this métier focuses on three major species/species groups (brilliant pomfret, emperor, and goldbanded jobfish), while also landing a large range of demersal reef-associated species (10 boats in the fleet).

Small pelagics pole and lines (manual): In Réunion, this métier is predominantly targeting populations of small pelagic scads, though also seabream and clupeiods (61 boats in the fleet).

Large pelagics troll lines: In Mayotte, commercial targeting of large pelagic fish such as dolphinfish, wahoo and tuna (56 boats within the fleet). This is likely to also partially encompass the recreational fishery. Similarly, in Réunion, the gear predominantly targets large pelagic species, including tuna and tuna-like fishes, with a dominance of blue marlin, common dolphinfish, yellowfin tuna and wahoo in the landings (130 boats in the fleet).

Large pelagics drifting longlines: These are set to target large pelagic fish (1 boat in the fleet). In Réunion, this métier almost exclusively targets albacore tuna, though catches of common dolphinfish, skipjack and yellowfin tuna are also recorded (46 boats in the fleet). There also exists a specific metier to include drifting longlines set exclusively for swordfish (40 boats in the fleet).

26 Melissa Conord (OFB), personal communication, June 2021.

Large pelagic pole and line, chartered recreational boats: In Réunion, fleet targeting large pelagics, mainly focused on yellowfin tuna, common dolphinfish and wahoo, but also landing several tuna species, barracuda and large pelagic sharks (99 manual pole-and-line boats in the fleet, 20 chartered recreational boats in the fleet). As in all French ORs, there is very little data on recreational fisheries, although there are recent calls to survey these fisheries. In addition, sports fisheries (i.e. game fishing) are not monitored, but there are projects to do so, particularly for sensitive species (which includes sharks, yellowfin tuna and some locally important species).

Purse seiners: There are 5 industrial purse seiners (≥40 metre) flagged to Mayotte, which operate from Port Victoria (Seychelles) and target tuna and tuna-like species. These vessels were registered just before the baseline reference capacity freeze by the IOTC in 2012, and do not land or dock in Mayotte. These EU vessels operating outside Réunion EEZ focus on large pelagic species (tuna and tuna-like species). Such species are managed under IOTC mandate. There are currently no fishing agreements with foreign, non-EU countries.

4 INSTITUTIONAL ANALYSIS IN SUPPORT OF FISHERIES MANAGEMENT

The section below identifies the key institutional structures and arrangements in place for data collection, scientific advice, research, monitoring, control and surveillance (MCS) in support of fisheries management in each of the ORs.

4.1 Macaronesia

4.1.1 Azores

In the Azores, a division of responsibilities for marine fisheries has been established and is shared among regional and national government bodies in partnership with the professional fishing associations. The Azores is an autonomous region of Portugal, holding political and administrative statutes and self-governing bodies. The management of the Azorean fisheries is under the CFP and shared among regional and national government bodies. The government bodies that manage the fisheries are the Ministry of the Sea (national) and the Secretariat for Sea and Fisheries (regional) – through the Direcção-Geral dos Recursos Naturais, Segurança e Serviços Marítimos (DGRM) and the Direcção Regional das Pescas (DRP).

The Secretaria Regional de Mar e Pescas (SRMar) has the responsibility to manage all issues related to the maritime space, including fisheries, aquaculture, ocean exploration, licensing users of the sea and its funds, as well as management of coastal areas and cooperation with the Maritime Police. Combined, DRP, the Departamento de Oceanografia e Pescas (DOP) at the University of the Azores and the consortium Okeanos are the main scientific bodies for analysing the data and producing scientific advice in the Azores. As the majority of the institutions are located on Faial island, most of the main actors know each other, facilitating good cooperation, communication and knowledge exchange. There is also thought to be good regional collaboration across Macaronesia and across ORs (e.g. European project, ORFISH[27]). The Advisory Council for the outermost regions, Conselho Consultivo para as Regiões Ultraperiféricas (CC-RUP[28]) also forms a potentially important advisory body for the region and is located in Azores.

[27] https://orfish.eu/home
28 https://www.ccrup.eu/

The fishing sector is organised at the local level through Producer Organisations (POs). These POs represent the islands' archipelago and several fishing activities and are involved in some data collection. Fishers and shipowner associations take appropriate measures to ensure fishing is sustainable, to improve the conditions of sale or recovery of fish caught by their members and in general take all appropriate measures to improve the income of their members. Fisheries organisations also allow coordination and may facilitate cooperation with scientists in data collection.

The two main international fisheries bodies for which the provision of scientific data and advice are essential and mandatory under the national data programme are ICCAT (for tuna and tuna-like species) and North East Atlantic Fisheries Commission (NEAFC). There is thought to be no clear scientific regional membership on these bodies (apart from some Working Groups within International Council for the Exploration of the Sea (ICES) and the Standing Committee on Research and Statistics within ICCAT) and therefore specificities of the OR are thought to be underrepresented. Scientific fisheries advice is provided by ICES and the Scientific Technical and Economic Committee for Fisheries (STECF), while other technical advice and insights from the fishing sector is provided by the South West Waters Advisory Council (SWWAC), the Long Distance Advisory Council (LDAC) and the most recent fisheries advisory council created in the European Union, CC-RUP. For large pelagic fishes (tuna and tuna-like species), fisheries advice is provided by ICCAT. Environmental policy advice is managed by national agencies and the Oslo-Paris convention (for the Protection of the Marine Environment of the North-East Atlantic) (termed OSPAR), with advice being provided by national agencies, OSPAR, the European Environment Agency (EEA), and ICES.

The collection of biological data on fishes within the Azores has been in a process of transition. Such a shift has been associated with the movement of data collection from the previous institution (DOP, University of the Azores) to the DRP in Azores (under the umbrella of the DGRM). Some data collection methods and programmes (e.g. observers-at-sea) were reduced during this transitional phase, as well as some reports were produced behind schedule.

With regard to coastal marine resources of commercial interest, the existing information is limited to specific studies, which raises some uncertainty concerning the effectiveness of the management measures implemented for some fisheries. In 2019 this knowledge gap led to the regional administration supporting a new monitoring programme for coastal resources (MoniCo). This will help assess their conservation status and thus impose more conscious measures to allow the sustainability of these fisheries.

Scientific marine research is mainly conducted at the University of the Azores, where the DOP is the most relevant, in conjunction with satellite entities (i.e. Portuguese mainland groups, as well as international groups) that share facilities and infrastructures. Among these satellite entities, the most important are the consortium Okeanos (which has more financial autonomy than the university), Instituto do MAR (IMAR) and the Laboratory of Robotics and Systems in Engineering (LARSyS). The Research Centre in Biodiversity and Genetic Resources (CIBIO) in the University of the Azores Department of Biology also produces research in blue biotechnology. Even though IMAR and DOP are now beyond the DCF framework (with the exception of scientific surveys), they make a substantial contribution to fisheries knowledge. The University of Azores has also conducted relevant research on fisheries' socio-economic projects.

The Inspeção Regional das Pescas dos Açores (IRPA) is a service of the Secretaria Regional de Mar e Pescas (SRMar) which - in collaboration with other bodies and institutions - is responsible for planning, coordinating and executing the supervision and control of fishing activities in the Azores. The IRPA has recently improved its ability to enforce management measures and there is an occasional assessment of IUU fishing by science institutions.

However, this is not used for management and there is still little understanding of the consequences of illegal activities.

4.1.2 Madeira

The National body responsible for the implementation and coordination of the DCF work plan is the DGRM. Several entities participate in the DCF work plan and in Madeira the entity responsible for implementing the DCF is the Direção Regional do Mar (DRM), which is a Directorate within SRMar. DRM is also responsible for data collection and analysis. The existing infrastructure is thought to be adequate although the number of staff (researchers and technicians) is considered to be below what is desired.

At the local level, the fishing sector is organised into POs. Fisheries organisations allow coordination and may cooperate with scientists in data collection. The fishing sector is also represented in the SWWAC and the CC-RUP by COOPESCAMADEIRA.

There are two main international fisheries bodies for which the provision of scientific data and advice are essential and mandatory under the national data programme: ICCAT for tuna and tuna-like species and CECAF for small pelagic and demersal species. National scientists participate regularly in relevant assessment working groups of ICCAT and CECAF but regional representation for the OR is thought to be minimal.

All vessels landing fresh fish in Madeira sell first-sale fish at the auction market. Therefore, data regarding all vessels' landing, including SSF, are collected. The sources of information on landings of fresh or refrigerated fish in Madeira ports is undertaken by DRM. DRM electronically registers all the data from first sale, and then sends the information to the national administration, according to the rules laid out in the Control Regulation (1224/2009)[29].

With regard to the development of maritime space research, the creation of the Madeira Ocean Observatory in 2014, made it possible to aggregate all the bodies and institutions that carry out research activities in the marine area. The following entities are involved in marine scientific research: ARDITI - Agência Regional para o Desenvolvimento da Investigação e Tecnologia e Inovação; CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental; MARE - Center for Marine and Environmental Sciences; Madeira Whale Museum; Funchal Natural History Museum and SPEA - Portuguese Society for the Study of Birds. Beyond the official channels of data collection, universities also collect data for marine and fisheries research and make a substantial contribution to fisheries knowledge. There are a number of scientific studies that form the basis for local regional management and are candidates for newly proposed data collection requirements under the DCF. However, this type of data collection in general is usually unstructured and rarely results in management measures.

In previous years the responsibility for the implementation of DCF was attributed to the DRP. Nowadays DRP is responsible for control and surveillance of the fisheries in this OR. It is responsible for issuing licences for recreational and commercial fishing, licensing fish auctions and the processing industry as well as the evaluation of projects that aim to modernise the professional fishing fleet. DRP oversees the maritime activities using VMS, inspections on vessels and landings with the collaboration of Guarda Nacional Republicana (GNR) and Maritime Police. A new system is expected to be put in place (SIVCC) under

[29] Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

the responsibility of the GNR to improve and reinforce monitoring on regional coasts and deal with issues related to recreational and professional fishing and marine pollution.

As in the Azores, maritime management in the region is complex and several layers of decision-making could make data collection and fisheries management burdensome. There are no common platforms or tools to aid communication which means that coordination between the State, regional administrations, and scientific entities at state and international level requires significant effort. Data are also not shared on a regular basis and are only made available when formally requested. At the international level (ICCAT and CECAF) there is a lack of OR representation which means that the specificities of the OR might not be included. However, there are few people in Madeira that work in the fisheries sector and the majority of the institutions are in Funchal. Therefore, most are familiar with each other, which creates a good environment for knowledge sharing and collaboration. There is also thought to be good regional collaboration with other ORs in Macaronesia.

4.1.3 Canary Islands

In the Canary Islands there is a clear division of roles and responsibilities with regard to data collection within marine fisheries. Despite this, management can be complex, encompassing several layers of decision making: the EU, Spain, regional management, a bilateral agreement with Madeira and international management. As such, this process is not always effective, due to the high number of bodies associated with data collection. The regional government has jurisdiction over the so-called "interior waters", aquaculture, first sales and commercialisation whereas the Spanish government is in charge of management in the Spanish territorial waters and the EEZ (i.e. external waters). There are also 2 main international fisheries bodies for which the provision of scientific data and advice are mandatory under the national data programme: ICCAT for tuna and tuna-like species and CECAF for small pelagic and demersal species. Members of the Spanish Institute of Oceanography (IEO) based in Canary Islands, participate in both RFMO meetings. The tuna team participates in ICCAT whilst the CECAF team participate in several working groups (small pelagic fish - north; demersal fish – north and south; and artisanal fisheries). This OR representation at RFMO level helps to ensure OR specificities are taken into account.

The organisation responsible for the implementation of the National Work Plan for data collection is the Secretaría General de Pesca (SGP), which belongs to the Ministerio de Agricultura, Alimentación y Medio Ambiente (MAPA). The SGP ensures that activities are implemented on time and data are provided to the requester. The SGP is also in charge of collecting and providing the economic and social data relevant to the DCF (including aquaculture and processing industries).The national correspondent for the DCF is in the SGP and has to assure that this data is transmitted.

Biological and fishing activity data for Canary Islands fisheries are collected by the Spanish Institute of Oceanography (IEO), which provides data and scientific advice for management decisions. Within the data collection framework, IEO scientists comply with the requirements of the National Programme of Basic Fisheries Data, which is the Spanish work plan for the DCF. IEO also collects data for the international fisheries (CECAF and ICCAT) and their scientists participate in meetings. Beyond the minimum requirements of the 2017-2019 EU-MAP, IEO collects additional data and also participates in international and EU funded projects, with IEO scientists also involved in ICES working groups. The Fisheries Office of the regional government (Consejería de Agricultura, Ganadería y Pesca) is preparing the creation of a Scientific Committee for advice on fisheries management, with the participation of research institutions like IEO and local universities among other relevant stakeholders.

Although the fishing sector does not play a formal role in data collection within the DCF, it does collaborate with government and scientists in some data collection (e.g. observer programmes and fishery dependent data). "Cofradías" fishing guilds represent the interest of fishers (both shipowners and crew members) and have a role as collaborative corporations with the regional government (Aranda and Murillas, 2015). Cofradías are organised into federations, one for each of the two provinces of the Canary Islands Autonomous Region: Santa Cruz de Tenerife and Las Palmas. They take part in the National Federation of Fishing Guilds of Spain and also participate in the Advisory Councils where they convey the insights of the sector and are directly represented before the EC. The Canary Islands sector participates in the Advisory Council for the outermost regions (CC-RUP) which started its activities in 2019[30]. The CC-RUP's secretariat is located in Azores and the current chair is the president of the Regional Federation of Fishing Guilds of the Canary Islands. This AC gathers the nine ORs and is a key instrument in the process of fisheries regionalization of the EU, conveying the recommendations of fishing organisations and other interest groups in relation to management measures proposed by the EC and Member States. It is also worth stating that prior the creation of the CC-RUP the Macaronesia ORs were represented by the SWWAC (also termed CC-SUD in France)[31]. Producer Organisations, in turn, are bodies representing the interests of the ship owners. POs also participate in the work of the ACs. In the Canary Islands there are three POs, two of them devoted to small-scale tuna fishing activities and one dedicated to industrial fishing in third countries' waters.

Data collected by the Canary Islands government encompasses first sales and other transversal data e.g. fleet data and catches, which are submitted to the Fisheries Secretariat in Madrid in the framework of the Control Regulation and subsequently sent to the European Commission. First sales data are collected in close cooperation with the fishing sector, e.g. fishing guilds and some private companies. The insular governments ("Cabildos" in Spanish) of Gran Canaria and Tenerife also conduct data collection for local needs, but information about the regularity of these data being collected, funding and how these data are stored, processed and made accessible to third parties remains unclear.

Beyond the official channels of data collection, other entities (e.g. universities) collect data for research purposes but usually on a more ad hoc basis and in most cases are funded by the Transnational Cooperation Programme 'Madeira-Azores-Canarias' (MAC). In particular, post graduate departments make a substantial contribution to fisheries knowledge. Data on biological topics, fisheries and fleets, socio-economic aspects and governance are contributed by the Universidad de Las Palmas de Gran Canaria and the Universidad de La Laguna. Universities have a close relationship with the regional government and with IEO and links are well established. In turn, universities also participate in the scientific process within ICES and their researchers participate in Working Groups. However, data and information gathered by EU-funded projects and other funding is generally usually accessible for research institutes or other entities. Therefore, there might be overlaps in data collection that contribute to a wastage of resources. The link between academia, local governments and others for funding, storage and accessibility of data is also unclear and poorly documented.

MCS activities are conducted according to requirements set out in the Control Regulation and are carried out by the Fisheries Inspection service of the General Directorate of Fisheries of the Canary Islands government. According to the interviewees and with news published quite often in the media there is evidence of active IUU fishing in the region. It

30 https://www.ccrup.eu/es/inicio-2/

31 https://cc-sud.eu/index.php/en/

seems that the control system and legal means should be strengthened to deter illegal activities in the region.

4.1.4 French Outermost Regions

Data collection within the French ORs is, in general, well-structured and there is a national framework and institutional structure in place with some specificities between the ORs depending on local context, although it remains very pyramidal. In all ORs, Ifremer has a prominent role, being responsible for 90% of all data collection, while Institut de Recherche pour le Développement (IRD) collects data on the high seas' fisheries for tuna and tuna-like species. The Service de la Statistique et de la Propsective (SSP) and Laboratory of Economics and Management, Nantes-Atlantique (LEMNA) implement socio-economic surveys on all French vessels on the fleet register, including in the ORs and report to the Direction des Pêches Maritimes et de l'Aquaculture (DPMA). However, fishers are wary of the state and there is sensitivity surrounding socio-economic data as fishers can be suspicious that this information could be used for fiscal controls.

Although there is a well-structured framework in place and regional participation is evident, the flow of data in ORs is not considered as good as the mainland. This is possibly because reference data were originally built for Metropolitan France, so are not necessarily suited to ORs, but this is being addressed. There has also been an increase in compliance of reporting logsheet[32] data.

Ifremer and IRD play a central role in the production of national scientific advice and are able to use raw data collected in the Système d'Informations Halieutiques (SIH) to provide answers to advice requests. Advice is often requested by the Direction de la Mer (DM, Sea Directorate) or by central French authorities such as DPMA, under the Ministry of Agriculture and Fisheries. This is particularly important in Guadeloupe, St Martin and Martinique in the context of protection measures taken relating to the impact of chlordecone on the fisheries sector.

Ifremer developed SIH to gather all information into a single system and has a central role in providing methodologies, sampling schemes and workplans for field activities. Ifremer manages SIH and is in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the other institutions (DPMA, ICES, ICCAT etc.). There is good collaboration with the Atlas of European Tuna fisheries maintained by IRD to compile all tropical tuna fisheries data. IRD is responsible for compiling data on tuna and tuna-like species (which is compiled using an Electronic Reporting System (ERS). SSP sends statistics to the EC and FAO, with disaggregation per OR. Ifremer and IRD both contribute with biological data to dedicated RFMO, to which the EU is a contracting party (ICCAT, IOTC, Western Central Atlantic Fishery Commission (WECAFC), among others). In Guadeloupe and Martinique there is a transversal SIH Steering Committee with all fisheries stakeholders to review data related progress on an annual basis.

One of the main issues across all French ORs is staff turnover and lack of human capacity in the form of local staff in the ORs. For example, IRD is currently running at full capacity and is therefore unable to deal with urgent requests if they have not been budgeted or planned for in advance. In French Guiana, the shrimp fishery is subject to biological sampling but other fisheries are not covered due to staffing reasons. There is also very little competition for data collection calls for tenders in ORs, where parts of the data collection is outsourced, and contractors have a hard time recruiting fisheries data

32 This is not an actual log book but a simplified declaration of landings.

collectors (as there is little activity, work is not full time and thus salaries are poor, while requiring a certain amount of expert knowledge).

In Guadeloupe and St Martin data collection is outsourced to EI Groupe, on three-year contracts (most recently renewed in 2021), which can have advantages but also can create risks in data collection procedures. The positive of outsourcing is that there is a dedicated team in place to conduct daily activities and this team can be easily mobilised. The disadvantage is that there is no dedicated staff in Ifremer to supervise DCF activities in Guadeloupe. This means there is a risk of misunderstanding some aspects of data collection. In addition, the renewal of the contract can lead to periods without data collection in place (such as 2016 and 2017), while with staff turnover there is a need to rebuild the trust with fishers.

In Mayotte, data are collected by the OFB through the Marine Park staff, following SIH protocols from Ifremer. OFB is only there to collect data and does not have access to SIH data for scientific purposes, except through formal data requests. This may cause a risk to data collection, as fisheries are not a priority for OFB and their overall mission does not include fisheries monitoring. In Mayotte, there is a lack of skills and knowledge that cannot be addressed with money, due to the local context. In terms of observer/sampler coverage, one key problem is staff need to speak the local language/dialects to be able to interact with fishers and also need to have a certain level of education and training to be able to properly collect data, and this proves very hard to reconcile. So collected data are often of questionable quality and requires a lot of verification and correction, increasing the workload of the OFB staff. Administration, staff regulations and salary caps are hindering data collection by OFB staff as well as a large number of landings sites and only four OFB fisheries agents to cover them. Direction de la Mer Sud Océan Indien (DMSOI) also stated that there are only 26 staff for policing navigation, fisheries, and "lighthouses and beacons" tasks, which can be a limiting factor for MCS activities. Another issue in Mayotte, is that, since 2014, paper fishing logbook information has not been processed by France Agrimer, as there have been issues with species code lists used in logbooks compared to what the SIH/DCF mandates. Though this issue has been resolved according to DMSOI and OFB, historical data have not been corrected and are not entered at this time.

In Réunion, DMSOI is in charge of coordinating SIH activities for DPMA. It is a very restrictive system that doesn't provide room for local initiative or leeway to change methods based on local needs/specificities. It also makes it difficult to promote and use the data at the local level. However, there is thought to be good stakeholder awareness and capacity building in Réunion and DMSOI provides routine training for the various stakeholders regarding regulations, techniques etc. DMSOI and Ifremer have a good working relationship and there is thought to be good collaboration between institutional actors and a good MCS and legal framework in place.

In Martinique, Guadeloupe and St Martin, Ifremer is the only research institute. There are no research institutes in Mayotte. Scientific activities are conducted by OFB and, on a case-by-case basis, by Ifremer and IRD. In Réunion however there are a number of research institutes including the Université de la Réunion, as well as a few semi-public institutions involved in marine biology/ecology. The University, through its marine ecology laboratory, undertakes research on marine ecosystems, which touch on areas related to fisheries, such as vulnerable species and ecosystem impacts. There are no research institutes in French Guiana apart from Ifremer and so there is thought to be a lack of local research and control data are not shared with scientists as there is no mandate for it.

In regard to MCS for all French ORs, all information requirements for fishers are mandated by the Control Regulation. Vessels under 12 m must report fishing activities in paper logsheets to the local Sea directorates, which are then transferred to FranceAgriMer for

data entry. There is an electronic data flow in place for larger vessels (≥12 m). All data then goes into the SIH (including VMS and sales). At the local level, DMSOI and the Préfet are in charge of regulation implementation and enforcement. DMSOI is in charge of coordinating the Regional Fisheries Management Plan for the Préfet: Brigade Nautique, gendarmerie, OFB, marine park and Navy on the high seas. MCS activities are programmed as part of a National Biannual plan, which includes declinations at the local level. At the level of RFMOs, control is enforced by Member States but the RFMO body in charge of compliance can identify Members that are not compliant and ask them to remedy the situation.

In the Caribbean ORs, the local sea directorate is supported by Centres Régionaux Opérationnels de Surveillance et de Sauvetage (CROSS) and Centre National de Surveillance des Pêches (CNSP) regarding legal obligations and sharing of legal compendium to all MCS partners. Operational Units receive regular training on MCS through Ecole Nationale de la Sécurité et l'Administration de la Mer (ENSAM). Specific training for police and customs officers related to fisheries are also regularly organized.

5 FUNDING STRUCTURE AND USE OF EMFF FOR DATA COLLECTION

The European Maritime and Fisheries Fund (EMFF) is the key instrument to ensure the continuity of financial resources throughout the ORs. The EMFF is managed at the national level, although regional authorities are allocated funds and therefore manage part of the EMFF. There is also a long and effective tradition of the use of co-financing from other European programmes. In the sections below the report provides a summary of the use of funding, both the EMFF and other European funds utilised by the ORs.

5.1 Macaronesia

5.1.1 Azores

Under the EMFF, the Azores received (to October 2018) EUR 75 million, which has been predominantly used to cover Union Priority 5 (EUR 36 million) to improve the marketing, diversification and valorisation of seafood products, including the Code of Procedure in the Administrative Courts (CPAC), and Union Priority 1 (EUR 30 million) which is used to better balance fisheries activities and environmental protection and sustainability. Funding is also apportioned to Union Priority 3 (EUR 3 million) which is utilised to ensure compliance with CFP rules regarding control and data collection, and is directly relevant for funding DCF data collection activities (see full table in Annex 2). This Union Priority includes measures under Article 77, which refers to data collection. The European Maritime, Fisheries and Aquaculture Fund (EMFAF) proposal for 2021-2027 envisages that Portugal will allocate at least EUR 102 million for the Azores and Madeira for such priorities.

Within the Azores, the EMFF is one of the main sources of funding utilised for fisheries data collection. In this respect, two applications have been made under EMFF. Their purpose is to collect and process fisheries dependent and independent data: catch and bycatch, biological sampling and socio-economic data, as well as improve fisheries data collection and management.

Although the budget for such activities (i.e. Union Priority 3) is smaller than for other EMFF Priorities, funding covers the necessary data collection activities under the DCF obligations for the Azores. However, there are difficulties faced in the Azores regarding EMFF implementation, which are linked to both internal and external management of the EMFF, the low administrative capacity in the Azores (as most of the potential beneficiaries are small businesses), and the lack of adaptation of EMFF measures to the local context (EC,

2019), especially in ORs being unable to utilise EMFF funding to pay for permanent staff longer than the cycle of EMFF funding to permanent enhance capacity.

For the Azores (as for Madeira) 11 institutions are involved in the management of EMFF funding (based on the Portuguese mainland) and within the Azores themselves (i.e. which leads to a high administrative burden). The managing, certifying, paying and audit authorities are national-based, while the regional local application, quality control, administrative validation of investments and measures using EMFF funding are performed by regional intermediate bodies (see Annex 2).

In regards to EMFF in the Azores, the Secretariat of the Sea and Fisheries of the Azores Government has developed a set of overall objectives under the implementation of the CFP. These objectives are focused on promoting and reinforcing the need to ensure responsible and sustainable fishing, to promote competitiveness and sustainability of companies, focusing on innovation, quality and product enhancement. In short, for the region the programme "Melhor Pesca, Mais Rendimento" is intended to: (i) add value to fisheries products; (ii) modernise the fishing fleet and introduce new technologies; (iii) enhance the environment and reduce consumption associated with fishing; (iv) increase demand for ready-made products; iv) strengthen sustainable harvesting practices; (v) replace imports with regional/national production to meet market demand; (vi) continue to promote safe conditions at sea; (vii) support further development of marine biotechnology; and (viii) enhance marine agriculture.

The Azores has a long and effective tradition in the use of co-financing from European funds including EMFF for DCF workplan and other purposes, the European Regional Development Fund (ERDF) and the Interreg's programme MAC, to collect fisheries and marine scientific data (see section 4, Azores profile report). According to the Regional Directorate of Fisheries the following programmes/projects contribute most to the collection of relevant data collection in support of fisheries management:

- POPA (Programa de Observação para as Pescas dos Açores): a data collection programme for regional fisheries, which focuses on collecting data on the pole-and-line tuna fishery within the Azores.

- COSTA (Consolidating Sea Turtle conservation in the Azores): within a partnership with international institutions, this project utilises data collected in the surface longline fishery to assess turtle bycatch. The project relies on the voluntary collaboration of ship owners and captains of the Portuguese surface longline fleet that allow fishery observers to embark. The main objectives of monitoring fishing operations are to assess the interaction of sea turtles with the longline fisheries and provide the fishers with knowledge on best handling practices and dehooking tools that helps minimize the impact of surface fisheries on the mortality of these animals.

- CONDOR project (CONDOR): this programme started in 2009 and has a main objective of undertaking an annual monitoring of the abundance and biomass of demersal fishes in the Condor Seamount to assess their recovery since fishing was prohibited on this seamount since 2010. An important seamount area for local fisheries for decades, it also became (in 2016) a protected area of the Azores Marine Park and scientific observatory to investigate various aspects of seamount ecosystem structure. This seamount hosts important habitats for conservation, such as coral gardens, deep-sea sponge aggregations and subpopulations of commercially valuable demersal fishes.

- MoniCo: The knowledge gap in the management measures implemented for some coastal fisheries led the regional administration, in 2019, to support a new monitoring programme for coastal resources (MoniCo) which main activities are: (i) planning and implementing a fisheries monitoring programme of coastal resources (vertebrates,

mega-invertebrates and algae) and assessment of their conservation status; and (ii) monitoring Azores coastal biodiversity and habitats, which aims to continue the environmental monitoring of the Azores coastal marine biodiversity, focusing on its most vulnerable species and habitats, including marine protected areas (MPAs) and fisheries restriction areas.

- ARQDAÇO: Since 1994, there has been an annual longline survey of demersal fishes (within the ARQDAÇO project)[33], with the objectives to: (i) provide an estimate of the abundance and size composition for commercially important demersal species; (ii) collect biological information on growth, reproduction, diet and migration; and (iii) obtain information on resource ecology, such as depth distribution and community structure.

In regard to scientific data collection, to improve management the Azores Government also supports several data collection programmes/projects with regional (and/or national) and EU funding through a range of available programmes (Annex 2). Additional funding for the Azores comes from the Ministry of Education and Science, through the Foundation for Science and Technology (FCT) and the Regional Fund for Science for development of fisheries science and knowledge. The Azores regional government also subcontracts the science institutions in the region for service provision contracts and projects. In parallel, the regional scientific entities obtain regular funding through applications to specific funding avenues for projects, namely within the scope of national applications and through the FCT, as well as European funding (within the scope of initiatives such as the Seventh Framework Programme (FP7), later replaced by the Horizon 2020 programme) (Annex 2).

5.1.2 Madeira

Madeira received under the EMFF (as of October 2018) EUR 28 million, which has been predominantly used to cover Union Priority 5 (EUR 16 million) to improve the marketing, diversification and valorisation of seafood products including CPAC, while this funding has also been used to cover Union Priority 1 (EUR 7 million) which is used to better balance fisheries activities and environmental protection and sustainability. Funding is also apportioned to Union Priority 3 (EUR 2 million) which is utilised to ensure compliance with CFP rules regarding control and data collection (see full table in Annex 2). This includes Article 77 that is the one of interest to this study, as it refers to data collection. Other priorities covered by EMFF funding are Union Priority 4 (EUR 22 million), Union Priority 6 (EUR 5 million) and Union Priority 7 (EUR 34 million). As stated above for the Azores, the EMFAF proposal for 2021-2027 envisages that Portugal will allocate at least EUR 102 million for the Azores and Madeira (26.9% of the budget for Portugal MS)

The EMFF is one of the main funding sources utilised by Madeira for fisheries data collection. In this respect, two applications have been made under EMFF (as these were made for both Portuguese ORs). As stated above, their purpose is to collect and process fisheries dependent and independent data: catch and bycatch, biological sampling and socio-economic data, as well as improve fisheries data collection and management. Also, as with the Azores, although the budget for data collection activities (i.e. under Union Priority 3) is smaller than for other EMFF Priorities, there is no evidence to suggest that the funding does not cover the necessary data collection activities (including onboard observers and scientific surveys) needed to undertake DCF obligations for Madeira.

There are difficulties faced by Madeira regarding EMFF implementation, linked to internal management of the EMFF, the low administrative capacity in Madeira (as most of potential

33 https://portal.azores.gov.pt/web/drp/arqdaco

beneficiaries are small businesses) and the lack of adaptation of EMFF measures to the local context (EC, 2019). In comparison with the Azores, 9 institutions are involved in the management of EMFF funding (based on the Portuguese mainland) and within Madeira themselves (i.e. which leads to a high administrative burden). The managing, certifying, paying and audit authorities are national-based, while the regional local application, quality control, administrative validation of investments and measures using EMFF funding is performed by regional intermediate bodies (see Annex 2).

Of the EMFF funding for Madeira, 86% to date has been committed, amounting to EUR 23 million. Under Union Priority 3 (Fostering the Implementation of the Common Fisheries Policy), namely through measures under Article 77, EUR 597 764 was allocated to Madeira; of which 95% has been committed (EUR 565 153).

For Madeira, there were a range of successful projects with an application to marine fisheries data/science funded from outside the EMFF (available between 2007 and 2015). For example, Madeira received funding through PROMAR[34] (2007-2013) and MAR2020[35] (2014-2020), which were co-funded by EMFF, while the Programa Indicativo de Cooperação (PIC) MAC 2007-2013 and PIC MAC 2014-2020 programmes were co-funded by the ERDF. Lastly, ARDITI (Agência Regional para o Desenvolvimento da Investigação e Tecnologia e Inovação) is also funded by the ERDF.

There are also various European support programmes (e.g. LIFE, INTERREG) that encourage the development of scientific projects and have contributed to funding within Madeira (as well as the Azores and the Canary Islands but also extending its area of intervention to third countries such as Cape Verde, Mauritania and Senegal) (see Annex 2). This type of programme not only allows these regions to be seen as a whole, but also allows for the exchange of ideas and above all the development of partnerships between the various entities and research organisations in Macaronesia.

The Instituto da Conservação da Natureza e das Florestas, I.P. (IFCN) has applied for funding to the Blue Fund (EUR 150 000 application approved, but no financial allocation) and to Life4Best (EUR 40 000) which is awaiting results. Funding was requested for the collection of information on coastal habitats, which can provide information to assist coastal fisheries management.

5.1.3 Canary Islands

Concerning EMFF funds in Spain, the general budget at state level for data collection is EUR 99 million, as of 2019. Out of this, EUR 79 million is co-funded by the EMFF. A share of approximately EUR 64 million is managed by the Intermediate Bodies (IBs[36]) of the State General Administration. IEO, as one of the IBs, is allocated approximately EUR 54 million from EMFF and is entitled to administrate this. Data collection under the DCF in Canaries is not conducted by the regional government. This is the responsibility of IEO and is conducted using part of the funds this institute manages for DCF activities across Spain.

As of January 2019, the Canary Islands were allocated approximately EUR 83 million from the EMFF national budget, predominantly used to cover Union Priority 5 (EUR 65 million)

34 Portugal's programme for the European Fisheries Fund (EFF) 2007-2013.

35 This is the operational programme through which the support measures available under the European Maritime and Fisheries Fund are implemented in Portugal

36 In Spain, the official name is Intermediate Management Body (IMB). For more information, please see link to the Spanish intermediate management bodies: https://www.mapa.gob.es/es/pesca/temas/fondos-europeos/puntos-contacto-oig-plan-informacion-y-publicidad_tcm30-436043.pdf

to improve the marketing, diversification and valorisation of seafood products, Union Priority 2 (EUR 5 million) which is used to meet the objectives of the Canaries strategic plan for aquaculture, and Union Priority 1 (EUR 4 million) which is used to better balance fisheries activities and environmental protection and sustainability. Funding is also apportioned to Union Priority 3 (EUR 360 000) which is utilised to ensure compliance with CFP rules regarding control and data collection; this includes measures under Article 77 (EUR 120 000).

EMFF funding is administered by the regional government of the Canary Islands and is related to fisheries data collection outside the DCF. As of January 2019, no projects had utilised this budget. Nevertheless, currently there are some EMFF-funded projects that are being developed by the regional government in 2021 under Union Priority 3, mostly for fisheries control, e.g. related to recreational fishing, green boxes for tracking fishing activity, the development of software for traceability and first sale improvement (Pablo Martín-Sosa, personal communication, 2021).

In addition to the national allocation of EMFF under shared management, there is also a range of other EU funds that has been utilised by IEO and other parties in the Canary Islands, e.g. universities and the regional government, in collecting biology/fisheries data outside of the DCF requirements. Such studies include GEPETO (funded by INTERREG) and ORFISH, which is funded by the EMFF direct management and coordinated by the Guadeloupe region. There are other funds like ERDF, which coordinates the MAC programme (under the umbrella of INTERREG), which funds three major themes: Scientific research, the Environment, and Institutional strengthening. This programme is available solely for the Macaronesian ORs and countries in Western Africa and Cape Verde, and since 2007 has funded EUR 2.7 million in projects. These have mostly been employed by universities for marine environment and ecosystems, and aquaculture research, but important fisheries projects have also been carried out under this funding. Overall, since 2002 there has been over EUR 9 million in awarded projects from different funding sources that have been undertaken, or are still to be completed, which are relevant for fisheries in the region (see Annex 2).

5.2 French Outmost Regions

Overall, France received under the EMFF (2014-2020) EUR 588 million, which is predominantly used to cover Union Priority 5 (EUR 163 million) to improve the marketing, diversification and valorisation of seafood products, Union Priority 1 (EUR 151 million) which is used to better balance fisheries activities and environmental protection and sustainability, and Union Priority 2 (EUR 89 million) which is used to meet the objectives of the French national strategic plan for aquaculture. Funding is also apportioned to Union Priority 3 (EUR 122 million, 20.8% of EMFF allocation) which is utilised to ensure compliance with CFP rules regarding control and data collection. This includes measures under Article 77, which is the one of interest to this study as it refers to data collection: total budget in this programme is EUR 66 million. This is the main source of EMFF funding for DCF data collection at the national and OR level. Other priorities covered by EMFF funding are Union Priority 4 (EUR 22 million), Union Priority 6 (EUR 5 million) and Union Priority 7 (EUR 34 million).

The EMFF process in France works in both a top-down and bottom-up process. From the top-down, the Commission votes a global envelope for EMFF, which is the result of political consensus. The national envelope is scaled according to complex rules, including different criteria, and a percentage of this envelope is assigned to data collection (Article 77). From the bottom-up, at French national level, the needs from different institutions are collected according to the DCF requirements and national priorities, and a draft of the total budget for DCF data collection is produced, assessed and revised following governmental discussions.

The DPMA is the single EMFF management authority for France, although some of the fund management is delegated to sub-national level (Régions). Each institution has to submit a request for funding to DPMA. As the request covers funding of routine data collection under DCF, the overall validation process is quite smooth (4-5 months from proposal to funding). EMFF funds 80% of the eligible costs (not all data collection activities are eligible), with the remaining 20% supported by the institution's own budget.

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the following fund for 2021-2027 (EMFAF), funding be attributed for the whole funding cycle to secure funding for data collection over the 6-year period. In addition, difficulties related to the application for, and obtention of funds, under EMFF have been highlighted by the French Cours des Comptes[37]. DPMA confirmed that administrative issues at the start of the cycle led to very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. However, such low deliverance of EMFF funds associated with administrative and I.T. issues were predominantly at the beginning of the implementation cycle, and have now been addressed.

Other funding sources

Ifremer had a total annual budget in 2017 of EUR 194 million (Cours des Comptes, 2019), with the following breakdown: (i) EUR 154 million directly supported by the national budget (subsidies for public services support); and (ii) approximately EUR 40 million from contracts and projects, including support from EMFF.

Under France's regular national budget, funds can be provided under various mechanisms. These include grant agreements between Ifremer and IRD, which can be used to finance requests for studies to Ifremer to address specific questions. These agreements can also provide financial support to smaller projects (like data collection), though such funding is now tending to be progressively included into the DCF work plan. There are also triannual agreements with IRD, with funding allocated directly by DG MARE or CINEA (formerly EASME) to specific projects for field data collection or meta-analysis.

OR funding for data collection at the national level

Given the centralization of the data collection programme in Ifremer, with global support from SIH in Brest (Bretagne, France Metropolitan), funds for measures under Article 77 are managed and engaged at the national level. These are then managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and the ORs, including sub-contracting with external vendors for data collection in some ORs (detailed where appropriate, below). Although no specific budget has been proposed by the EMFF operational programme for French ORs, use of EMFF funds in the OR can be extracted from France's financial report (Liste des opérations du programme national FEAMP 2014-2020, 2019). There is no specific EMFF funding request for Ifremer data collection under DCF for each OR, but under request for this study, Ifremer provided a breakdown for expenses engaged specifically in each of the ORs for the period 2017-2018.

There exist some alternative sources of funding outside of the EMFF for activities not covered under DCF. Regarding Ifremer, conventions between Ifremer and DPMA ("Convention socle halieutique") cover actions suggested by Ifremer that are not covered under the DCF (i.e. Ifremer proposes actions, DPMA funds them); there are now less activities under this line than in previous years, as more are being covered by the DCF, i.e. for several years, the remaining 20% of DCF-funded activities were included under

37 Cours des comptes = Account court, the French National Institution in charge of controlling National Accounts.

this line, but this is now part of the national counterpart. Currently the activities remaining include SACROIS[38] and the data access portal, while under the Marine Strategy Framework Directive (MSFD) there is a partnership between the OFB and Marine parks to provide tools and services. In Mayotte, data is collected following SIH protocols and entered/stored using SIH tools. In other ORs, there is no data collection activity but Ifremer provides summary data for marine parks and Natura 2000 areas, under a pluriannual data provision convention (latest data available from 2019).

5.2.1 Caribbean

5.2.1.1 Guadeloupe

For Guadeloupe, it has been highlighted within the French EMFF programme the need to support fishers to mitigate the impact of chlordecone on fishing activities. Engagement of the budget according to the needs within the total envelope (here Union Priority 1) is delegated to the Guadeloupe region. In this respect, the total use of EMFF funds in Guadeloupe is EUR 3 million (data to December 2019), with 36% for control and surveillance (Article 76), 39% for seafood transformation (Article 69) and 16% for OR compensation costs (Article 70).

There is no specific engagement line for measures under Article 77 related to DCF data collection available for Guadeloupe; this is engaged at the national level. The institution involved in data collection in Guadeloupe is exclusively Ifremer. Despite this, there is no specific EMFF funding request for Ifremer data collection under DCF (Article 77) for Guadeloupe. However, for Guadeloupe, although there was no funding for data collection in 2017 due to a change in the contractor, this OR has been provided EUR 276 000 and EUR 375 000, in 2018 and 2019 respectively, from the national budget (Table 1). Such funding corresponds to the contract with Groupe EI to collect fisheries data in the region. Added to this amount is a small percentage for SIH activities related to the organization of data collection in Guadeloupe (recruitment of an external company, providing of quarterly sample scheme, technical support to data entry), as well as analysis and raising of statistics and production of statistics.

Table 1: Expenditures incurred (EUR) by Ifremer for data collection in Guadeloupe.

Data type	2017	2018	2019
Biological Data	EUR 0	EUR 23 279	EUR 33 371
Economic Data	EUR 0	EUR 0	EUR 11 740
Effort and Landing data	EUR 0	EUR 253 256	EUR 330 703

5.2.1.2 St Martin

Total use of EMFF funds in St Martin has been EUR 80 million (up to December 2019), with 100% of this used for OR compensation costs (Article 70). This funding represents 11 requests for 11 fishers. No specific engagement line for measures under Article 77 related to DCF data collection is available for St Martin. As with all other French ORs, this measure is engaged at national level. In addition, institutions involved in data collection in St Martin

[38] SACROIS is a cross validation algorithm to validate landing data, consolidate and qualify production and effort datasets: https://wwz.ifremer.fr/sih_eng/Debarquements-effort-de-peche/Sacrois

are limited, with all collection done by Groupe EI through telephone interview under the exclusive supervision of Ifremer Martinique (no specific costs provided for these).

5.2.1.3 Martinique

As for Guadeloupe, within the French EMFF programme there is highlighted the importance of supporting Martinique fishers to mitigate the impact of chlordecone on fishing activities. Engagement of budget according to need within the total envelope (here Union Priority 1) is delegated to Martinique Communauté Territoriale.

The total use of EMFF funds in Martinique is EUR 9 million (up to December 2019), with 65% for infrastructure (Article 43), 14% for technical backstopping (Article 78) and 7% for aquaculture (several measures). There was no specific engagement line for measures under Article 77 related to DCF data collection for Martinique. This measure is engaged at the national level.

The institution involved in data collection in Martinique is exclusively Ifremer. The breakdown of expenses engaged specifically for Martinique is provided below (Table 3). This breakdown encompasses specific field activities directly related to data collection. Added to this amount, a percentage should be considered of SIH activities related to organization of data collection in Martinique (providing of quarterly sample scheme, technical support to data entry) and the analysis and raising of statistics and production of statistics.

Table 2 Expenditures incurred (EUR) by Ifremer for data collection in Martinique.

Data type	2017	2018	2019
Biological Data	EUR 14 573	EUR 48 079	EUR 49 695
Economic Data	EUR 0	EUR 0	EUR 376
Effort and Landing data	EUR 186 949	EUR 192 929	EUR 227 855

5.2.1.4 French Guiana

Total use of EMFF funds in French Guiana has been EUR 23 million (as of December 2019), with 100% for cost compensation (Article 70), and no specific direct funding for data collection (Article 77). For French Guiana, central Ifremer funds between EUR 180 000 and EUR 270 000 have been used for routine data collection over the last 3 years (Table 3).

Table 3 Expenditures incurred (EUR) by Ifremer for data collection in French Guiana.

Type of data	2017	2018	2019
Biological data	EUR 12 913	EUR 27 751	EUR 27 877
Economic data			EUR 7 194
Effort and landings data	EUR 170 269	EUR 243 974	EUR 236 507

5.2.2 Indian Ocean

5.2.2.1 Mayotte

Total use of EMFF funds in Mayotte has been EUR 4 million (as of December 2019), comprising 69% for cost compensation (Article 70) and 15% for data collection (Article 77). For Mayotte, there are no expenses for data collection, as the only institution involved in data collection in Mayotte is OFB, and they directly applied for EMFF funding outside of the national DCF allocation. For the EMFF period, OFB received EUR 698 475 for data collection in Mayotte (Table 4).

Due to staff constraints, for the next EMFAF cycle (2021-2027) funding requests will stay the same within Mayotte, but the following points could use additional funding:

- Collection of new data
- DCF data collection obligations for recreational fisheries
- Coverage of informal fisheries, and
- Extension of biological data collection

Table 4 EMFF funds received (EUR) by OFB in Mayotte under Article 77.

Operation	Total eligible funds	Total funding received
2017 Data collection	EUR 293 416.05	EUR 234 732.84
DCF 2018	EUR 286 262.55	EUR 229 010.04

5.2.2.2 Réunion

Total use of EMFF funds in Réunion has been EUR 28 million (as of December 2019), with 75% for cost compensation (Article 70), 8% for control and enforcement (Article 76) and no specific direct funding for data collection (Article 77). For Réunion, from central Ifremer funds, between EUR 180 000 and EUR 270 000 have been used for routine data collection over the last 3 years (Table 6). In addition, within Réunion Ifremer stated that research projects related to data collection had been funded under measures within Articles 28, 39 and 40.

Table 5 Expenditures incurred (EUR) by Ifremer for data collection in Réunion.

Type of data	2017	2018	2019
Biological data	EUR 132 539.99	EUR 97 464.14	EUR 72 327.48
Economic data	EUR 0	EUR 0	EUR 0
Effort and landings data	EUR 138 666.62	EUR 126 264.72	EUR 111 135.63

6 CURRENT STATUS OF IMPLEMENTATION OF DATA OBLIGATIONS AND ANY GAPS

Within this Task, building on Tasks 1 – 3, the report provides an assessment of the range of data obligations within each OR. Although such data may already be collected under existing obligations, such as the DCF or SMEFF, limited capacity or other constraints may limit the type and volume of data collected, thus creating gaps in their implementation. Therefore, this task will help to understand the current state of implementation, what needs to be addressed and how any gaps can be closed.

6.1 Macaronesia

6.1.1 Azores

6.1.1.1 Data collection obligations

The source of information on landings of fresh or refrigerated fish in Azores ports is LOTAÇOR E.P. This entity electronically registers all the data from first sales, and then send the information to the national administration, accordingly to the rules laid out in the 2009 EU Regulation Community Control System[39].

At-market and at-sea sampling of métiers[40] LHP_CEP, LHP_LPF, LLD_LPF, FPO, GNS_FIF and PS_SPF show that they are extremely selective fisheries without occurrence of bycatch, while LHP_DWS, LHP_FIF, LLS_DWS and LLS_DEF are multispecies fisheries where bycatch may occur.

There is no sampling protocol specifically directed to incidental bycatch of birds, mammals, reptiles and fish. However, when they are observed during regular onboard sampling protocol (ICES X/Azores) they are registered.

For effort, the primary data source is logbooks data and sales notes are the secondary data source, especially for vessels below 10 m. For the Azores region a complementary data collection is run with the aim of completing the information for effort variables with a sampling coverage of 5% of fishing trips. This is collected from all harbours where technicians/samplers are located. The information to be collected on effort refers to: days at sea, fishing days, number of fishing trips, number of fishing gears, number of fishing operations, number and size of nets, number of hooks and lines and number of traps.

The change of the DCF entity in Azores, naturally led to some difficulties in the at-sea observer work plan, which were however overcome. The Azores at-sea observer programme now collects comprehensive data on species composition and length composition of all retained and discarded components of the catch on a haul-by-haul basis. All interactions with vulnerable fauna (e.g. sea-birds, sea-turtles and marine mammals) are recorded, as well as their condition when released. Landings from vessels with an

39 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50)

40 LHP_CEP: Handlines for Cephalopods (squid); LHP_LPF: Pole and line, pelagic fish; LLD_LPF: Drifting longlines, pelagic fish; FPO: Pots and traps; GNS_FIF: Gillnets, coastal demersal and pelagic fish; PS_SPF: Purse seines, small pelagic fish; LHP_DWS: Handlines, deep-water species; LHP_FIF: Pole and line, coastal demersal and pelagic fish; LLS_DWS: Set longlines, deep-water species; LLS_DEF: Set longlines, demersal fish.

observer on board will be sampled by the samplers present at the landing port. Non-responses and refusal rates are recorded.

Onboard observer protocol instructs to check for all catch (target + incidental bycatch + discards) during the hauling process in gill nets and longline. The sampled and non-sampled fraction of the gear is recorded in order to have estimates at haul level (ICES X/Azores).

The annual spring bottom longline survey - ARQDAÇO - although not compulsory under the 2017-2019 EU-MAP, is included in the Portuguese work plan for DCF (thus, funded by EMFF). It was established in 1995, targeting demersal and deep-water species up to 1200 m depth in the areas near all the nine islands of the archipelago, and various seamounts in the Azores Exclusive Economic Zone. The main aim of the monitoring surveys is to monitor the abundances of the main demersal fishes in Azores.

At-market sampling for ICCAT (tunas) is performed at Azores. Sampling strategy targets AZM24 - LHP_LPF _<12m; AZM25 - LHP_LPF _>12m (poles and lines); AZM29 – LLD_LPF (longline)

Pilot survey (18-19) aims to estimate the total catch of elasmobranchs and tuna species by recreational fishing in Azores.

6.1.1.2 Implementation of DCF data collection obligations and potential issues

There were some constraints linked to the recreational pilot study during the period of transition of biological data collection from DOP-University of Azores to the Regional Directorate of Fisheries. Nevertheless, preliminary estimates on fishing effort and catch rates have to be properly assessed in the future with complementary data (i.e. logbook panel and an on-site survey) since they present typical problems of recall and non-response bias. For that reason, new procedures are being prepared to be implemented in 2020-2021.

6.1.1.3 Additional data collected

The OR has a long and effective tradition of the use of co-financing from European funds such as EMFF and ERDF, and in particular its Interreg's programme MAC, to collect fisheries and marine scientific data (see section 4 profile report). According to the Regional Directorate of Fisheries, the following programmes/projects contribute most to the collection of relevant data collection in support of fisheries management: the Azores Fisheries Observer Programme (POPA), COnsolidating Sea Turtle conservation in the Azores (COSTA), the condor project (CONDOR), the recently implemented Monitoring Programme for Coastal Resources (MoniCo), and the Annual Demersal Monitoring Campaigns (ARQDAÇO).

6.1.2 Madeira

6.1.2.1 Data collection obligations

The sampling obligations under the DCF (2017-2019 EU-MAP and 2020-2021 EU-MAP) are:

- At-market sampling (ICCAT, CECAF Divisions 34.1.2 and CECAF 34.2.0) to obtain length distributions of fish landed at auctions by Madeiran vessels operating in CECAF 34.1.2. and CECAF 34.2.0 Divisions of all métiers.
- At-sea sampling (ICCAT, CECAF Divisions 34.1.2 and 34.2.0).

6.1.2.2 Implementation of DCF data collection obligations and potential issues

The on-board observer programme is not currently operational and for various administrative reasons has not been implemented. The systematic failure to implement an on-board observer programme has been a recurrent source of deviations from some objectives of the Madeira OR in the framework of DCF. Despite the efforts made by the Regional Directory of the Sea in recent years, this has been largely limited by the lack of local companies that are truly aimed at providing this type of service, with limited access to scientific observers trained to do this type of work. Recently it was announced that the programme "Observers on board" for the black scabbardfish fleet would move forward in 2021. This would be the first step towards carrying out scientific and technical studies to assess the conservation status of the deep-sea turtle and the impacts of incidental capture on the black scabbardfish fishery. However, there are no references to observer programmes in the other fleets that fish in the Madeira EEZ.

Research surveys at sea are not carried out in Madeira, the main reason being that there is no research vessel in this region. In the last decade the only research survey carried out was within the BIOMETORE project, which is funded by EEA grants and Direcção Geral Políticas do Mar (General Directory for Sea Policies). The main goal was to collect information on the NE Atlantic seamounts which included the Madeira-Tore seamount chain (in 2016). The general objective of the project was to increase scientific knowledge on the biodiversity and oceanographic characteristics of these regions. The project was funded by the EEA-Grants.

At-market sampling is done by Direcção Regional do Mar staff based on the statistical sampling of length and weight of fish specimens landed daily at the auction, information on capture areas and fishing effort exerted by trip provided by fishing logbooks, integrated in the National Programme for Fisheries Data Collection for tuna and black scabbardfish.

There is a gap in abundance of marine species (fishery independent data), including species that are exploited by fisheries.

It is not expected that the latest 2020-2021 EU-MAP of DCF species will impact current data collection progress significantly. The competent authorities do not see the need to include additional species or data collection needs in the DCF for this particular OR.

The DRP and Directorate of Inspection and Control Services (DSIC) are the competent authorities that validate catch certificates under Regulation 1005/2008[41], which aims to control IUU activity.

6.1.2.3 Additional data collected

Madeira has a tradition of participating in research projects involving the Azores and Canary Islands under programmes such as Interreg and Interreg MAC. However, there are still gaps in data on oceanography, topography and mapping of habitats.

41 Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999 (OJ L 286, 29.10.2008, p. 1–32).

6.1.3 Canary Islands

6.1.3.1 Data collection obligations

Data collection in the context of the 2017-2019 EU-MAP concerns fisheries activities in national, international and third country waters (i.e. Madeira and Moroccan waters, respectively). Data collection of biological data includes three métiers: small pelagics, tuna and demersal species. Main species for sampling include parrotfish, sardine, mackerel, horse mackerel, sardinella, bluefin tuna, albacore, skipjack, bigeye tuna, yellowfin tuna and swordfish.

6.1.3.2 Length sampling

The current length sampling obligations under DCF (2017-2019 EU-MAP; 2020-2021 EU-MAP) are:

- Concurrent length sampling at market (main landing sites) for tuna fish (métier LHP_LPF_0_0_0)[42].
- Concurrent length sampling at sea of purse seiners PS_SPF_10_0_0 (1 sampling per month) and demersal fleet MIS_DES_0_0_0 (≥2 samplings/month) in Tenerife Island (and Gran Canaria from March 2021 onwards). Retained and discarded catches are sampled on board.
- Stock-specific length sampling at market of the main target species of all métiers. This covers parrotfish (MIS_DES_0_0_0), and targeted small pelagic species (PS_SPF_10_0_0) and tuna (LHP_LPF_0_0_0). Sampling is performed on a monthly basis and covers the main landing sites of each métier in the whole archipelago.

6.1.3.3 Biological Sampling

Large pelagic samples caught in the Canary Islands are sampled in the lab to obtain reproductive data. Species sampled are bigeye tuna, skipjack tuna, yellowfin tuna, albacore and Atlantic bluefin tuna. Growth structures (otoliths) have been collected for the Atlantic bluefin tuna, under the framework of specific projects co-funded by ICCAT. The number of biological samplings and temporal coverage within the year depends on the availability of specimens for sampling in the landing sites and is limited by the high prices of these species at market.

Four small pelagic species are sampled monthly in the lab, to collect biological-reproductive parameters (samples caught in Tenerife Island, métier PS_SPF_10_0_0): Atlantic chub mackerel, horse mackerel, European pilchard and round sardinella.

Collection of hard structures (otolith, spines) for growth analysis is also carried out for Atlantic chub mackerel and for relevant tuna species in some periods (e.g. Atlantic bluefin tuna) under specific projects funded by ICCAT.

6.1.3.4 Implementation of DCF data collection obligations and potential issues

Concerning length frequencies and biological sampling, the 2017-2019 EU-MAP establishes the obligation to collect data for a number of species provided that their catch is higher

42 As defined in Chapter I of Annex of Commission Decision No. 2010/93/EU: sampling all or a predefined assemblage of species, simultaneously in a vessel's catches or landings.

than 200 tonnes per year[43]. Parrotfish catches do not always reach 200 tonnes per year, nevertheless it is selected for length sampling (at sea and at port) because it is the most caught species in the demersal métier (MIS_DES_0_0_0).

The development of sampling schemes under the DCF is quite recent, with two métiers for small pelagic fish and demersal species approved in 2013 and 2015 respectively. Tuna métier for the Canary Islands was included in the DCF earlier (2003). Thus, the historical data series are rather short.

A programme of SSF observers on board is in place in the western archipelago (Tenerife Island) and recently extended to the eastern (Gran Canaria Island from March 2021). The programme examines the retained and discarded catch. This programme was launched in 2015 for the aforementioned demersal métier (two samplings per month take place since 2016). In 2017 the programme was extended to the aforementioned small pelagic métier (one sampling per month).

The sampling network of IEO (RIM) covers the length sampling at market of most relevant commercial species landed in the diverse landing sites in Canary Islands.

6.1.3.5 Additional data collected

Additional length sampling at market is collected for commercial species (e.g. common dentex, alfonsino, moray eel, grouper, amberjack) that are not included in the 2017-2019 EU-MAP. The sampling network of IEO (RIM) covers the most relevant commercial species landed in the Canary Islands (even if some of them are not required stocks under DCF, or their catches do not reach the 200 tonnes per year (2019 EU Research Surveys[44]). In addition, there has also been an inclusion of a new fishing ground named "Canary" within the CECAF region in the 2015 Regional Coordination Group of Long Distance Fisheries, to separate EU waters ("Madeira" and "Canary") and non-EU waters ("From Morocco to Guinea-Bissau"). Moreover, seasonal tagging campaigns were conducted in the past (supported by ICCAT), while since 2016 the IEO has carried out several pilot surveys to establish the methodology applicable in the Canary Islands to the stock assessment of small pelagic species.

6.2 Caribbean

6.2.1 Guadeloupe and Martinique and St Martin

6.2.1.1 Data collection obligations

Guadeloupe and Martinique are required to report data on catch volume for the following stocks: snapper, grouper, lionfish, tuna-like fish, blue marlin, and dolphinfish. Guadeloupe complies 100% with this DCF requirement (Chapter III.2.a.1 of 2017-2019 EU-MAP). Concerning length frequencies data (Chapter III.2.a.i.) these are not published but some are collected.

43 Under previous Annex Chapter II 'Thresholds' of Commission Implementing Decision EU 2019/909. Establishing the Multi-Annual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors and now under Annex Chapter II 'Thresholds for data collection' of Commission Implementing Decision EU 2021/1168.

44 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory research surveys and thresholds for the purposes of the Multi-Annual Union programme for the collection and management of data in the fisheries and aquaculture sectors (C/2019/1001, OJ L 145, 4.6.2019, p. 21–26)

The list of stocks under ICCAT in the case of Guadeloupe and Martinique includes 23 species, encompassing yellowfin tuna, skipjack tuna, bigeye tuna, albacore, bluefin tuna and other tuna and tuna-like species.

In 2019, ICCAT presented its annual report for biennial period 2018-2019[45]: It is reported that dolphinfish, blue marlin and yellowfin tuna represents 70% of landings. Length frequencies for these species are collected. Five large pelagic stocks were assessed: it is assumed that necessary biological data for this assessment were collected and shared for yellowfin tuna, Atlantic blue marlin, Atlantic sailfish and skipjack tuna.

Ten species are to be reported for WECAFC for all French relevant ORs (Guadeloupe, Martinique and French Guiana). Species with management plans (i.e. conch[46], lobster[47]) and large pelagics are monitored in Guadeloupe and Martinique and the data reported. Compliance to DCF requirements can be considered of good quality for these species regarding catch volume (Chapter II.2.a.i). Regarding length frequencies, some are collected.

Regarding Chapter III.2.a.ii and 2.a.iii on commercial fisheries related to mean-weight and age distribution of catches, limited data are reported. A recent study conducted on 12 demersal stocks[48] mentioned that there is a need for more research on biological parameters to conduct stock assessment. On the other hand, for some large pelagics the state of knowledge seems to be suitable for stock assessments. Lastly, no reporting is done on recreational fisheries (Chapter III, 2.a.iv of regulation 2017-2019 EU-MAP).

Section III.3 of 2017-2019 EU-MAP lists requirements for data to assess the impact of Union fisheries on marine ecosystems in EU waters and beyond. The species listed are not relevant to Guadeloupe and Martinique. The list contains sharks and rays, mammals, crustacean species, birds and cnidarians to be reported for certain areas or for all regions/oceans. Due to the nature of artisanal fisheries in Guadeloupe and Martinique, the impacts listed in Section III.3 of regulation the 2017-2019 EU-MAP are not an issue.

Section III.4. lists requirements for detailed data on the activity of Union fishing vessels in Union waters and non-Union waters as per the Control Regulation (1224/2009). SIH provides information per métier on vessel activity, such as average vessel size, GT and power, as well as total landing and value. Average number of crew is also mentioned. There is high level information on effort (days at sea for instance), but not detailed information. Compliance to III.4 is considered good.

Section III.5. lists requirements for social and economic data on fisheries to assess the performance of the EU fisheries sector. STECF 19-19 mentions that before 2018 no data was provided for fleet segments less than 12 metres in French ORs. Considering that in these regions the predominant activity is small-scale in nature, there is a general lack of historical socio-economic data in these regions.

It is to be noted that there is no compulsory list of stocks in St Martin in the 2017-2019 EU-MAP for which the biological data are requested.

45 https://www.iccat.int/Documents/BienRep/REP_TRILINGUAL_18-19_II_3.pdf

46 http://www.fao.org/documents/card/en/c/b3134e3b-59f6-44dc-a195-aefec1bf33a4/

47 https://clmeplus.org/doculibrary/marplesca-the-regional-caribbean-spiny-lobster-panulirus-argus-fishery-management-plan/

48 Guadeloupe: Lionel Pawlowski, Victoire Robineau, Olivier Guyader, Martial Laurans, Jérôme Weiss, Jérôme Baudrier, Emmanuel Thouard (https://archimer.ifremer.fr/doc/00595/70677/71784.pdf)

6.2.1.2 Implementation of DCF data collection obligations and potential issues

Catch and effort information are collected by Ifremer with the support of a local contractor. There is a need for a better liaison between the Martinique's Ifremer office and the local vendor. Overall, there is a lack of information on the biological parameters of the main commercial species, and therefore little ability to conduct stock assessment on such species. However, the Agence Française de Développement recently attempted to increase the number of samples able to be analysed for biological parameters by buying fishes from fishers in the market. There is also a lack of socio-economic data for each OR being collected. However, a survey to inform an understanding of the socio-economic structure within Martinique and Guadeloupe was conducted in 2020 and the results are currently being assessed.

Finally, recreational fisheries impact on ecosystems is largely unknown. Here again, a survey has been utilised to better assess the recreational fisheries sector in Guadeloupe and Martinique. Regarding the 2020-2021 EU-MAP, Ifremer and IRD were consulted on the list of species for DCF and mentioned the need to add species from the ORs. Ifremer and IRD mention that there are a small number of species important for SSF that are not covered (or not covered anymore) by DCF in the 2017-2019 EU-MAP and that the list of species will need to be reviewed to ensure that species important for the ORs can be covered by EMFF.

6.2.1.3 Additional data collected

No additional data beyond the DCF is reported.

6.2.2 French Guiana

6.2.2.1 Data collection obligations

The 2017-2019 EU-MAP provides the minimum list of stocks to collect biological data for French Guiana. This consists of 11 stocks, amongst them grouper, snapper, mullet, catfish, weakfish and prawns. In this list, red snapper, prawns, acoupa weakfish and green weakfish are included in the National Work Plan. The remaining species are not part of this plan. According to STECF 2020 (PLEN-21-01) these four species sampled represent 80% of catches. The catches of the stocks outside the National Work Plan are below the threshold of 200 tonnes per year. These four species (red snapper, prawns, acoupa and green weakfish) have been included in the 2020-2021 EU-MAP. Concerning stocks under the purview of Regional Fisheries Bodies (RFB), no stocks are actually captured by French Guiana fisheries under the mandate of ICCAT. Regarding WECAFC, the only covered stock in the French Work Plan is shrimps.

Section III.3 of the 2017-2019 EU-MAP lists requirements for data to assess the impact of Union fisheries on marine ecosystems in EU waters and beyond. The species listed are not relevant to French Guiana. The list contains sharks and rays, mammals, crustacean species, birds and cnidarians to be reported for certain areas or for all regions/oceans.

Regarding Section III.4. of the 2017-2019 EU-MAP data on the activity of Union fishing vessels in EU waters and non-EU waters (as per 2009 EU Regulation Community Control System), SIH provides information per métier on vessel activity such as average vessel size, tonnage, and power, as well as total landing and value. Average number of crew is also mentioned. High level information on effort (days at sea for instance) is available, but there is no detailed information. Compliance to this section is considered good.

Concerning socio-economic data, from 2019 a methodology has been developed and applied for collection of data on socio-economic variables in French Guiana (STECF 19-

19[49]). This is an improvement on data collection for this region; STECF 19-19 reported that before 2018 no data was provided for fleet segments less than 12 meters in French ORs, resulting in a lack of historical data on the small-scale fleets predominant in these regions. This fleet undertakes fishing activities that have particular features, including the predominance of one-day trips, direct sales to consumers and no logbooks – such features require tailored methodologies.

6.2.2.2 Implementation of DCF data collection obligations and potential issues

IRD runs observer programmes in the Atlantic Ocean (as well as in the Indian Ocean) to complement biological data under DCF obligations. Observers' collection includes some data on discards.

Ifremer indicates that shrimp biological sampling in French Guiana is done at processing plants. Red snapper biological sampling is limited to some length measurements at landing sites from coastal fishers. There is an issue in data collection since the processing plants buying catches from Venezuelan vessels do not always cooperate with Ifremer. Acoupa weakfish length measurements are done at the landing sites.

The 2020-2021 EU-MAP adds 3-4 coastal species (such as green weakfish and acoupa weakfish). There are some exploratory samplings in progress as there is currently very little data available for stock assessment, but staffing remains an issue.

Ifremer has started a project (Multifish) to try and collect information on data poor species - mostly weakfishes and catfishes. The DM indicated that there are some species for which data is not collected because they are not covered by DCF. It also mentioned that it would like to have more biological data on a number of species, especially on life cycle, to be better able to assess and manage the stocks.

6.2.2.3 Additional data collected

IRD mentions that there might be data collected by anticipation of future requests by RFMOs or DCF. E.g.: data on anatomical implantation of hooks had been collected for several years in anticipation of potential measures on hooks (see AZURE project on megafauna release survival in longline fisheries).

6.3 Indian Ocean

6.3.1 Mayotte and La Réunion

6.3.1.1 Data collection obligations

The 2017-2019 EU-MAP lists that Mayotte and La Réunion are required to report data on the following stocks: snappers, groupers, tuna-like fish, swordfish, other billfishes, dolphinfish and bigeye scad. Regarding catch volume (Chapter III.2.a.1), some species listed are not included in the French work plan for the collection of data. Concerning length frequencies data (Chapter III.2.a.i.), some are collected.

The list of stocks under IOTC for Mayotte and La Réunion are presented in the 2017-2019 EU-MAP and are also a legal obligation under IOTC. This includes 15 species, encompassing yellowfin tuna, skipjack tuna, bigeye tuna, and albacore.

49 Scientific, Technical and Economic Committee for Fisheries (STECF) – Outermost Regions (OR) (STECF-19-19).

All species listed are covered under the relevant IOTC data reporting requirements. For Mayotte, the IOTC Compliance Committee noted in its 2020 EU Compliance Report[50], that no data had been provided for France-Mayotte coastal fisheries (handline & troll line), but France indicated that this was due to an issue in the chain of transmission rather than a lack of available data, and that measures had been taken to provide the data as soon as possible.

STECF (19-19) concluded that in 2017, 17 species included in the 2017-2019 EU-MAP for Mayotte were already collected, representing 33% and 28% of the landings in tonnes and euros, respectively. In the 2018 national annual report the number of species dropped to 11 species. As indicated in the national annual report, the samples concerned the large pelagic species and not the demersal and benthic species harvested within the Mayotte lagoon. In fact, data collection of demersal and benthic species has only recently begun. Only 7 species are scheduled (16%). A STECF (STECF 19-19) recommendation is to review this list and to include a larger set of species (recommended also for the other ORs), covering not only the large pelagic species but also the relevant species harvested in the lagoon and at the edge of the lagoon. The EWG notes that data collection of biological samples in Mayotte is difficult due to the landing conditions of the small-scale vessels and the large number of non-designated landing sites.

Out of 7 stocks to be specifically included under DCF in Mayotte and La Réunion, 4 of them are not included in the French work plan, but they are all stocks for which catches are under 200 tonnes per year and therefore below the threshold.

Concerning La Réunion, an analysis of the 2017 national report was conducted by STEFC (2020) and concluded that 13 species were sampled and reported, representing 89% and 85% of the landings in tonnes and euros respectively. In terms of species covered in the 2018 national report, the number of species is quite similar with 12 species covered. The situation is quite good compared to other French ORs. Most of the samples are for large pelagic species which are the main component of the landings in Réunion.

Considering that data are provided with information from Mayotte and Réunion together, the sampling effort cannot be properly evaluated at ORs level. Dolphinfish, a species with important landings, is not included in the 2020-2021 EU-MAP. One recommendation is to include this species in the list, as well as wahoo and groupers. The difference between the 2017-2019 EU-MAP and the 2020-2021 EU-MAP is the inclusion of deep-water demersal species and other deep-water species. The EWG notes that data collection of biological samples in the Réunion region is not easy for small-scale vessels. Most of the small-scale vessels operate from many landings sites where the vessels landings are directly sold to consumers.

6.3.1.2 Implementation of DCF data collection obligations and potential issues

In terms of landings, data collection is implemented by Ifremer and performed by OFB in Mayotte, with some size distribution data collected in Mayotte line fisheries. In addition, IRD runs at-sea observer programmes in the Indian ocean to complement biological data under DCF obligations. Observers' collection includes some data on discards. The purse seine fishery has logbooks collected for the Indian Ocean. However, according to OFB, observer coverage is 4-5% and is not high enough, but there is a lack of human and financial resources. Biological and socio-economic data are the main gaps.

50 IOTC-2020-CoC17-CR06, IOTC Compliance Report for: European Union, https://www.iotc.org/sites/default/files/documents/2020/09/IOTC-2020-CoC17-CR06_E_F-European_Union.pdf

IRD stated that stomach content sampling is not yet implemented, but that it can produce useful information to understand regime shifts, especially in longline and recreational fisheries.

In Mayotte, there is a structural lack of skills and knowledge in the region, which cannot be solved with funding. There are also the contractual conditions for OFB staffing, plus the fact that OFB is a very young public agency, and recruiting staff is not easy. There is also a salary cap that makes it difficult to recruit without going through a process of calling for tenders with third-party contractors. There are administrative rules such as a cap on 3 consecutive 2-year contracts for a given person that make it hard to keep long term staff. In addition, local conditions are not very attractive for staff from mainland France. The current lack of staff at OFB Mayotte also makes it difficult to propose new projects. One solution to ensuring adequate logistic support for data collection in Mayotte may be to externalise data collection i.e. conduct subcontracting to make it easier to recruit people and organise.

In 2021, the focus will be on improving biological data within an AFD/Ifremer project. This project will enhance monitoring of catches and purchasing of fish at landing sites to be sent to Ifremer for biological assessment. The aim of this project is to decide which species to include in the national work plan.

Regarding the 2017-2019 EU-MAP, Ifremer and IRD were consulted on the species list and mentioned the need to add species of particular interest in the ORs. IRD indicates that, for the Indian and Atlantic Oceans, all species are covered by the French national data collection scheme.

Ifremer and IRD mentioned that there are small species important for SSF that are not included under the 2017-2019 EU-MAP and that the list of species should be extended so that species important for the ORs can be covered by EMFF.

In Mayotte specifically, the 2017-2019 EU-MAP adds one single species to be covered: bluefin trevally (*Caranx melampygus*). However, the local fisheries are so opportunistic that catches of that species are below the threshold for mandatory data collection (200 tonnes).

6.3.1.3 Additional data collected

Additionally, deep-water species have also been sampled in other projects, but have not yet been included to date. IRD mentions that data might be collected in anticipation of future requests by RFMOs or DCF. For example, data on anatomical implantation of hooks had been collected for several years in anticipation of potential measures on hooks (see AZURE project on megafauna release survival in longline fisheries). These activities are launched based on the expertise of scientists and on requests or suggestions from WPs in RFMOs etc.

7 CURRENT FISHERIES MANAGEMENT MEASURES AND THE SCIENCE BEHIND THEM

7.1 Macaronesia

7.1.1 Azores

7.1.1.1 National

In the Azores, EEZ fisheries management is based on regulations issued by the European Union, by the Portuguese government and by the Azores regional government. Under the CFP, blackspot seabream, black scabbardfish, and deep-water sharks are under a TAC and a quota system (EC. Reg. 2340/2002[51]). Deep-water stocks are regulated in terms of fishers' access to such resources and the conditions used to fish such stocks (EC. Reg. 2347/2002[52]) .Regulations also allow the Azores to restrict access to deep-water stocks for Azorean vessels up to 100 nm limits from their islands coast (EC Reg. 1954/2003[53]). Trawl gears are forbidden in the Azores region, while the Azores regional government have also introduced technical measures (starting in 1998, which include fishing restrictions by area, vessel type and gear, fishing licences based on landing thresholds, minimum lengths and closed seasons), which have been updated thereafter (ICES, 2018).

Fishing includes not only fishing with a vessel, but also the gathering of marine animals and onshore fishing (on foot). In this respect, within the Azores fishing may only be carried out by the following fishing methods: (i) onshore fishing; (ii) line fishing; (iii) trap fishing; (iv) lifting gear; (v) encircling gear; and (vi) gillnet fishing. The following fishing methods are prohibited: (i) trawl gear; (ii) the use of gillnets at depths greater than 30 m; (iii) drift-nets; and (iv) gillnets made up of more than one set (Regional Legislative Decree no. 331 28/2010/A, of 9 November).

Within the Azores, bycatch of ETP species (e.g. turtle bycatch with longline fishing activities) could be reduced by further regulation of the blue shark fishery, while mitigation measures such as requiring vessels to move away from fishing areas after high catch rates of turtles, bans on longline activities in high loggerhead turtle aggregation areas, and selected gear modifications may also reduce potential turtle bycatch.

7.1.1.2 International

Fisheries in the Azores are managed under the EU CFP, with some fisheries managed by the NEAFC, ICCAT and local government. Fisheries advice is provided by ICES and STECF. Other stakeholders providing advice are SWWAC, CC-RUP and LDAC. For large pelagic fish (tuna and tuna-like species) fisheries advice is provided by ICCAT. Environmental policy is managed by national agencies and OSPAR, with advice being provided by national agencies, OSPAR, the EEA, and ICES. International shipping is managed under the International Maritime Organization (IMO) and whaling is managed by the International Whaling Commission (IWC) (ICES, 2019)

51 Council Regulation (EC) No 2340/2002 of 16 December 2002 fixing for 2003 and 2004 the fishing opportunities for deep-sea fish stocks (OJ L 356, 31.12.2002, p. 1–11)

52 Council Regulation (EC) No 2347/2002 of 16 December 2002 establishing specific access requirements and associated conditions applicable to fishing for deep-sea stocks (OJ L 351, 28.12.2002, p. 6–11)

53 Council Regulation (EC) No 1954/2003 of 4 November 2003 on the management of the fishing effort relating to certain Community fishing areas and resources and modifying Regulation (EC) No 2847/93 and repealing Regulations (EC) No 685/95 and (EC) No 2027/95 (OJ L 289, 7.11.2003, p. 1–7)

7.1.1.3 Fishing areas and Marine Protected Areas

There are specific regulations that limit fishing in several islands and marine areas of the region. These regulations are based on the minimisation of biological and physical disturbances, or are based on the adaptation of regulations to allow new areas or expansion of fishing areas (when demonstrably, impacts initially predicted for the region following initiation of fishing activities, were not presented).

7.1.1.4 Science behind fisheries management measures

Most of the regulatory initiatives of the Azores regional government have been supported by scientific data and knowledge since 2012.

Twenty-two (18 fishes, 2 molluscs and 2 crustaceans) out of 138 species recorded landed in the region during the period 2009-2019 were selected as priority stocks for local assessment and monitoring according to the FAO and ICES criteria. Twenty-two stocks were selected as priorities for local assessment and monitoring. The region has a large number of ecological and fisheries scientific studies that form the basis for regional management measures for several species. Despite this, scientific analysis of such fisheries is lacking due to a lack of manpower (ORP Country Profile Report: expert judgment, conclusions). For example, a range of coastal species (grouper, moray eel, grouper, squid, mackerel, lobster), offshore rockfish and algae have been identified as critical for improvement in scientific knowledge.

In the Azores, over 110 000 km^2 of marine areas, including a suite of coastal habitats, offshore areas, seamounts, hydrothermal vents and large parcels of mid-ocean ridge presently benefit from some form of protection. The management of the Azorean Sea reflects an efficient operationalisation of management measures and an active involvement of stakeholders through consultation and information. For example, the monitoring and enforcement of regulations restricting fishing activities within some MPAs in the Azores was established under the project MONIZEC-ARP of the regional government. Monitoring and surveillance sometimes do not provide the necessary protection from the fishery fleet.

7.1.2 Madeira

7.1.2.1 National

The management objectives applicable in the Madeiran region are mostly aimed at regulating fishing effort and the application of quotas, which are defined in ICCAT for large migratory species (bigeye tuna, skipjack tuna), or by the EU for black scabbardfish and small pelagics (i.e. only blue jack mackerel). Besides TACs and quotas, tuna fisheries and black scabbardfish fisheries are managed by fishing effort limitations and minimum landing sizes. Madeiran vessels targeting black scabbardfish operate in the Madeira EEZ, adjacent international waters and in waters north of the Canary Islands under an existing CECAF fisheries agreement.

Other resources of regional importance (mainly blue jack mackerel, Atlantic chub mackerel and, Azorean and sun limpets) have local numerical assessments under sub-division in CECAF (34.1.2.). Recent studies have shown a decreasing trend in the length composition of blue jack mackerel (Vasconcelos et al., 2018), while there is evidence that a high proportion of Atlantic chub mackerel and pilchard are being discarded at sea (Tejerina et al., 2019); measures that could improve the sustainability of the small pelagic fishery include the implementation of closed seasons during species spawning periods (Vasconcelos et al., 2012). The limpet population is considered fully exploited, close to the maximum sustainable yield (MSY) (Sousa et al., 2018; Sousa, 2019). This has prompted

several management measures to maintain the population and productive levels. The first assessment on the status of the limpet population was undertaken in 1994, resuming in the mid 2000's. For these populations, management of the harvest began in 1995, while monitoring of the population started in 1996. As a consequence of the ongoing monitoring and evaluation of limpet since 2016, there is a seasonal ban on collecting limpets between December and March, while other conservation measures (e.g. bag limits and minimum landing size) may be introduced in future. In comparison, the topshell harvest is not regulated, with documented reductions in the size structure, abundance and reproductive potential of populations (Sousa, 2019). For these species, although there has been an increase in understanding of the structure, abundance and population biology, there is no information on future specific measures to be implemented.

EU regulations have been regionally adapted through regional legislative decrees, adapting the management of the activity to regional specificities (at the environmental and socio-economic levels). As an example, in the Madeiran regional pelagic fishery, there is a de minimis exemption for certain cases detailed in Commission Delegated Regulation No. 1394/2014 of 20 October 2014[54], which establishes a discard plan for certain pelagic fisheries in the southwestern waters. There is also a 'survivability exemption' in the regulation which states that catches of anchovy, horse mackerel and Atlantic mackerel in artisanal purse-seine fisheries may be released.

Overall, fishing activities and regulations at Madeira seems to be highly biased towards tunas and black scabbardfish, which in time could result in an unsustainable pattern of exploitation of other resources. In this respect, important demersal finfish resources are not scientifically assessed, and although are of a high economic value only form a small part of the commercial fishing of Madeira. Unlike other ORs (e.g. Azores) there is no publicly available list of management measures at a regional level for such species.

7.1.2.2 International

Management of the economically important large pelagic migratory species is carried out at international level by ICCAT. For these important commercial species, an extra allocation of 100 tonnes in 2020 (in addition to the allocated quota of 19 360 tonnes) were received for exclusive use by artisanal vessels in the Canary Islands, the Azores and Madeira. The specific allocation of this additional quantity to the Member States was for Spain (87.3 tonnes) and Portugal (8.2 tonnes).

In the case of black scabbardfish, the geographical area of operation of the Madeiran fleet belongs to the CECAF areas 34.1.2 and 34.2.0, with the EU responsible for determining the TAC for the Madeiran CECAF area. In 2018, the Council decided that the TAC for black scabbardfish in area 34.1.2 was to be determined by Portugal if it was consistent with the principles and rules of the CFP, in particular the principle of sustainable exploitation of the stock (Council Regulation (EU) 2021/91).

7.1.2.3 Marine Protected Areas

Madeira has six relevant protected areas, although none belong to the OSPAR network of MPAs. In all MPAs of the Autonomous Region of Madeira (ARM), all types of fishing - even live bait fishing - are prohibited. Objectives of conservation are well defined by the ARM and management measures are well defined, based on these objectives.

54 Commission Delegated Regulation (EU) No 1394/2014 of 20 October 2014 establishing a discard plan for certain pelagic fisheries in south-western waters (OJ L 370, 30.12.2014, p. 31–34)

7.1.2.4 Science behind fisheries management measures

Resource management/conservation has been based on advice from regional management studies since 2018. There are several scientific studies that form the basis for local regional management measures and are candidates for newly proposed data collection requirements under the DCF. Despite this, very few stocks, compared to species landed, have had analytical assessments undertaken, and TACs developed.

Local management of stocks is not always possible to effectively implement in the region, due to European level restrictions. European regulations, by defining rules (fleets, minimum catch sizes, prohibiting the use of certain gears or banning certain species) do not always take into account the specific characteristics of the multispecies artisanal fishery within Madeira, and the historical use of specific resources. However, according to Article 9 of Council Regulation (EU) 2021/91 where TACs for some deep-sea species (including kitefin shark) are fixed at zero, there is an obligation of immediate release at sea and fishers cannot retain and sell their catch, thus losing a source of economic revenue for ca. 200 families

There is a need to establish minimum catch sizes and a ban on catches for the endemic and vulnerable species (barred hogfish and island grouper), while there is also a need to assess the impact of big game fishing in the resources and socio-economy of Madeira.

7.1.3 Canary Islands

7.1.3.1 National

The regional government established in 2003 the *Ley de Pesca* (Fisheries Act), which regulates inter alia the commercial and recreational fishing activities and the use of specific fishing gears within internal maritime waters. Further considerations were included in a 2019 amendment to include fisheries activities linked to tourism. There is a recent proposal *Pesca Marítima de Recreo en Aguas Exteriores*[55] for the regulation of recreational fisheries at the national level, in which new limitations have been proposed for 'underwater sea fishing' within the fishing area of the Canary Islands (external waters).

Minimum conservation sizes for a number of commercially important species (e.g. parrotfish, red mullet, tropical tunas, mackerel and horse mackerel) caught in national fishing grounds of the Canary Islands has been established in Real Decreto 2134/1986 (Amendment the Real Decreto 1076/2015 and updated in Orden 2536/2015, and Orden 441/2019 which is the later updates of fishing gear and modalities). Regulation (EU) 2019/1241 prohibits the deployment of bottom set gillnets, entangling nets and trammel nets at depths greater than 200 m, or bottom trawls or similar towed gear within the area including Canary Island waters.

7.1.3.2 International

Demersal and small pelagic stocks are included under the remit of CECAF. CECAF is an advisory body and therefore their recommendations are non-legally binding. Thus, no conservation and management measures (CMMs) for those stocks can be established. In consequence, only scientific recommendations can be provided for the CECAF 34.1.2 area.

The national government has the management responsibility for external waters i.e. encompassing the Spanish EEZ, with the exception of the inshore waters, which are under

55 https://www.mapa.gob.es/es/pesca/participacion-publica/pproyecto%20pesca%20recreativa%202021.aspx

the purview of the regional governments. International measures are in place for large pelagic species (covered under ICCAT management measures), including TACs for tuna. Consequently, the TAC level determines the quotas allocated to Spain and then allocated to the Canary Islands fleet.

Canary Islands fisheries are highly impacted by ICCAT Recommendation 19-04 regarding the management plan for Atlantic bluefin tuna. This recommendation establishes a 100 tonne "sectorial quota" for tuna bait boat vessels of the EU ORs. In 2020, a share of 87.3 tonnes was apportioned to the Canary Islands artisanal fleet. Recommendations regarding albacore and tropical tunas are also relevant for the Canary Islands fleet.

Some small pelagic species (anchovy, horse mackerel, jack mackerel and mackerel) have an exemption from the landing obligation (Regulation 1380/2013[56]) in relation to high survival rates, considering the characteristics of the gear, the fishing practices, and the ecosystem (Commission Delegated Regulation 1394/2014[57]) in which they are fished within the Canary Islands.

7.1.3.3 Marine Protected Areas

Within the Canary Islands, there are three marine reserves of fisheries interest: La Palma (2001), La Graciosa (1995) and El Hierro (1996), where restrictions on fishing activities have been established[58]. Despite this, within all three areas, there has been no routine scientific monitoring or assessment of the impacts of the closures on adjacent fisheries since 2011-2012.

7.1.3.4 Science behind fisheries management measures

Scientific advice to the regional, national and EU administrations is provided by the IEO, collecting information for all relevant fisheries in the area. The Canary Islands Universities (Las Palmas de Gran Canaria, La Laguna) also perform advisory services to the regional government.

In 2012, scientific advice about minimum sizes for most of the important fisheries' species of the Canary Islands was published (González et al., 2012). In 2020, the Fishery Office of the regional government proposed the creation of a working group for the management of the fishery resources, with the participation of IEO and local universities. The main goal was to analyse and discuss proposals from the fishing sector in the Canary Islands. Since 2020, a new concept of "fishery essentiality", based on the economic viability of artisanal fisheries and fishers' behaviour, was defined and is being used to influence management decisions.

Within the Canary Islands fisheries, species identification and reporting of such species are challenging, as there many landing sites and a high diversity of species captured. Such diversity may reduce the representability of data collected.

Additional scientific data are required for underpinning management measures (as identified in Section 6) in relation to: tuna species, catches of bait (small pelagics), acoustic surveys, first sales registration in all landing sites, fishing effort by species as

56 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22–61)

57 Commission Delegated Regulation (EU) No 1394/2014 of 20 October 2014 establishing a discard plan for certain pelagic fisheries in south-western waters (OJ L 370, 30.12.2014, p. 31–34).

58 Available in Spanish at: https://www.gobiernodecanarias.org/pesca/temas/reservas_marinas/.

fisheries (mix of gears directed to multiple species), geographical distribution of fishing effort, implementation of a recreational data collection system, genetic data to monitor the effect of MPAs on conservation of resources, and socio-economic data to represent the peculiarities of the SSF.

7.2 Caribbean

7.2.1 Martinique

7.2.1.1 National

At the national level, both management and conservation measures have been imposed through local regulations. The range of legal instruments undertaken by the national government encompass regulations for professional fishers, recreational fishers, and restrictions in fishing activities due to chlordecone or in national parks (i.e. MPAs). In addition, Decree number R02-2019-04-08-00432 regulates professional maritime fishing in Martinique.

Regulations (Prefectural Decree number 2012335-0003 30/11/2012) have imposed a ban on fisheries in relation to chlordecone. Other existing regulations, related to ecosystem preservation, have been enacted which have banned fisheries in different areas.

7.2.1.2 International

Being an EU outermost region, all EU regulations apply to Martinique, through their implementation in the French national regulations.

7.2.1.3 Science behind fisheries management measures

Martinique has a complete legal framework related to management of fisheries supported by scientific advice from Ifremer and recommendations from fishers' associations.

7.2.2 Guadeloupe

7.2.2.1 National

At the national level, management and conservation measures are imposed through local regulations. Legal texts in Guadeloupe encompass regulations for professional fishers and recreational fishers, as well as restrictions in fishing activities due to chlordecone and areas protected under MPAs.

In January 2019 a new decree, modified in April 2021 (971-2019-08-20-003 S25C-91908201515034) regulates recreational fisheries. This decree increases restrictions on fish catch, including furthering the conservation of juveniles. In addition, additional regulations are in place to ban or limit fishing in Basse Terre. For example, the Prefectural decree 2014059-004 28/02/201435 defines areas where fishing is banned and other areas where fishing is limited to certain species.

The catch of several demersal species has been reduced with the introduction of closed seasons to reduce fishing pressure and allow stocks to recover. For example, catch of conch has been closed across the 2020/2021 season as per Comité Régional des Pêches Maritimes et des Elevages Marins (CRPMEM) recommendation (2 year ban). Conservation measures have also been enacted for conch (closed season), lobster (ban on breeding lobster) and white urchin (1 month open season).

7.2.2.2 International

Being an EU outermost region, all EU regulations apply to Guadeloupe through their implementation in the French national regulations.

7.2.2.3 Science behind fisheries management measures

Guadeloupe has a complete legal framework related to management of fisheries supported by scientific advice from Ifremer and recommendations from the fishers' associations. These measures have a direct impact on the ability of the SSF sector to go fishing further and deeper. They will need to be adapted to recognize the archipelago specificity.

7.2.3 St. Martin

7.2.3.1 National

The same regulations applied in Guadeloupe apply in St Martin for professional fishers (decree 2002 / 1249 / PREF / SGAR / MAP) and recreational fisheries (decree 971-2019-08-20-003 S25C-919082015150). In addition, in January 2019 a new decree (modified in April 2021 (971-2019-08-20-003 S25C-91908201515034)) was enacted that regulates recreational fisheries. Further, within St Martin restrictions on fish catches (to support the conservation of juvenile finfish, especially for yellowfin tuna) have been enacted.

7.2.3.2 International

Being an EU outermost region, all EU regulations apply to St Martin through their implementation in the French national regulations.

7.2.3.3 Marine protected areas

In St. Martin, a natural reserve ("Réserve Naturelle") has been created according to decree 98-802 of 3 September 1998. Fishing is strictly banned within the reserve (Article 5 of decree 98-802). A third of the island is a natural reserve.

7.2.3.4 Science behind fisheries management Measures

St Martin has a complete legal framework to effectively manage their fisheries, which is supported by scientific advice from Ifremer and recommendations from fishers' associations

7.2.4 French Guiana

7.2.4.1 National

The regulation of sea fisheries is predominantly undertaken at the community or national level (see Title IX of the Rural and Maritime Fishing Code and the Environment Code for national rules). Locally, the Préfet can impose additional provisions. Certain decisions of the Comité Regional des Pêches Maritimes et des Elevages Marins (CRPMEM) can be made mandatory. There are very few provisions specific to French Guiana in terms of the regulation of professional maritime fisheries.

7.2.4.2 International

Being an EU outermost region, all EU regulations apply to French Guiana through their implementation in the French national regulations. There are two specific EU management

measures that apply to French Guiana: an access agreement with Venezuela and the definition of a yearly TAC for the penaeid shrimp fishery.

The access agreement (Council Decision (EU) 2015/1565)[59] allows Venezuelan longliners to fish for red snapper in French Guiana waters. This agreement fixes the number of boats allowed to operate (currently 45) and mandates that 75% of catches must be landed in French Guiana and sold to designated local processing companies (which currently encompasses two companies).

As the EU is a Contracting Party (Member) of ICCAT and WECAFC, all CMMs adopted by these RFMOs apply to French Guiana. No species covered by ICCAT are fished in this OR, and WECAFC does not adopt binding management and conservation measures.

7.2.4.3 Science behind fisheries management measures

Data available for the red snapper fishery are too uncertain to draw conclusions about the state of the stock and the fishery. More precise quantitative-based management measures are needed.

The annual TAC for the penaeid shrimp fishery is defined based on advice from Ifremer to DPMA on the status of the stock. The last proper regulation in setting the TAC was in 2019. Since then (2020 and 2021), the TAC has been proposed by France to the EC and renewed, but without regulatory formalisation.

In recent years, the Ifremer assessment of penaeid shrimp fishery has concluded that the TAC is probably too high and not the best management measure for a short-lived stock with rapid cyclical dynamics. Other management measures, such as reducing fishing effort, are required but would need appropriate data and relevant studies; setting an alternative management MSY objective is essential.

7.3 Indian Ocean

7.3.1 Mayotte

7.3.1.1 National

At the national level, management and conservation measures are imposed through local regulations. Legal texts in Mayotte encompass regulations for professional fishers and recreational fishers, as well as MPAs. In 2018, the Arrêté Préfectoral n° 2018/DMSOI/601 du 28/06/18 Portant Réglementation de l'Exercice de la Pêche Maritime dans les Eaux du Département de Mayotte Prefectoral Decree grouped all fisheries regulations in Mayotte into one single legal instrument. Rationale for each measure, including scientific underpinnings, are only available in the original individual regulations.

Fishing is banned for a number of shark and ray species protected under the Convention on International Trade in Endangered Species (CITES), including Mobulid rays. Further to this, a local regulation has banned professional and recreational fishing of manta rays year-round within Mayotte waters (Arrêté préfectoral n°37/UTM/2013 portant interdiction de pêche des raies Manta). Lastly, to reduce excessive harvesting of large molluscs in the

[59] Council Decision (EU) 2015/1565 of 14 September 2015 on the approval, on behalf of the European Union, of the Declaration on the granting of fishing opportunities in EU waters to fishing vessels flying the flag of the Bolivarian Republic of Venezuela in the exclusive economic zone off the coast of French Guiana (OJ L 244, 19.9.2015, p. 55–57).

Mayotte lagoon, the harvesting of coral and the collection of several shellfish species in Mayotte is banned (Arrêté préfectoral n°481/DAGC - corail et coquillage).

7.3.1.2 International

Being an EU outermost region, all EU regulations apply to Mayotte, through their implementation in the French national regulations. In addition, there is a specific EU regulation that applies to Mayotte only: the agreement between the EU and the Republic of the Seychelles on access for fishing vessels flying the flag of the Seychelles to waters and marine biological resources of Mayotte. The agreement provides authorisation to highly migratory species (species listed in Annex 1 of the UN Convention on the Law of the Sea, 1982), with the exclusion of thresher sharks, hammerhead sharks and the following species: basking shark, whale shark, great white shark, silky shark and oceanic whitetip shark. The agreement includes an exclusion of endangered species.

A Joint Committee oversees the monitoring of the agreement between the EU and the Republic of the Seychelles on access to resources in Mayotte. This includes monitoring the performance, interpretation and application of this agreement, providing liaison for matters of mutual interest, acting as a forum for amicable settlement and reassessing the level of fishing opportunities based on scientific advice and financial contribution.

As the EU is a Contracting Party (Member) of the IOTC, all CMMs adopted by this RFMO have applied to Mayotte since 2014. All IOTC CMMs are based on the work of the IOTC working parties and Scientific Committee. Their implementation by Members, including the EU, is monitored by the RFMOs through their Compliance Committee.

7.3.1.3 Science behind fisheries management Measures

There is an adequate body of fisheries regulations addressing specific local issues in Mayotte.

7.3.2 Réunion

7.3.2.1 National

CMMs are imposed through local regulations. Réunion regulations cover professional fishers, recreational fishers, as well as MPAs. In 2008, the Arrêté nº1742 dated 15 July 2008 Réglementant l'Exercise de la Pêche Maritime Professionnelle dans les Eaux du Département de la Réunion grouped all professional fisheries regulations in Réunion into one single legal instrument. It is updated on a regular basis, most recently in 2017. In 2008, Arrêté n°1743 du 15 Juillet 2008 Réglementant l'Exercice de la Pêche Maritime de Loisirs dans les Eaux du Département de La Réunion regrouped laws for recreational fisheries. In 2019, similar procedures in regulation were adopted for traditional fishing: Arrêté Préfectoral N°3416 du 31 Octobre 2019 Portant Réglementation des Pêches Traditionnelles Exercées à Titre de Loisir à l'intérieur de la Réserve Naturelle Maritime de La Réunion.

Due to the low stock status of coastal sharks and the endemic status of ciguatera[60] within Réunion, there is a local regulation ban on the trade of all requiem sharks, cow sharks and hammerhead sharks in place (Arrêté préfectoral 185 dated 13/02/2015 Amending arrêté 1742 on professional fishing in Réunion). Further to this, the fishing, transport and sale of

60 This is a food-borne illness which is caused by eating fish contaminated by the ciguatera toxin. The toxin is produced by dinoflagellates, concentrated in fish organs and cause nausea, pain, cardiac, and neurological symptoms in humans when ingested.

a range of shark species is banned including as whitetip reef shark, grey reef shark, coral shark, blacktip reef shark and tawny nurse shark (Arrêté préfectoral 185 dated 13/02/2015 Amending arrêté 1742 on professional fishing in Réunion island).

7.3.2.2 International

All EU regulations apply to Réunion through their implementation in the French national regulations. As the EU is a Contracting Party (Member) of the IOTC and SIOFA, all CMMs adopted by these RFMOs apply to Réunion. Their implementation by the contracting parties, including the EU, is monitored by the RFMOs through their Compliance Committee.

In relation to large pelagic species, IOTC CMM recommendations are in place and are well implemented by the RFMO. The level of compliance to such CMMs is good, as evidenced by IOTC's EU Compliance Reports as a contracting party (DMSOI, personal communication, 2021).

7.3.2.3 Science behind fisheries management measures

The process of advice starts with a request from DMSOI or CRPMEM to Ifremer for scientific advice. Afterwards, discussions on the advice provided are held. Lastly, Ifremer confirms that regulations have taken scientific advice into account. DMSOI also provides routine training for the various stakeholders regarding regulations, techniques etc.

Scientific underpinning of the regulations adopted is deployed by Ifremer, the local CRPMEM and the Réunion Marine Park Scientific Council. According to DMSOI, all measures proposed are based on scientific evidence (e.g. bans on fishing larvae of two small benthic gobies (red-tailed goby and *Cotylopus acutipinnis*) 7 months a year, or a peskaval fishery closure period proposed by CRPMEM are based on Ifremer advice).

In relation to coastal and demersal reef fish species, sanitary measures should be defined in relation to ciguatera, common in certain areas of Réunion waters (DMSOI, per. comm.).

Local regulations targeting large pelagic species are also in place, oriented mostly to ensure successful allocation between different fisheries (including professional vs recreational) rather than assuring sustainability of the resources.

8 OBSTACLES TO SOUND SCIENTIFIC ADVICE FOR FISHERIES MANAGEMENT IN ORS

8.1 Macaronesia

8.1.1 Azores

The fishery within the Azores is relatively small-scale and dominated by small-sized vessels (< 12 m, 90% of the total). Landings by weight are dominated by pelagic (63%) and demersal species (33.5%).

Concerning the shortcomings or obstacles to fisheries management and focusing on stock management, most stock boundaries and stock connectivity are unknown. In addition, the majority of stocks have not undergone an analytical assessment and therefore do not have biological reference points within the ICES framework. There are still gaps in the understanding of the status of regionally relevant coastal species, especially those landed by SSF in the region (e.g. groupers, squids).

Effective management of fisheries within the Azores is hampered by a low understanding of recreational fisheries, which may form an important impact on several relevant species. There is now increasing interest in understanding the impact of recreational fisheries in the Azores, with pilot studies having been carried out under the DCF. It is essential that once results of these pilots are analysed, there is a consideration of the inclusion of specific recreational fisheries surveys under the routine data collection programmes.

Regarding data collection shortcomings or obstacles, within the Azores there were some constraints during the period of transition of the DCF from DOP-University of Azores to the Regional Directorate of Fisheries; these have almost been resolved. In addition, although a range of data is collected in the Azores, there is an overall lack of human resources to analyse such data, and therefore provide the necessary scientific underpinning to improve the knowledge and management of their fisheries. Significant improvements can be made in terms of standardisation and coordination based on the information collected from different information sources and entered into the different databases. For example, cross-referencing VMS/AIS data bases against auction landings, logbooks etc. This would be a very significant improvement over MSP, VME, MPA management.

There is a need to increase the number and extent of surveys quantifying fishing effort data by métier, as well as in collecting socio-economic data in relation to the SSF. More targets are also needed to identify VMEs.

Although fisheries conservation measures are considered appropriate, the main difficulty is the compliance and enforcement of such measures. For example, within the Azores, over 110 000 km^2 of marine areas presently benefit from some form of protection. Despite this, the majority are not covered by substantial monitoring, while even those that are monitored surveillance do not always provide the needed protection from regional fishing fleets. In addition, fisheries management at the EU level does not always consider the specific socio-economic importance of different fisheries within the Azores. For example, bottom longline fishing is one of the main métiers operating in the Azores. Although highly selective and non-abrasive, such fisheries are likely to catch shark resources that have historically formed an important economic resource for the region. Despite this, there is an EU ban on fishing of deep-sea sharks, and therefore no way of local fishers utilising such resources. In addition, since 2000, the use of bottom longlines in coastal areas has been significantly reduced, as a result of EU bans on such gears (up to 3 nm from shore). As a consequence, smaller boats that operate in this area have changed their gears to several types of handlines, which may have then increased pressure on a range of

important coastal species (Morato et al., 2011); parrotfish are landed by these fishing activities, and was the second most landed species during the April 2019 - March 2020 period within the Azores.

8.1.2 Madeira

The fisheries in Madeira are predominantly SSF, with the main exploited species being deep-water finfish (e.g. black scabbardfish) and high migratory species (e.g. tuna species).

As in the Azores, the stock boundaries and the stock connectivity of the majority of fish species are unknown in Madeira. There are also important gaps in oceanography, topography and mapping of habitats and abundance of marine species, including species that are exploited by the fisheries in the region. Many of the small neritic tunas that sustain the SSF are not subject to comprehensive data collection under regular programmes.

Concerning data collection shortcomings or obstacles, the main gaps come from the scarce information from fishery independent data. There have also been problems during recent years in the implementation of on-board observer programmes due to administrative reasons.

As in the Azores, further data collection is needed to quantify fishing effort métier, as well as in collecting socio-economic data in relation to the SSF. In addition, although a pilot study was carried out under the DCF pilot studies, there is no regular information regarding the impact of recreational fisheries within Madeira. Based on the results obtained through these pilot studies, it may be appropriate to implement routine sampling for the collection of this information. Big game fishing is also an important activity in this OR and in addition to the biological impact of such fishing, it could be relevant to collect data about the economic impact of this fishery in the region.

Although management measures are useful and effective, a lack of monitoring cannot always ensure compliance with the management regulations. In addition, European regulations, by defining rules (fleets, minimum catch sizes, prohibiting the use of certain gears or banning certain species) do not always take into account the specific characteristics of the multispecies artisanal fishery within Madeira, and the historical use of specific resources. For example, there is zero TAC on kitefin shark, which is an economically important resource in the region, and a bycatch product of the black scabbardfish fishery. However, due to no TAC for this species, fishers cannot retain and sell their catch, which they then discard, thus losing an important source of economic revenue for ca. 200 families. It is essential that local management is taken into account as specific management measures in the region.

Finally, although the current infrastructures are considered adequate, the level of staff and other human resources needed are considered limited to implement effective data collection programmes.

8.1.3 Canary Islands

The Canary Islands hold a large variety of pelagic and demersal fish species. The most commonly caught species are included in the 2017-2019 EU-MAP, representing around 92% of the local landings. Based on the landings reported, 84% are pelagic species and 14% demersal species. The fisheries sector is characterised by the predominance of small-scale fishing vessels.

Concerning the shortcomings or obstacles to fisheries management, focusing on stocks management, the main gap is the lack of knowledge of stock status which may lead to

overfishing. This has been identified in most fishing grounds where the SSF operates. The boundaries of some stocks are unknown. This lack of knowledge is greater for stocks outside of those assessed within ICCAT and CECAF.

In relation to data collections obligations, biological sampling of target species is limited to small pelagics and length sampling to demersal species. The sampling performed on tuna species does not have adequate coverage due to the high price of specimens (i.e. any sampling is undertaken by IEO of fishes bought off local fishermen). It is fundamental for good data collection programmes that the national and regional government of the Canary Islands have adequate funds to ensure adequate sampling of landed tuna in the region.

One of the main challenges for data collection is the monitoring of recreational fishing activities (see a recent proposal at Spanish level for 'underwater sea fishing' in section 7.3.1). Although there is little knowledge of the impact of this fishery on marine resources, based on recent studies the impact of such fisheries can be equal to, or even greater than, commercial fisheries. The implementation of routine programmes to collect recreational fisheries data is a priority in the Canary Islands. In addition, it is relevant to note that under the 2017-2019 EU-MAP and the 2020-2021 EU-MAP, the list of mandatory species on which data is collected for recreational fisheries is limited. In the 2020-2021 EU-MAP covering 2022 onwards the relevant Regional Coordination Group for data collection should agree to a revised list of species; the Regional Coordination Group for the sea basin encompassing the Canary Island is already at work on this. This is especially relevant as the mortality caused by the recreational fisheries could reach 40% of the total catches and 70% in some islands (MAPAyA, Jimenez Alvarado, 2016, Pascual-Fernández et al., 2012). Information on the impact of recreational fisheries is crucial for a proper stock assessment and management of the fisheries. Furthermore, as the Canary Islands is a very touristic region, the economic impact of this activity could also be relevant and should be analysed for management purposes.

The Canary Islands fishing fleet is almost entirely small-scale, making its monitoring and data collection programmes complex. For example, the large number of landing sites on different islands increases the difficulties of sampling across this fleet to the desired levels. To counter this, a robust and well-designed survey is required to monitor vessels at various landing sites to collect basic data needed for assessment and management (e.g. catch and effort data). This requires an allocated budget and human resources.

In addition, the information reported under transversal data from this fleet (e.g. sale slips, logbooks) coming from the EU Control Regulation is very scarce. This is notably more evident for vessels < 10 metres length overall (LOA). As these vessels must report only sale slips and the information on fishing gear used, effort and geospatial data is very limited, resulting in little ability to estimate fishing effort. In addition, it is quite complicated to allocate the corresponding métier to different trips while the quality of catch data could be low as this information is reported by fishers. Such catch data needs to be validated by scientific sampling data, as the identification of species is not always correct: fishers tend to group some species landings under a single family or genus rather than at species level.

For vessels < 12 m LOA it is not mandatory to have any tracking device installed (e.g. VMS, AIS); the use of such devices could improve knowledge about effort realised, identify main fishing grounds, and improve the control of these vessels. This is a crucial aspect to consider for management and conservation measures, taking into account the maritime space to manage.

Concerning socio-economic data, the universities in Canary Islands conduct studies and data is also available from official sources such as Instituto Canario de Estadistica

(ISTAC)[61], although these official sources provide data for fisheries and aquaculture together e.g. for employment data. Socio-economic data to help characterise the fleet are not readily available. However, the universities and the regional government conduct work to collect these data within the framework of diverse research activities. The socio-economic data collected under the DCF seems scarce and it is argued by some interviewees that it does not consider the peculiarities of the SSF.

The Canary Islands has developed a well-established research infrastructure with highly trained personnel. All data collected under the national work plan is implemented by IEO, while some institutions such as universities conduct their own research-led data collection activities. The regional government is responsible for reporting transversal data such as sales slips (mandatory under the EU Control Regulation). However, funding for data collection under the DCF or other EU funded projects is not easily accessible for research entities. As such, the objectives of data collection may overlap between different institutions. To prevent this, it is important to improve the communication and coordination between institutions involved in data collection. Further to this, implementing a robust data collection programme that satisfies the ORs needs is essential to ensure the effective and efficient use of EMFF funds allocated.

Other research projects funded by the EC under different programmes (e.g. Interreg) have also been used to improve knowledge and scientific advice in the Canary Islands. They are not directly connected with the DCF, but are relevant for fisheries data collection. The Interreg fund has been used to collect data for marine environment, ecosystems, and aquaculture purposes. Such programmes are also essential in improving knowledge and providing better scientific advice. However, these research projects have a limited duration and it is important to identify essential data needs for the long term and try to incorporate them, when possible, under EMFF funding and especially under the budget allocated to the DCF.

Finally, concerning management measures, in external waters the responsibility lies with the national government. These measures are put in place for resources such as small and large pelagic and demersal resources, which are targeted by SSF employing traditional fishing gear. For some tuna resources TACs are in place and control of fishing activity is conducted by the national government. Fisheries management in the region is affected by international management, as some of the most important resources exploited in the Canary Islands are managed at the international level in ICCAT or are dependent of the scientific advice of CECAF. Thus, there is a complex institutional setting where some of the most relevant management measures, such as TACs, are affected by international management; for tunas the TAC level determines the quotas allocated to Spain and then allocated to the Canary Islands' fleet. Such quota is contested by regional stakeholders which consider the level of the regional TAC does not reflect regional needs and the nature of the SSF activities.

8.2 Caribbean

8.2.1 Martinique

Fisheries in Martinique catch a large variety of fish species and the main fisheries can be considered SSF. A common characteristic of this fishery is that it does not target specific species. Both small and large pelagics represent around 30% of the catch, while the

61 http://www.gobiernodecanarias.org/istac/

remaining 70% predominantly comprise demersal fishes, including reef fish and crustaceans.

Regarding the stocks assessed, 12 main fished species are well assessed, and the data collected for this assessment is sufficient to run data limited models. However, for all other species there is not a formal stock assessment as the basic biological data collected is not sufficient for a reliable stock assessment.

Massive use of chlordecone between 1972 and 1993 resulted in soil and water pollution. Because of this no fishing zones on the eastern part of Martinique and in the Bay of Fort-de-France have been established. Fishers are encouraged to go fishing further from the coast, which implies deeper fishing given the bathymetric profile of Martinique. This hampers the potential development of the sector and will certainly encourage emergence of new stocks exploitation (deep species). Such fishing activities will require an adaption of some regional and national legislation if new deep-water species are exploited by the fleet.

Regarding the impact of recreational fisheries, voluntary data collection is currently being undertaken. Although this could be considered as a starting point, the quality of the data should be analysed. It is quite common, especially in the case of recreational fishers, that avid fishers participate in this volunteer surveys, resulting in the potential for an overestimation of catches.

Ifremer plays a central role in Martinique through implementation of sample-based surveys collecting catch and effort data (OBSDEB programme) and biological data (OBSVENTE programme). Ifremer design data collection methodology, provide tools for data entry, processing and computation (SIH, managed in Brest, France) and conduct field activities to collect data from fishers. The main data gaps are related to socio-economic data and recreational fisheries, although as mentioned above, some studies have begun. In addition, compliance to DCF obligations related to biological data parameters is low except for certain large pelagic species. The list of species collected under the DCF should be reviewed and analysed taking into account the specific needs for this region, including management needs. This means that this list may need to be extended.

8.2.2 Guadeloupe

Multi-gear SSF is the main type of fisheries in the archipelago. These fisheries do not target any specific species. The catch structure is composed of large pelagic species (40% of the catch), with the remaining 60% comprising demersal fish (i.e. reef fish, crustaceans and other species). The majority of vessels within Guadeloupe (64%) operate within the 12 nm limit, while 23% operate on a regular basis outside this limit. However, given the high level of chlordecone, the proportion of vessels operating outside the 12 nm limit is regularly increasing.

Stocks managed under ICCAT are monitored and five have formal stock assessments to determine stock status. However, other relevant stocks in this region have not been formally assessed, due to limitations and gaps in biological sampling of these species. This hampers effective management of the stocks in this region. In addition, as in Martinique, little recreational fisheries data being collected, though data is being collected by volunteers (under the same program as discussed above for Guadeloupe), though should be independently assessed.

Data collection of field activities has been outsourced to a private company, but remains under full supervision and management of Ifremer Martinique and SIH in Brest. Ifremer plays a central role through the implementation of sample-based surveys collecting catch and effort data (Observation des Marées au Débarquement (OBSDEB) programme, with a

specific focus on Guadeloupe), and biological data (OBSVENTE programme, covering all France). However, there is a need for additional staff in Ifremer Martinique dedicated to monitoring and coordinating activities in Guadeloupe, including data collection. No Ifremer staff specifically dedicated to Guadeloupe activities has any impact on communication and monitoring quality of collected data. The impact of this is mitigated by regular calls and (at the least) a yearly visit to Guadeloupe by Ifremer Martinique. However, as there is no direct supervision by Ifremer, there is a risk of misunderstanding some aspects of data collection (e.g. methodology for biological sampling when collecting catch / effort information).

Compliance with the EU Control regulation has been low until recent years. An effort has been made to increase this compliance and in 2020, 40% to 60% of logsheets were reported with information on fishers' activity. However, the quality of this reported data has not been compared and validated with the sampling surveys carried out by Ifremer; validation is essential to the efficient management of the fisheries in this region.

In relation to data collection, an important lack of information exists on biological parameters to conduct stock assessment of the main commercial fisheries (except large pelagic species, for which . Lack of socio-economic data is also evident. Data relating to ETP species is also scarce. For proper management of fisheries resources in the region, it is important to address the lack of data on the variables mentioned above.

8.2.3 St. Martin

No literature could be found precisely describing the different stocks / métiers operated in St Martin. Discussion with a fisheries expert having worked in St Martin from Comité de la Pêche Maritime et des Elevages Marins (CRPMEM) in Guadeloupe indicated that the same métiers as in Guadeloupe are operated with the same species caught.

There is no routine data collection organized in St Martin except for the effort "Calendrier d'activité". These data are not published by SIH. Limited numbers of professional fishers (10-20) would not justify setting up an OBSDEB programme as in Guadeloupe, in terms of financial investment and in terms in methodology (sample-based approach for 20 fishers is not the adequate method, better to go for a complete enumeration by interviewing all fishers). Regular telephone interviews could be one immediate solution even with the uncertainty on quality of data.

Collecting and using log sheet could be an alternative solution assuming good quality of data reported by fishers, with random controls being implemented. A global programme to assess quality of log sheet should be implemented.

8.2.4 French Guiana

French Guiana is the only OR that is not an island. Regarding the exploited stocks, these are coastal species dominated by weakfishes or sea catfishes. There are 43 species or group of species captured that are formally monitored. Operations are split between coastal SSF not targeting specific species, commercial vessels from Venezuela targeting red snapper and a small number of commercial ship trawlers. Out of the 43 monitored species, only 2-5% are formally assessed and are focused only on red snappers and penaeid shrimps. This means that the assessment is focused on those species targeted mostly by the most industrial fleet and that the relevant coastal species for the artisanal fleet are not assessed.

According to DPMA and French Guiana Sea Directorate, the local industry expressed interest in developing high sea fisheries targeting tuna and tuna like species. However, there are important scientific, technical and management-related limitations on data on

potential target resource in the region. Also, no local boats are suited to offshore fisheries. In addition, fishers of the region do not have the necessary skills in the required fishing techniques.

An important shortcoming from a stock assessment perspective is the lack of reporting catches by most of the artisanal vessels. The quality of the reported data is also low. This information relies on the sampling data collected by Ifremer observers. However, although some few ports are officially allocated for landings (e.g. red snapper can only be landed in Cayenne), an important fraction of these landings are undertaken on different beaches and other non-official landing sites. This means that greater coverage is needed from sampling programmes to collect good quality data. In addition, IUU fishing is considered by local authorities likely to be a major issue with catches roughly estimated to be at least equal to, if not higher than, legal reported catches. The information about recreational fisheries catches is also unknown, although it is planned to start using off-site surveys (e.g. telephone surveys). The lack of reporting of landings by an important fraction of the artisanal vessels, the importance of the IUU and the unknown impact of recreational fisheries hampers tremendously the correct management of most of the species in French Guiana.

The data collection programme is mainly implemented by Ifremer with the participation of a local company in the Northern areas. The limitation in human resources is also a shortcoming for good implementation of robust data collection programmes. Although there is the potential need to enhance such human resources, discussions with the local institutions in French Guiana highlighted that it is highly unlikely that local data collectors will be sent to study in mainland France just to then come back to the OR to be a part time data collector (as sampling is such that there it is not a full time role). The restrictions on sending people to mainland France will come down to the cost (which is expected to be very high), while those that likely to take a part time data collector position might not have basic local education. Lastly, as public salaries are low, there may be issues with the local institutions retaining such trained staff. Similar to other French ORs, the main budget to implement a data collection programme comes from the EMFF funding. As in other French ORs, the major issue regarding this funding is how it works. It is based more on a project basis rather than implementing a robust routinary data collection programme. The cost would be tremendous, and also. Again, here, we are not inventing stuff, just recording what the local institutions told us.

Considering the specific issues related to the DCF, 7 stocks are included under the French workplan instead of the 11 stocks mandatory to collect data. This is due to the threshold applying where catches under 200 tonnes are not mandatory to cover (Commission Implementing Decision (EU) 2019/909). However, it is important to consider the uncertainties in the quality of the reported catches and also the rationale of considering this threshold in the case of these OR regions. These stocks could be relevant for this coastal population management and perhaps the application of the threshold should be analysed. There are also problems in the access to some landings in the case of shrimps and red snapper that could decrease the quality of the data collected. This is due to the refusal of some local processors to sample some catches as they refuse to allow scientists into their premises. According to the most recent red snapper stock assessments performed by Ifremer, the current management measure for that stock, i.e. limit on the number of boats allowed to fish, is not adequate to properly manage the stock. However, the available data are too uncertain to draw conclusions about the state of the red snapper stock and therefore make it difficult to recommend precise quantitative management measures.

Potential solutions to remedy the red snapper data gaps include scientific studies (survey on possible changes in fishing practices, experimental study comparing different hook sizes) and also possible changes to the regulations, particularly by increasing the

proportion of the catch landed in French Guiana (currently 75%) and/or by imposing size sampling of these catches. In the shrimp fishery, due to the significant reduction in landings in 2018 affecting the proper implementation of the catch sampling plan and the lack of cooperation from some shipowners, a stock assessment could not be performed. Ifremer's advice is that an annual TAC alone is probably not the best management measure, and that in-year reassessment (adaptive management) seems to be the preferred option. Other management measures, in particular by means of fishing effort, could be envisaged but would require a very thorough study of the relationship between fishing effort and mortality. Finally, the setting of an alternative management objective to MSY is essential. Furthermore, a fishery-independent study of the shrimp stock would be required to properly assess the fishery.

8.3 Indian Ocean

8.3.1 Mayotte

Exploited stocks in Mayotte are predominately coastal catches, with very little activity outside of the lagoon. Fisheries in Mayotte catch a large variety of fish. Approximately 700 fish species are identified in Mayotte, of which about 300 are fished (Weiss et al., 2019). The predominant fishery is the multi-gear artisanal fishery that does not target specific species and is predominately an opportunistic fishery.

Concerning species and stocks monitored, there are few species that have a formal stock assessment. Of the 50 species in which catch is monitored, only 5 species are formally assessed. These are species covered by IOTC. There is no formal assessment for non-tuna like species. This hampers the management of especially the coastal species fished by fishers in Mayotte. As mentioned above the number of species fished is huge and it is not possible to collect data for all of these species. However, based on the landings or sampling data, these species could be grouped and prioritised in terms of their importance in the local economy and included under the routine data collection programmes. This could be a starting point for a proper management of these species. The taxonomic levels provided for the catch composition is very limited for management purposes (e.g. marine fishes not elsewhere included (nei) group or other species nei).

An important shortcoming, common to other ORs, in Mayotte is the absence of information about the recreational fishery activity and especially on the biological impact of this fishery on different fish species. The impact of this fishery in this region could be as important or higher than the commercial fishery. There is a need to start conducting monitoring programmes to collect data of recreational fisheries if proper management of the marine resources is the objective. In addition, 'informal' and IUU fishing is widespread. All these gaps and uncertainties about the total catches in the region could be improved by increasing the monitoring and control in the region, although the characteristic of the fisheries and also a large number of landing sites make the implementation of the monitoring programmes complex. Furthermore, in Mayotte fisheries policing is not a priority compared to missions related to illegal immigration from neighbouring Comoros. However, the fight against illegal fishing is related to the overall illegal immigration issue as a large number of illegal immigrants work in IUU fishing. There is also a confusion of roles in the minds of fishers who sometime perceive fisheries' MCS activities as police activities, making it harder to collect data etc., since OFB has both roles.

The data collection programmes are mainly implemented by Ifremer with the participation of IRD especially on the onboard observer programme and on tuna fisheries in the Indian Ocean as in other French ORs. In Mayotte, landings and biological data is collected by OFB following SIH protocols. There are some issues that still need to be solved to improve the quality of the data collected. It is the case logbook information is still not reported following the code lists that the SIH/DCF mandates. In addition, OFB's overall missions do not

include fisheries monitoring: the fact that OFB does this in Mayotte for Ifremer is an exception, so this is not a priority at the level of the institution. OFB's staffing regulations also make it difficult to keep expert staff.

The main budget to implement a data collection programme comes from the EMFF funding. As in other French ORs, the major issue regarding this funding is how it works. It is based more on a project basis rather than with the aim of implementing a robust routine data collection programme. DPMA has proposed that, for the new EMFAF, funding be attributed for the whole cycle to secure data collection over the 6-year period to improve this situation. In addition, early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities.

Concerning specific issues regarding the data collection obligation in Mayotte, some mandatory DCF species are not part of the French work plan. The observer coverage is considered to be not high enough according to OFB but there is important lack of human and financial resources to improve this situation. In Mayotte, there is a lack of skills and knowledge that cannot be addressed with money, due to the local context. Administrative, staff regulations and salary caps are hindering data collection by OFB staff. One solution could be to externalise the data collection, to make it easier to recruit people, to organise etc., (as is done in French Guiana or Martinique).

Biological and socio-economic data are the main gaps. As previously mentioned, a recommendation is also to include a larger set of species harvested in the lagoon to be covered.

8.3.2 Réunion

The fishery sector in Réunion is a mix of small-scale vessels operating in coastal waters and larger vessels operating offshore, particularly targeting large pelagic species (tuna and tuna like species mostly). There are two segments in the fleet ≤12m LOA, comprised of the artisanal fleet operating mostly in coastal waters and vessels >12m LOA, composed of industrial vessels fishing on the high seas. The composition of the catches is dominated by large pelagic species, where a small fraction (less than 10%) is composed of coastal species.

Based on the landings data, there are 89 species captured but only 16 are formally assessed. Six are small demersal or pelagic species and 12 are large pelagic species assessed by the RFMO IOTC. In addition to this low number of species assessed, an important gap exits in data collection on depredation catches (sharks, marine mammals etc.). These lost catches are not taken into account in landing data and could represent a significant amount. This is an important shortcoming for correct management of these sensitive species. Another important gap concerning stock management is the lack of data on recreational fishing activity. The impact of this recreational fishery could be relevant in marine resources and is essential for proper management of the marine resources. Under the 2017-2019 EU-MAP, the mandatory species to collect data for recreational fisheries is limited to few species. Under these species, highly migratory species are included for all regions. However, in the case of the ORs, a proper evaluation would be needed when defining the relevant species targeted by the recreational fishery, as it could be very different from the current mandatory list of species. This is essential, especially when the impact of this fishery could be important on some species or stocks. Another important gap under the data collection programmes is the data collection of socio-economic variables.

The data collection programme is mainly implemented by Ifremer with the participation of IRD, especially on the onboard observer's programme and on tuna fisheries in the Indian

Ocean. This programme is well structured but what is hampering this programme is not the financial resources but the lack of human resources, in particular contracting local staff in the ORs experts in the field. The budget is obtained from the EMFF funding but hiring long term staff is not an option under the EMFF. In the specific case of la Réunion, DMSOI is in charge of coordinating SIH activities for DPMA. However, it is a pyramidal system that does not leave a lot of leeway local initiatives. There is no leeway to change methods based on local needs/specificities and it makes it also difficult to promote and use the data at the local level.

As it is mentioned in the paragraph above, the main budget to implement a data collection programme comes from the EMFF funding. The major issue regarding this funding is how it works. It is based more on a project basis rather than implementing a robust routine data collection programme. In addition to this funding, other sources are the national budgets through grants agreements, conventions etc., and specific projects funded by DG MARE. But again, these type of projects have a limited period of time. They could provide good outputs for specific needs but not always enough when the data collection needs are more essential from a long-term perspective.

9 OUTERMOST REGION-SPECIFIC SWOT ANALYSIS AND RECOMMENDATIONS

The following section provides a summary of the SWOT analyses undertaken for each OR, highlighting the most important factors only. The full SWOTs can be found in Annex 3. Where no Strength, Weakness, Opportunity or Threat could be identified, or in the case of the level 2 analysis, no linkages were identified, this has been clearly stated.

The results of a broad analysis undertaken of each SWOT to identify common trends can be found in the figures below. Figure 1 provides an overview of the number of Strengths, Weaknesses, Opportunities and Threats found in each OR. This figure indicates that the majority of factors affecting each OR are internal (Strengths or Weaknesses) with much fewer external factors impacting data collection and scientific advice (Opportunities or Threats). St Martin had the fewest Strengths, Weaknesses, Opportunities or Threats overall, which was to be expected considering the small fleet size. There also appears to be a similar ratio of Strengths, Weaknesses, Opportunities and Threats in each OR.

Figure 2 shows the number of Strengths, Weaknesses, Opportunities and Threats for each Task (Tasks 1-5). This figure indicates that the majority of weaknesses are concerned with Task 1 (Stock Status), followed by Task 4 (Data Collection Obligations) and Task 2 (Institutional Structures). By Task, it is also clear that most factors affecting data collection and scientific advice are internal to the OR.

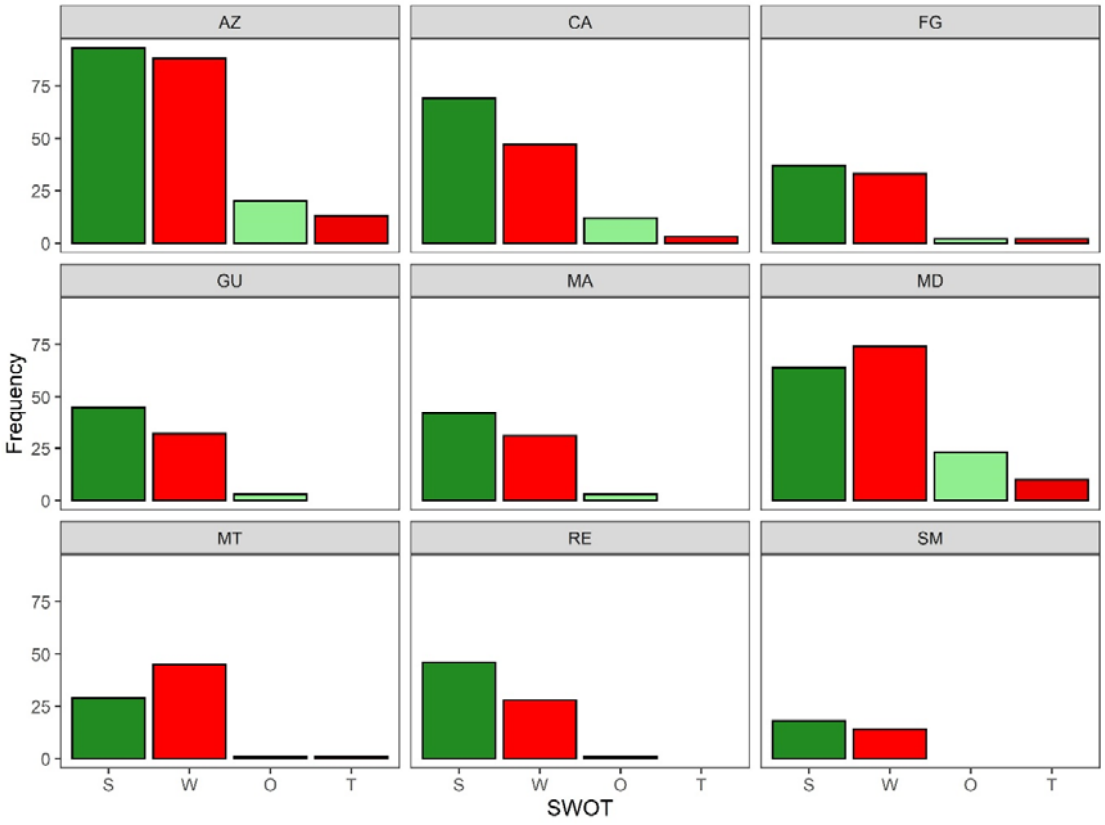

Figure 1: Frequency of Strengths, Weaknesses, Opportunities and Threats for each OR. AZ = Azores, CA = Canary Islands, FG = French Guiana, GU = Guadeloupe, MA = Martinique, MD = Madeira, MT = Mayotte, RE = Réunion, SM = St Martin.

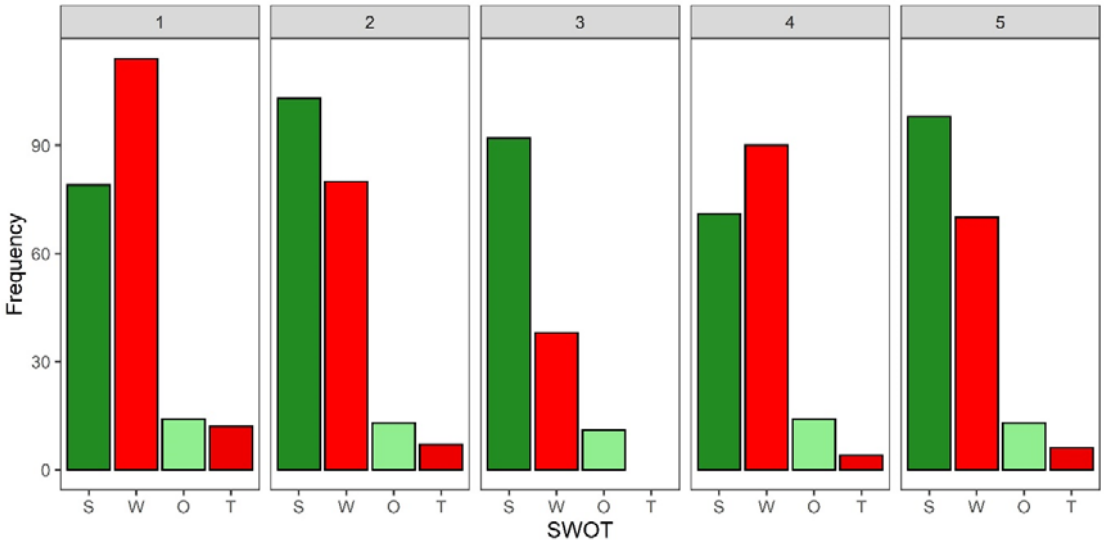

Figure 2: Frequency of Strengths, Weaknesses, Opportunities and Threats for each Task 1-5.

9.1 Macaronesia

9.1.1 Azores

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in the Azores. For the full SWOT analysis, please see Annex 3.

Table 6: Summary of Level 1 SWOT analysis for Azores.

	Positive	Negative
Internal	**STRENGTHS** • Main target species and métiers are known • Relevant data collected • DCF sustainable and implemented with onboard observers and scientific surveys • Long tradition of scientific projects and programmes • Several monitoring programmes or studies outside DFC • Good capacity and high skill level • Clear roles and responsibilities • Local management measures • Space for new fisheries • Good collaboration between scientific bodies and Macaronesia area • The fishing sector is organised at local and regional level • Space to introduce innovative tools for data collection • Bycatch of endangered species is considered low • Large number and regulated MPA • Recreational fishing is described, well segmented, and regulated • Scientific bodies are prompt to translate science into regulation • Azores fleets prohibited to use destructive gears such as trawls and bottom gillnets	**WEAKNESSES** • No biological information, assessment and TAC for some commercial important species (risk of overfishing) • No sufficient skilled staff • Limited involvement of producers in management • Recreational and SSF constitute a challenge for data collection • There are no coordination tools/platforms in place to facilitate communication amongst institutions, scientists and managers • Centralization and bureaucracy in the management of the EMFF for data collection • Fisheries management does not always take into account the specific socio-economic characteristics of ORs • Monitoring is not enough in fisheries and MPAs • Social and economic data not included in the work plan

	Positive	Negative
External	**OPPORTUNITIES** • Potential for increased presence at ICCAT and ICES scientific WG to better represent OR priorities • Development of cooperation in the region in data collection • Use of drones to control MPAs • Structural funds other than EMFF • New communication and information technologies for improved data collection/articulation • Improved data collection and assessment may allow to implement TACs • Climate change effect on stocks	**THREATS** • Foreign commercial fleets activity does not enter local statistics • Unknown number of foreign vessels operating • Increasing IUU fishing • Limited regional representation in scientific bodies • Reduction of catch opportunities • Climate change effect on stocks

For the Level 2 SWOT analysis for the Azores, several Strengths, Weaknesses, Opportunities and Threats were linked. The following tables (Table 8a and Table 8b) provides a summary of the main points.

Table 8a: Summary of Level 2 SWOT analysis for Azores

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • New technology and communication platforms to strengthen collaboration between local, national and regional levels • Use MSP to protect Vulnerable Marine Ecosystems (VMEs) and associated high risk species	**"Attractive Options"** • Alternative funding sources (outside of EMFF) to support data collection • Improve regional collaboration to increase OR representation at the regional level • Exploit new communication platforms and technologies to improve data collection and collaboration • Develop collaboration within the Macaronesia area to study stock boundaries and shared stocks using genetic analysis where available • Opportunities to standardise transversal data collection • Remote length sampling available for auctions to respond to large number of landing site and isolated islands in the archipelago • Improved data collection may allow implementation of more TACs locally and better management • Employ new technology to assist in data collection (Recreational and artisanal)
Threats	**"Threats that can be defended"** • Improve knowledge of foreign vessels and those from the mainland within 100 nm • Utilise knowledge of the environmental ecosystem to help predict impacts of climate change on stocks • Utilise existing scientific infrastructure and MCS organisation to quantify IUU	**"High Risk Scenarios"** • Risk of overfishing due to knowledge gaps and increasing IUU fishing

Table 8b: Summary of Level 2 SWOT analysis for Azores

	Threats	Weakness
Opportunity	**"External Opportunities"** • Climate change may be beneficial to current stocks or allow new stocks to be exploited	
Strength		**"Internal Opportunities"** • Alternative funding to support data collection (outside EMFF) • New MoniCo System • Wider range data collection and assessment • Regional assessments to support national assessments • Mandatory auctions at landing sites could help increase data collection for the artisanal fleet • Recognise gaps in data and using alternative approaches, where alternative approaches are a viable option • Discard and bycatch assessments provide further data to conduct stock assessments • Knowledge of the gears and fishing activities within 100 nm should be extended to cover recreational, sports fishing and small-scale fleet • Build on good collaboration to remove blame between sectors and reduce burden • Regional scientists should also be more present in RFMOs • The recreational fishery is well regulated and licensed and therefore a framework may exist to ensure sufficient data collection • Where species are not present at landings site, scientific surveys could be used to support data collection. On-board observers could also be utilised where possible • Data limited approaches are available for stocks where data are limited

9.1.2

9.1.3 Madeira

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in Madeira. For the full SWOT analysis, please see Annex 3.

Table 9: Summary of Level 1 SWOT analysis for Madeira.

	Positive	Negative
Internal	**STRENGTHS** • Main target species and métiers are known • Relevant data collected • DCF sustainable and implemented • Good capacity and high skill level • Clear roles and responsibilities • Good management measures • Space for new fisheries • Good collaboration between scientific bodies and Macaronesia area • No IUU fishing products within ARM • The fishing sector is organised at local and regional level • Space to introduce innovative tools for data collection • Bycatch of endangered species is considered low • MPA's exist and are regulated • Recreational fishing is described and regulated. • Destructive gear bottom trawling and trammel nets are not allowed to fish in Madeira below 200 m. • Regulation of fisheries agreements in the Macaronesia Region	**WEAKNESSES** • No biological information, assessment and TAC for some commercial important species (risk of overfishing) • No regular scientific surveys and on-board observer programme • No sufficient skilled staff • So far NGOs don't work with fisheries related issues • Limited involvement of producers in management • Deep and low productivity waters limits potential catch, fishing activity biased towards tunas and black scabbardfish • Recreational and SSF constitute a challenge for data collection • There are no coordination tools/platforms in place to facilitate communication amongst institutions, scientists and managers • Centralization and bureaucracy in the management of the EMFF for data collection • Fisheries management does not always take into account the specific socio-economic characteristics of ORs • Lack regulations • Monitoring is not enough • Social and economic data on the processing industry is not included in the work plan

	Positive	Negative
External	**OPPORTUNITIES** • Potential for increased presence at ICCAT and CECAF scientific WG to better represent OR priorities • Development of cooperation in the region in data collection • New communication and information technologies • Structural funds other than EMFF • New communication and information technologies for improved data collection/articulation • Use of drones to control MPAs • Regional representatives in scientific working groups relevant for the area • More articulation with other sea related activities (biotechnology) • Improved data collection and assessment may allow to implement TACs • Climate change effect on stocks	**THREATS** • Limited regional representation in scientific bodies • Increasing IUU fishing • Reduction of catch opportunities • Climate change effect on stocks

For the Level 2 SWOT analysis for Madeira, several Strengths, Weaknesses, Opportunities and Threats were linked. The following tables (Table 10a and Table 10b) provides a summary of the main points.

Table 10a: Summary of Level 2 SWOT analysis for Madeira.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive Options"** • Utilise regional collaboration to improve knowledge on stock boundaries and shared stocks • Alternative funding to the EMFF could be identified to fill existing gaps in fisheries knowledge • Madeira participates in regional data collection and as such could attend RFMO / regional meetings to represent OR specificities • EU legislation should be simplified to supports its uptake • The use of new technologies could be a way forward to collect data in this type of fisheries/métiers • Regional networking and representation may help to improve management of OR fisheries • TACs can be a desirable tool for management and support allocation of resources amongst fleets • Utilise communication platforms and technology to improve collaboration and communication between different levels
Threats	**"Threats that can be defended"** • None were identified	**"High Risk Scenarios"** • There may be detrimental effects on current stocks by climate change and new stocks may not be able to be exploited potentially further reducing catch • Uneven application of law could result to issues amongst fishers

Table 10b: Summary of Level 2 SWOT analysis for Madeira.

	Threats	Weakness
Opportunity	**"External Opportunities"** • None were identified	
Strength		**"Internal Opportunities"** • Current knowledge may provide information to support stock assessments (limited by presence at meetings) • Wider range of data collection and assessment • MSP may help to provide information to fill gaps • There is the possibility of exploiting new fisheries which may help reduce pressure on stocks that are thought be subject to overfishing • Wider range of data collection and assessment • External funding could be utilised to fill gaps in data assessment and collection • Some recreational data are already collected at auction sites and should be further utilised and collected • TACs can be a valuable management tool when good catch data are available • Most institutions are based in Funchal and so familiarity may help facilitate potential institutional changes or transitions in responsibility • Universities can provide valuable data to fisheries knowledge and help support management • Auction market on-site questionnaires could be implemented • There is knowledge and a framework available to improve the management and monitoring of the recreational fishery

9.1.4 Canary Islands

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in the Canary Islands. For the full SWOT analysis, please see Annex 3.

Table 11: Summary of Level 1 SWOT analysis for the Canary Islands.

	Positive	Negative
Internal	**STRENGTHS** • Fleets and gears are characterised • Relevant data collection programme (both at market and at sea) • Highly qualified scientific staff in IEO and academia • IEO is an Intermediate Management Body under EMFF and thus in capacity to manage own funding for research within the DCF and beyond • Other sources of funding are available such as INTERREG • Clear roles and competencies in fisheries at local, regional, and international level • Extended exclusive fishing zone (100 m) for fishing activities of the Canary Islands fleet • Professional fishing is thoroughly regulated with many technical measures (e.g. trawling is forbidden) • The fishing sector contributes with scientists in data collection process • Research and academia contribute with sound research on fisheries biology and socio-economics • TACs are already in place for some ICCAT species • IEO has a research vessel that may allow successful acoustic surveys in the near future	**WEAKNESSES** • Large number of landing sites • Large fleet mostly artisanal and polyvalent • Mixed fisheries, large variety of gears and species targeted: difficult to obtain species-specific standardized fishing effort • First sales data difficult to collect accurately: misidentification of species at the first sale points • Biological samplings only in place in the west (Tenerife Island) • Weak awareness on sustainable practices leading to overfishing • IUU fishing is an acute problem • Recreational fisheries are increasing and are difficult to control and monitor • Scarce coordination of administration, scientists, and sector to organize the fishing activity • Management measures are poorly based on science • Some management measures are inconsistent with overarching sustainability goals • Lack of stock assessment for relevant small pelagic and demersal stocks • Coordination amongst regional actors involved in management and research is weak

	Positive	Negative
External	**OPPORTUNITIES** • Potential for an OR presence at ICCAT and CECAF meetings to increase representation. OR priorities would be much better included in this way • Structural funds other than EMFF offer good opportunities at regional and Macaronesia level • New technologies could be employed to facilitate observation on board of fishing activities • The new ORs AC may strengthen the voice of the Canary Islands and other OR fishing sectors before the EU • Improved data collection may allow increasing use of TAC as a management tool that facilitates control of catch uptakes • Implementation of methods and learning from other areas where data-poor fisheries have improved their stocks assessment	**THREATS** • Oligotrophic waters • Climate change

For the Level 2 SWOT analysis for the Canary Islands, several Strengths, Weaknesses, Opportunities and Threats were linked. The following tables (Table 12a and Table 12b) provides a summary of the main points.

Table 12a: Summary of Level 2 SWOT analysis for the Canary Islands.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • If OR presence was increased at regional and international meetings, then OR specificities would be better represented	**"Attractive Options"** • Increase knowledge through more collaboration • Increase local knowledge on stock can help identify stocks that are subject to overfishing or at risk of overfishing • Improve collaboration in the region could help strengthen data collection and resource assessments • Joint coordinated efforts could be done to increase uptake of EMFF if any of these funds are eventually difficult to employ • REM technologies could be employed as a substitution of scientific observers' programmes which are difficult to implement in large fleets where very small vessels predominate, making these programmes technically complicated • Improved data collection may allow implementation of more TAC (where appropriate)
Threats	**"Threats that can be defended"** • Oceanographic characteristics and the marine ecosystem are well studied and might provide insight into possible changes in stock abundance and distribution to help mitigate any negative effects of climate change	**"High Risk Scenarios"** • N/A

Table 12b: Summary of Level 2 SWOT analysis for the Canary Islands.

	Threats	Weakness
Opportunity	**"External Opportunities"** • None were identified	
Strength		**"Internal Opportunities"** • Current knowledge may provide information to support stock assessments • Alternative approaches have been developed to advance stock assessments • Wider range of data collection and assessment • Independent research could help support resource assessments • A new process is taking place at IEO in assigning the capture and effort to each métier due to the high polyvalence and opportunistic use of different gears during the trip • Existing knowledge of the marine ecosystem can be used to determine and mitigate possible impacts from aquaculture • The creation of a new Scientific Committee should help facilitate coordination and communication • Institutions can make a valuable contribution to fisheries knowledge and potentially could help supply vital data • External funding could be utilised to fill gaps in data assessment and collection • There is a framework in place to manage the recreational fishery

9.2 Caribbean

9.2.1 Martinique

The table below provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in Martinique. No Opportunities or Threats were identified for Martinique. For the full SWOT analysis, please see Annex 3.

Table 13: Summary of Level 1 SWOT analysis for the Martinique.

	Positive	Negative
Internal	**STRENGTHS** • Fishery sector in Martinique is exclusively SSF, operated from one type of vessel designed to be multi-gear (legacy from the old wooden Yole) and catching a large variety of species • It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch) • Institutional routine data collection is in place for biological data (catch / effort / some length frequencies), implemented and managed by Ifremer Martinique • Exploited stocks are well identified and information published (SIH) • ICCAT stocks are assessed • Funds are adequate to financially support current data collection activities • External fund available • DCF obligations are full filled for biological data except for recreation fisheries • Complete and up-to-date legislation for management and conservation of resources in Martinique	**WEAKNESSES** • General decrease in catches and number of fishers in the island for different reasons (hardness of fishing condition, impact of chloredecone) • No routine data collection on socio economic data and for recreational fisheries • No assessment of demersal stocks (reef fish, deep fish) • No compliance to DCF obligation regarding socio economics data and recreational fisheries
External	**OPPORTUNITIES** • None were identified	**THREATS** • None were identified

For the Level 2 SWOT analysis for Martinique, Strengths, Weaknesses, Opportunities and Threats were reviewed for linkages. The following table (Table 18a and Table 18b) provides a summary of the main points.

Table 18a: Summary of Level 2 SWOT analysis for the Martinique.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High risk scenarios"** • None were identified

Table 18b: Summary of Level 2 SWOT analysis for the Martinique.

	Threats	Weakness
Opportunity	**"External Opportunities"** • None were identified	
Strength		**"Internal Opportunities"** • Ifremer is starting to improve knowledge on stocks that have not yet been assessed • There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised • Wider range of data collection and assessment • Landing data are recorded on a daily basis and could be utilised to support stock assessments • There is a committee already established to review socio-economic data and should be utilised to support further data collection if required • External funding could be utilised to fill gaps in data assessment and collection

9.2.2 Guadeloupe

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in Guadeloupe. No Opportunities or Threats were identified for Guadeloupe. For the full SWOT analysis, please see Annex 3.

Table 19: Summary of Level 1 SWOT analysis for the Guadeloupe.

	Positive	Negative
Internal	**STRENGTHS** • Fishery sector in Guadeloupe is exclusively SSF, operated from one type of vessel designed to be multi-gear (legacy from the old wooden Saintoise) and catching a large variety of species • It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch) • Institutional routine data collection is in place for biological data (catch / effort / some length frequencies), locally implemented by an external vendor and managed by Ifremer Martinique • Exploited stocks are well identified and information published (SIH) • ICCAT stocks are assessed • Funds are adequate to financially support current data collection activities • Alternative funding sources • DCF obligations are full filled for biological data except for recreation fisheries • Complete and up-to-date legislation for management and conservation of resources in Guadeloupe	**WEAKNESSES** • General decrease in catches and number of fishers in the archipelago for different reasons (hardness of fishing condition, impact of chloredecone) • No dedicated staff in Ifremer Martinique to monitor Guadeloupe activities • Risk of break in data collection activities related to external vendor contract renewal • No routine data collection on socio economic data and for recreational fisheries • No assessment of demersal stocks (reef fish, deep fish) • No compliance to DCF obligation regarding socio economics data and recreational fisheries • Impact on non-assessed stocks of trend to go fishing farer and deeper due among other to closure of coastal areas (chlordecone)
External	**OPPORTUNITIES** • None were identified	**THREATS** • None were identified

For the Level 2 SWOT analysis for Guadeloupe, Strengths, Weaknesses, Opportunities and Threats were reviewed for linkages. The following table (Table 16a and Table 16b) provides a summary of the main points.

Table 16a: Summary of Level 2 SWOT analysis for the Guadeloupe.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High risk scenarios"** • None were identified

Table 16b: Summary of Level 2 SWOT analysis for the Guadeloupe.

	Threats	Weakness
Opportunity	**"External Opportunities"** • None were identified	
Strength		**"Internal Opportunities"** • Availability of data limited models to assess stocks • Ifremer are starting to expand stock assessments to other species • Training to encourage fishers to report catch and other data • Clear institutional set up is in place to support further data collection • There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised • External funding could be utilised to fill gaps in data assessment and collection e.g. demersal stocks • There is a committee already established to review socio-economic data and should be utilised to support further data collection if required • 2-year Plan in place that defines objectives for control and enforcement

9.2.3 St Martin

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in St Martin. No Opportunities or Threats were identified for St Martin. For the full SWOT analysis, please see Annex 3.

Table 17: Summary of Level 1 SWOT analysis for the St Martin.

	Positive	Negative
Internal	**STRENGTHS** • Fisheries sector is similar to Guadeloupe, with predominance of SSF. Only 20 vessels are registered in St Martin • Effort information collected by telephone by Groupe EI on behalf of Ifremer • Funds available to support data collection activities • Same legal framework for fisheries management and conservation applies to St Martin as in Guadeloupe	**WEAKNESSES** • No catch data collected • No dedicated staff in Ifremer Martinique to monitor Guadeloupe activities • Risk of break in data collection activities related to external vendor contract renewal • No routine data collection on socio economic data and for recreational fisheries • No assessment of demersal stocks (reef fish, deep fish
External	**OPPORTUNITIES** • None were identified	**THREATS** • None were identified

For the Level 2 SWOT analysis for St Martin, Strengths, Weaknesses, Opportunities and Threats were reviewed for linkages. The following table (Table 24a and Table 24b) provides a summary of the main points.

Table 24a: Summary of Level 2 SWOT analysis for the St Martin.

	Strengths	Weaknesses
Opportunities	**"Natural Priorities"** • None were identified	**"Attractive Options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High Risk Scenarios"** • None were identified

Table 24b: Summary of Level 2 SWOT analysis for the St Martin.

	Threats		Weakness
Opportunity	**"External Opportunities"** • None were identified	Strength	**"Internal Opportunities"** • Funding is available to support data collection

9.2.4 French Guiana

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in French Guiana. For the full SWOT analysis, please see Annex 3.

Table 25: Summary of Level 1 SWOT analysis for the French Guiana.

	Positive	Negative
Internal	**STRENGTHS** • Strong national institutional framework and policy for data collection, locally implemented by Ifremer and IRD • Exploited stocks are well identified and information is published (SIH) • ICCAT stocks are assessed • Funds are adequate to financially support current data collection activities • DCF obligations are fulfilled for most biological data • Complete and up-to-date legislation for management and conservation of resources in French Guiana	**WEAKNESSES** • low implementation of DCF obligations regarding socio-economic and recreational fisheries as no routine data collection • No assessment of most demersal stocks • Lack of staff resources at Ifremer to cover all activities • No ERS system in place
External	**OPPORTUNITIES** • Improve access to fisheries data by a wider audience • No conflicts between local fishers and 3rd party vessels	**THREATS** • IUU fishing from vessels flagged to neighbouring countries • Foreign landings and catches are not always recorded

For the Level 2 SWOT analysis for French Guiana, several Strengths, Weaknesses, Opportunities and Threats were linked. The following table (Table 14a and Table 14b) provides a summary of the main points.

Table 14a: Summary of Level 2 SWOT analysis for the French Guiana.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive Options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High risk scenarios"** • A lack of MCS data and increased IUU fishing from third countries may lead to overfishing and reduced data on removals. • IUU from third parties is considered a major issue, and French Guiana is not prioritising MCS activities to combat this.

Table 14b: Summary of Level 2 SWOT analysis for the French Guiana.

	Threats	Weakness
Opportunity	**"External Opportunities"** • None were identified	
Strength		**"Internal Opportunities"** • Using regional collaboration to improve knowledge of fisheries. • Alternative funding sources (outside EMFF) could be utilised to plug gaps in data collection. • Implementation of local fishery regulations to protect locally important stocks.

9.3 Indian Ocean

9.3.1 Mayotte

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in Mayotte. For the full SWOT analysis, please see Annex 3.

Table 15: Summary of Level 1 SWOT analysis for the Mayotte.

	Positive	Negative
Internal	**STRENGTHS** • Strong national institutional framework and policy for data collection, locally implemented by Ifremer and IRD • Funds are adequate to financially support current data collection activities • DCF obligations are fulfilled for most biological data • Complete and up-to-date legislation for management and conservation of resources in Mayotte	**WEAKNESSES** • Stocks delimitations and status is unknown • Non-compliance to DCF obligation regarding socio-economic or recreational fisheries due to no routine data collection. • Most stocks are not assessed • Informal and IUU fishing is widespread • Local institutional framework lacking staff resources • Fisheries policing not a priority
External	**OPPORTUNITIES** • Improve access to collected fisheries data	**THREATS** • IUU fishing from neighbouring Comoros vessels is widespread

For the Level 2 SWOT analysis for Mayotte, Strengths, Weaknesses, Opportunities and Threats were reviewed for linkages. The following table (Table 20a and Table 20b) provides a summary of the main points.

Table 20a: Summary of Level 2 SWOT analysis for the Mayotte.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High risk scenarios"** • None were identified

Table 20b: Summary of Level 2 SWOT analysis for the Mayotte.

	Threats	Weakness
Opportunity	**"External Opportunities"** • None were identified	
Strength		**"Internal Opportunities"** • There are plans in place to reduce pressure on overexploited stocks • External funding could be utilised to fill gaps in data assessment and collection • External funding could be utilised to conduct studies and collect data on the informal sector

9.3.2 Réunion

The below table provides a summary of the key Strengths, Weaknesses, Opportunities and Threats that were identified in Réunion. For the full SWOT analysis, please see Annex 3.

Table 21: Summary of Level 1 SWOT analysis for the Réunion.

	Positive	Negative
Internal	**STRENGTHS** • Strong national institutional framework and policy for data collection, locally implemented by Ifremer and IRD • Exploited stocks are well identified and information is published (SIH) • IOTC stocks are assessed • Funds are adequate to financially support current data collection activities • DCF obligations are fulfilled for most biological data • Complete and up-to-date legislation for management and conservation of resources in Réunion	**WEAKNESSES** • No routine data collection on socio-economic data or for recreational fisheries • No assessment of most demersal stocks • Non-compliance to DCF obligation regarding socio-economic data and recreational fisheries • Lack of staff resources at Ifremer to cover all activities
External	**OPPORTUNITIES** • Improve access to collected fisheries data	**THREATS** • None were identified

For the Level 2 SWOT analysis for Réunion, Strengths, Weaknesses, Opportunities and Threats were reviewed for linkages. The following table (Table 22a and Table 22b) provides a summary of the main points.

Table 22a: Summary of Level 2 SWOT analysis for the Réunion.

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High risk scenarios"** • None were identified

Table 22b: Summary of Level 2 SWOT analysis for the Réunion.

	Threats		Weakness
Opportunity	**"External Opportunities"** • None were identified	Strength	**"Internal Opportunities"** • There are projects to help monitor sports and recreational fisheries which should be further utilised and a definition of sports and recreational fisheries should be confirmed • There is a good institutional structure in place and a centralised system for data collection which could be utilised to improve monitoring and reporting of bycatch • External funding could be utilised to fill gaps in data assessment and collection There is a general lack of research on biological parameters but funding could be sourced to fill these gaps • Funding could be used to undertake studies on the recreational/sports fishery to provide a definition and improve knowledge • A collaboration between Ifremer and LEMNA will start in 2021 to collect socio-economic data for vessels <12 m

10 SYNTHESIS OF INDIVIDUAL OUTERMOST REGION SWOT ANALYSES

10.1 Introduction

The aim of task 8 was to undertake a SWOT analysis to synthesise all outcomes from each OR gap analysis along with other information collected into a final, overarching SWOT.

Task 8 was conducted through an internal workshop to review and finalise the individual SWOTs for each OR (task 7), reviewing issues that have been highlighted across the ORs in combination with the development of the overarching SWOT from the individual OR SWOTs and country reports.

The synthesis identifies those common elements between the ORs (limited to those with at least six references to a strength, weakness, opportunity and threat across the ORs), i.e. where common gaps (weaknesses) exist, but also identifying where strengths exist, common opportunities that may be exploited or common threats faced.

The synthesis has been aggregated in to the five areas highlighted in the individual SWOTs:

- Fish stocks and stock assessment
- Institutional structure
- Funding structures
- Data collection obligations
- Fisheries management and conservation measures

10.2 Task 1 - Fish stocks and stock assessment

In task 1, the majority of strengths, weaknesses, opportunities and threats were identified in three categories: "Stock status", "Data availability" and "Ecosystem" (see Figure 3). Common weaknesses were identified related to IUU and misreporting of data that would form part of stock assessments.

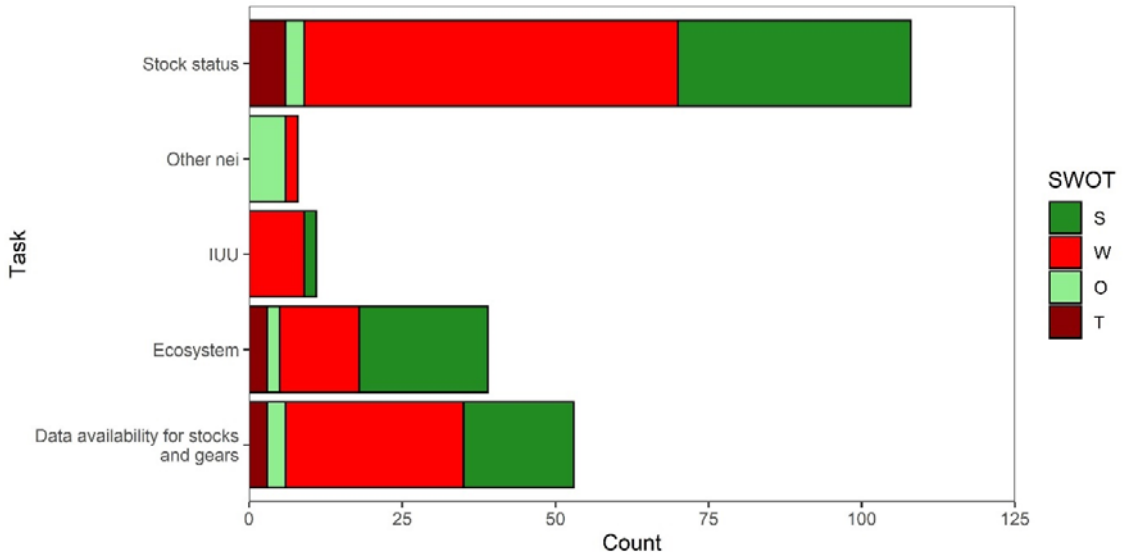

Figure 3: Breakdown of strengths, weaknesses, opportunities and threats by subtask for Task 1 (Fish stocks and stock assessment).

10.2.1 Stock status

Stock status was the area where the most strengths and weaknesses were identified across the ORs. The SWOT analysis showed that across the ORs stocks are clearly identified. Tuna and tuna-like species are assessed through the tuna RFMOS (ICCAT and IOTC), but small pelagic and demersal species are not very well assessed, or only small numbers of key species undergo assessment. Some ORs have specific sampling in place for specific stocks e.g. length sampling of demersal species, small and large pelagics in the Canary Islands, with some knowledge of the population structure and key biological parameters of some DCF and regional relevant target species, though these data are scarce across the ORs in general.

Gaps in the current knowledge of stock status and a lack of awareness by fishers may lead to overfishing of key stocks. Few opportunities have been identified, though an improvement in local stock knowledge, including stock structure, life histories and reproductive patterns could be usefully developed through collaboration between local institutions and CECAF Members with similar stocks. Two clear threats were identified: the threat of climate change on the future availability of current stocks and the reduction in future fishing opportunities for stocks that are or may be overfished at the moment.

10.2.2 Data availability for stocks and gears

Knowledge of the gears and fishing activities operating in the ORs is well known, though the level of catch and effort by each gear type is not very clear. This is particularly true of sport and recreational fisheries, which make up a significant proportion of the catch and effort. Many of the gear types used are discriminatory with limited or no industrial fisheries. As the informal sector is not currently covered by the DCF, data collection responsibility is part of the workload covered by local budgets and therefore data are difficult to collect. Development of new fisheries should be targeted towards the better monitored and managed stocks in the ORs, relieving pressure on the current targets.

Current studies on recreational fisheries in the French Caribbean ORs could provide useful information if applied to other ORs with similar fisheries, along with increased monitoring of sports and recreational fisheries in general.

10.2.3 Ecosystem

Good monitoring of the ecosystems is reported in the ORs, from bycatch and discard monitoring to development of marine spatial planning. In this respect, within the ORs the MSFD is resulting in MPA Frameworks being developed within some ORs, leading to a better understanding of the habitats and ecosystems under protection. Such MPA framework development is being underpinned through an increased data provision of a number of VMEs. Despite this, gaps in local oceanography, topography and mapping of habitats still exist. Fisheries sector development to fish further offshore may be an economic opportunity but exploitation of these poorly known ecosystems and stocks may be a risk. Climate change and the unknown impacts of ocean warming and acidification on ecosystems and fisheries are clear threats across the ORs. Equally, anthropogenic impacts such as those from local marine aquaculture (escapes, disease and ecosystem disturbance) and from land such as oligotrophic coastal waters and the impact of the toxic pesticide chlordecone in Martinique and Guadeloupe are highlighted.

10.2.4 IUU

Although not one of the most frequently reported elements, IUU fishing is noted as a weakness across a number of ORs, with quantification of such fishing not possible. IUU

fishing sources include foreign vessels operating offshore, local vessels not landing at the prescribed locations and large scale recreational fishing not reporting, none of which contribute to the data on total removals and thus affect the validity of the stock assessments conducted.

Table 23: Summary Synthesis SWOT for Task 1 "Fish stocks and stock assessment".

	Positive	Negative
Internal	**Strength:** • Stocks are clearly identified. • Tuna and tuna like species are assessed through the tuna RFMOS (ICCAT and IOTC). • Knowledge of the gears and fishing activities operating in the ORs is well known. • Good ecosystem monitoring in some ORs.	**Weakness:** • Small pelagic and demersal species are not very well assessed, or only small numbers of key species undergo assessment. • Catch and effort data by gear is not very clear (particularly recreational and sports fisheries). • Informal sector is not currently covered by the DCF. • Data collection responsibility is local and lower priority. • Some gaps in ecosystem mapping. • IUU fishing by local vessels.
External	**Opportunity**: • Development of further studies on recreational fisheries based on those in the French Caribbean ORs. • Improvement in local stock knowledge, through collaboration between local institutions and CECAF Members with similar stocks.	**Threat:** • Potential development of fisheries in offshore areas with little environmental knowledge. • Climate change and man-made impacts on the fisheries. • IUU by foreign vessels and current overfishing.

10.3 Task 2 - Institutional structures

In Task 2, the four most reported categories for Strengths, Weaknesses, Opportunities and Threats were "National coordination", "Division of roles", "Regional coordination" and "Clear MCS Organisation" (see Figure 4). The majority are internal (strengths and weaknesses) with a limited number of opportunities and threats (in particular for participatory decision making).

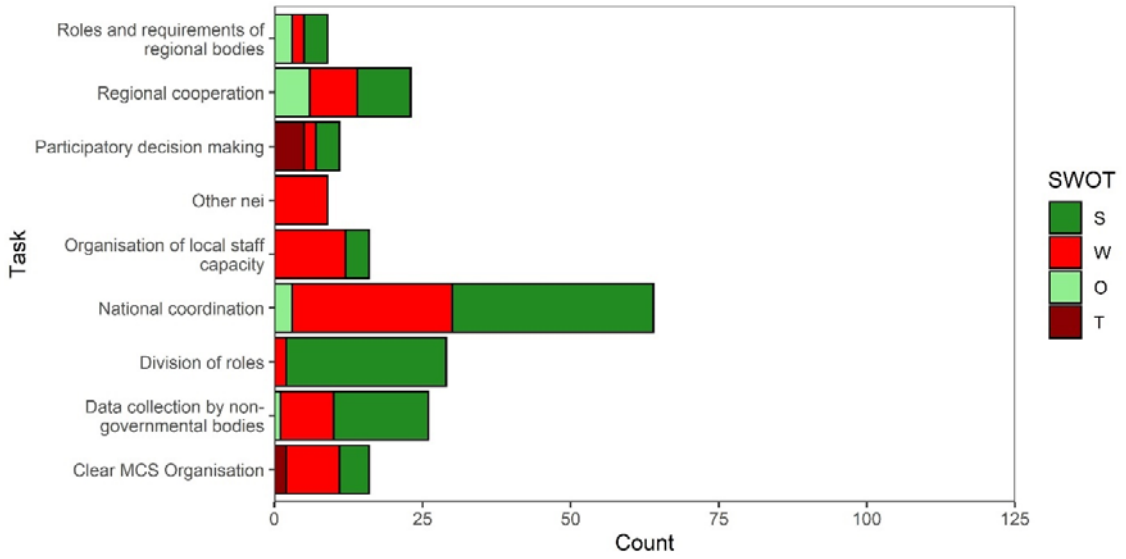

Figure 4: Breakdown of strengths, weaknesses, opportunities and threats by subtask for Task 2 (Institutional structures).

10.3.1 Division of roles

The division of roles in data collection across the ORs is clear and well established with roles for local and national institutions clear.

10.3.2 National coordination

A good level of national coordination was reported across the ORs. Centralised information systems assist in coordination and clear institutional setups for data collection are of clear benefit. Cooperative governance is in place between the administration, POs and other local stakeholders within and between Macaronesia ORs. Centralised logbook data collection is a key part of national coordination and contributes to a centralised database of catch and effort data, enabling easier data management and data use in each OR (though this collection may be by contracted organisations). Common weaknesses identified include a lack of human resources in local research institutions, work being conducted by national staff who may come into the OR only briefly without any full time staff in the OR and the applicability and inflexibility of some of the national systems that are in place when used in the ORs (e.g. for SSF, systems may not suit polyvalent fleets).

10.3.3 Data collection by non-governmental bodies

Non-governmental organisations and institutions make a substantial contribution to fisheries knowledge across the ORs in the form of projects, papers and theses. Fisher collaboration with other organisations is key for observer programmes and other MCS functions. One weakness identified across ORs is the requirement for outsourcing of data

collection. Where budgets do not allow for full time data collectors, this function is outsourced. Outsourcing data collection is often more expensive than when conducted by internal long-term staff and also leads to inconsistency in data collection leading to an overall lower quality of data. Other entities (e.g. universities) collect data for specific marine and fisheries research projects. These are not coordinated and not part of regular sampling programmes, and if coordinated with each outermost region or regionally could be of even more benefit.

10.3.4 Regional cooperation

Where regional cooperation exists, it is noted to be of benefit, through meetings to coordinate strategies related to relevant issues of stock assessment and management in the framework of RFMOs, through annual fisheries stakeholders reviewing fisheries issues and for data collection. There is no OR regional representation on the ICCAT or CECAF Working Groups, though some representation has occurred at IOTC. This could be improved with direct involvement from OR scientists in the RFMO Working Groups.

There is a key opportunity for regional cooperation in the development of data collection (highlighted for Macaronesia) where cooperation between Madeira, the Azores and Canary Islands under previous programmes have been successful and this success can be built on.

10.3.5 Clear MCS Organisation

Clear and improving MCS organisation is noted by a number of ORs. There is, however, a lack of MCS dedicated towards coastal fishing activities and managing protected areas, indicating that although the organisation is in place the targeting of resources may not be ideal. Although there is occasional assessment of the level of IUU fishing by scientific institutions this does not appear to be used for management purposes, which is a clear weakness and opportunity (if external) or strength (if internal), both in updating stock assessment estimates and tailoring the MCS response to be more efficient and effective in each OR.

10.3.6 Organisation of local staff capacity

Generally, ORs reported scientific and management personnel with good knowledge and adequate infrastructure at science institutions, but more resources were needed. Institutions are noted as running at full capacity and any activities that had not been planned or budgeted could not be completed. The lack of data collection staff is of particular note where a high turnover of staff is reported due to low wages, skills set required and language capacity. Data collectors are also typically only hired on short term contracts.

Table 24: Summary Synthesis SWOT for Task 2 "Institutional Structure".

	Positive	Negative
Internal	**Strength**: • Good level of national coordination across ORs. • Centralised information systems. • Substantial contribution from non-governmental bodies to data collection. • Regional cooperation when present is of benefit. • Clear MCS organisation. • Good knowledge of staff.	**Weakness**: • Lack of human resources. • National staff do specific work and then depart. • Outsourcing of data collection. • Underfunded and understaffed. • Data collection limited by high turnover.
External	**Opportunity**: • Regional or within OR coordination of data collection programmes to benefit all. • MS research bodies could better contribute expertise and data to regional RFMO working groups with OR attendance. • Opportunity for regional coordination. • Use IUU estimates to benefit MCS planning and organisation.	**Threat**: • No threats identified.

10.4 Task 3 - Funding structures

For Task 3, the three most commonly reported subtasks were "Management of EMFF"," EMFF funding" and "Other funds" (see Figure 5). The predominance of strengths highlighted across the subtasks listed under this task show the current funding structures are generally well regarded, although a number of weaknesses have been highlighted. No threats were identified, as external threats to the mostly internal funding mechanisms would be rare.

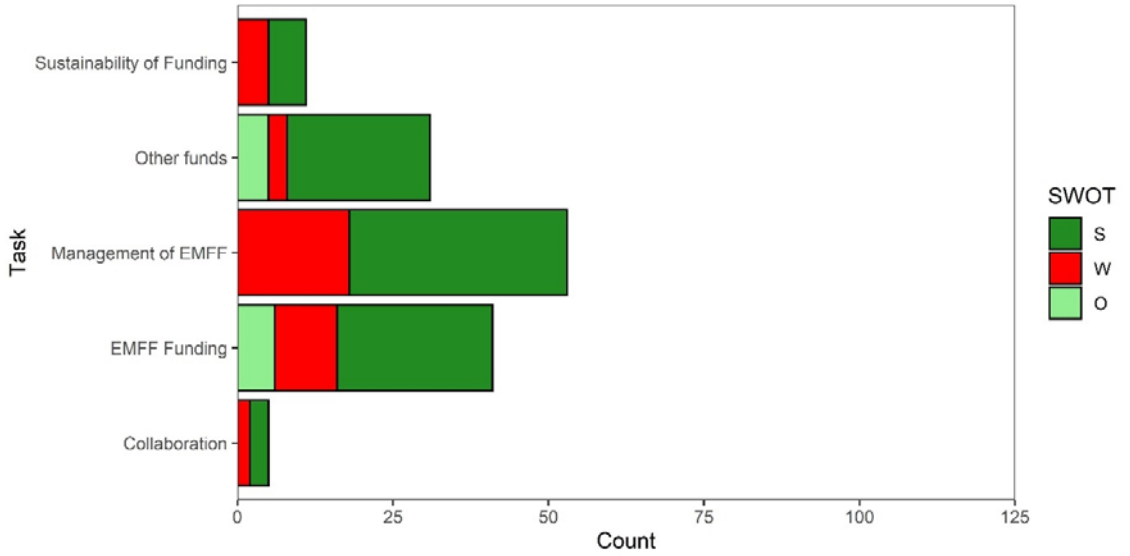

Figure 5: Breakdown of strengths, weaknesses, opportunities and threats by subtask for Task 3 (Funding structures).

10.4.1 EMFF Funding

EMFF funding is available for data collection in ORs. Where EMFF funding has not been used for data collection (e.g. the majority of ORs have focused a substantial amount of funding under Union Priority 3 and 5), some national budgets cover those programmes. Long term funding was highlighted as critical for data collection planning. Some weaknesses highlighted include that often EMFF funding for data collection cannot be fully used and are linked to the management of the EMFF, the low administrative capacity in ORs (as most of the potential beneficiaries are small businesses) and the lack of adaptation of EMFF (within MS) to meet OR needs, especially being unable to utilise EMFF funding to pay for permanent staff longer than the cycle of EMFF funding to permanent enhance capacity.

10.4.2 Management of EMFF

EMFF fund management is strengthened in MS by having an intermediary management body (e.g. IEO in Spain / DPMA for France) that speeds up the administrative process of accessing funds under the DCF. These organisations are notably set up for mainland access and not for the ORs. A major weakness highlighted by ORs is that the centralisation and excess bureaucracy in the management of the EMFF for data collection does not fit in with the scale of or how ORs manage their fisheries. Equally the national systems are bureaucratic and lead to delays in the funding actually reaching the beneficiaries. Information on how to obtain EMFF funding through national organisations, of which there

are often many (each with different functions in the process), is often opaque at the national and regional level.

10.4.3 Other funds

ORs have reported other structural funds also offer funding for scientific purposes, with studies with external funding to fill gaps for areas that have not been covered by EMFF funding such as socio-economic studies and recreational fisheries which are of importance to the ORs. Some ORs report that external (non-EMFF) funding is used for the majority of data collection activities. External funding is highlighted as an important component in filling the gaps for studies related to socio-economics fisheries data, recreational fisheries and improvement of biological knowledge of species.

10.4.4 Sustainability of Funding

Although most ORs when responding on this topic noted the benefits of the EMFF as long-term funding, it was clear that as EMFF funding cannot be used to hire long-term staff, this was a weakness that undermined the use of EMFF funds. Similarly, ORs reported that as the DCF funding works on a project-basis this did not meet the long-term routine nature of data collection required for fisheries management.

Table 25: Summary Synthesis SWOT for Task 3 "Funding Structures".

	Positive	Negative
Internal	**Strength**: • EMFF funding is available for data collection in ORs. • National intermediary bodies help management. • Other funding streams exist to fill in gaps, particularly where EMFF does not cover e.g. recreational fisheries. • EMFF provides long-term funding.	**Weakness**: • Project by project basis funding through EMFF not ideal for data collection. • National systems are bureaucratic and lead to delays. Systems also appear not to be transparent to ORs. • EMFF funding tailored for mainland not ORs. • Other funding streams not guaranteed. • EMFF not useful as long-term staff funding.
External	**Opportunity**: • No opportunities identified.	**Threat**: • No threats identified.

10.5 Task 4 - Data collection obligations

The most prominent subtasks reported under Task 4 were "Compliance with DCF", followed by "Transversal data" (see Figure 6). In both of these subtasks, the number of weaknesses highlighted outnumber the strengths - indicating there may be issues with respect to the ORs meeting data collection obligations, although some strengths are highlighted.

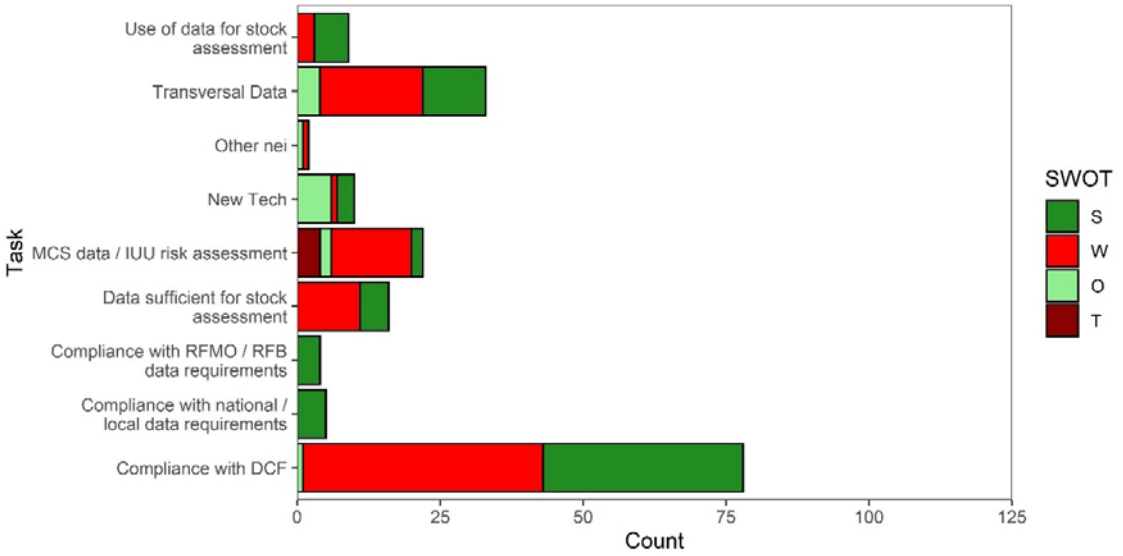

Figure 6: Breakdown of strengths, weaknesses, opportunities and threats by subtask for Task 4 (Data collection obligations).

10.5.1 Implementation of the DCF

Collection of catch, effort and biological data as required by the DCF is considered good within the ORs. Collection of data to meet the RFMO obligations has also been noted as being good, as much of the data has already been collected through the DCF. Some socio-economic data are collected but as the fishing fleets are small in number and small-scale or recreational in nature, data collection of this type may be more difficult to achieve. Observer data are also collected when available (small-scale and recreational fleets have obvious difficulties) and these at-sea sampling schemes collect important data on retained and discarded catches.

Under the requirements of the DCF however, data collection was limited to major species only. Length sampling is conducted for some locally important species that are not directly specified under the DCF due the 200 tonne threshold. In consequence, data required for stock assessment of other key local species is only partially collected and the stock assessment may not be conducted or does not produce clear results. Gaps in the biological and fisheries data collection for important stocks in the ORs leads to stocks with no management goals or biological reference points for management. Recreational and SSF pose a clear data collection challenge. Small-scale commercial fisheries are limited in carrying observers or remote electronic monitoring equipment, but may access a number of landing sites to land their catch. Recreational activities are important and increasing across some ORs and yet the data are insufficient to contribute to stock assessments. An opportunity for other ORs is that recreational data can be collected, as demonstrated through a Portuguese pilot study. EMFAF funding allows data collected under the 2020-2021 EU-MAP (2022 onwards) to request information on recreational fisheries.

A large amount of data is collected by diverse actors in the ORs including universities and the national and OR governments. These data are currently only accessible for those conducting the research and there is an opportunity through the EMFF to make this information accessible to all data users.

10.5.2 Transversal Data

Transversal data are available, but in limited quantities, often through market-related activities and not standard across ORs. Limited socio-economic data are collected. Fishing positions through VMS are not always available as small-scale and recreational fisheries are not required to carry VMS.

Opportunities have been identified for enhanced data collection filling current gaps: socio-economic data; market data (standardised and verified at source against logbook and VMS data) and recreational fishing data which is often missing.

10.5.3 New Technologies

One key strength identified using new technologies is the use of remote length sampling at Portuguese auction markets to allow data capture when staff may not be available. There is an opportunity to utilise this remote length sampling technology to collect these data across the ORs or wider. Similarly, as technology for VMS and remote sensing improves these can be included as tools for monitoring the small-scale and recreational fleets, although resistance from the fishers themselves is likely. REM technologies could be used where observer programmes or enhanced landings monitoring programmes cannot.

10.5.4 Data sufficient for stock assessment

There is a lot of data for stock assessment contributed by the ORs. Whilst not often enough in terms of quantity for a formal assessment, they can contribute to regional assessments or alternative approaches (e.g. data limited assessment approaches) which can be presented and discussed nationally or at an appropriate RFMO Working Group. These approaches could be a clear opportunity for stock assessment across the ORs in data-limited environments if shown to work. Tuna stock assessments have good data from the ORs data collection. Ability to collect length data and biometrics to contribute to ICCAT and IOTC stock assessments is a clear strength.

The commonest weakness is lack of data for demersal and small pelagic species. This is noted for small-scale and recreational fisheries in particular. Landings data are often not fully recorded and biological data missing.

10.5.5 MCS data / IUU risk assessment

Increasing IUU fishing, particularly in offshore areas where MCS activities are limited and in small-scale and recreational fisheries is a common weakness. It is difficult for OR management teams to quantify the level of IUU, which has an impact on the stock assessment as the level of total removals cannot be estimated. Many ORs have MPAs declared, but do not have an effective capacity to monitor them. The use of drones to control MPAs has been noted as a potential opportunity.

Table 26: Summary Synthesis SWOT for Task 4 "Data Collection Obligations".

	Positive	Negative
Internal	**Strength**: • Strong data collection for key species. • Strong data collection for tuna.	**Weakness**: • Limited transversal data. • Poor data collection for demersal / small pelagic. • Poor data collection for recreational / SSF. • Inability to quantify IUU. • Large unprotected MPAs. • Increasing IUU (domestic).
External	**Opportunity**: • Alternative (data-limited) approaches to stock assessment. • Opportunities to collect transversal data using new technology in markets. • Opportunities for new technology on small-scale vessels. • Use of drones to address MPA control issues.	**Threat**: • Increasing IUU (foreign).

10.6 Task 5 - Fisheries management and conservation measures

For task 5, the most commonly reported strengths, weaknesses, opportunities and threats for the subtasks across the nine ORs were "Appropriate MCS and sanctions", "Regulatory Framework and legislation with appropriate control and measures" (see Figure 7). Both indicate a number of strengths and weaknesses. "Regional/National cooperation on data and management", "Restriction of fishing opportunities" and "Management measures to counteract external impacts" are also highlighted and are discussed below.

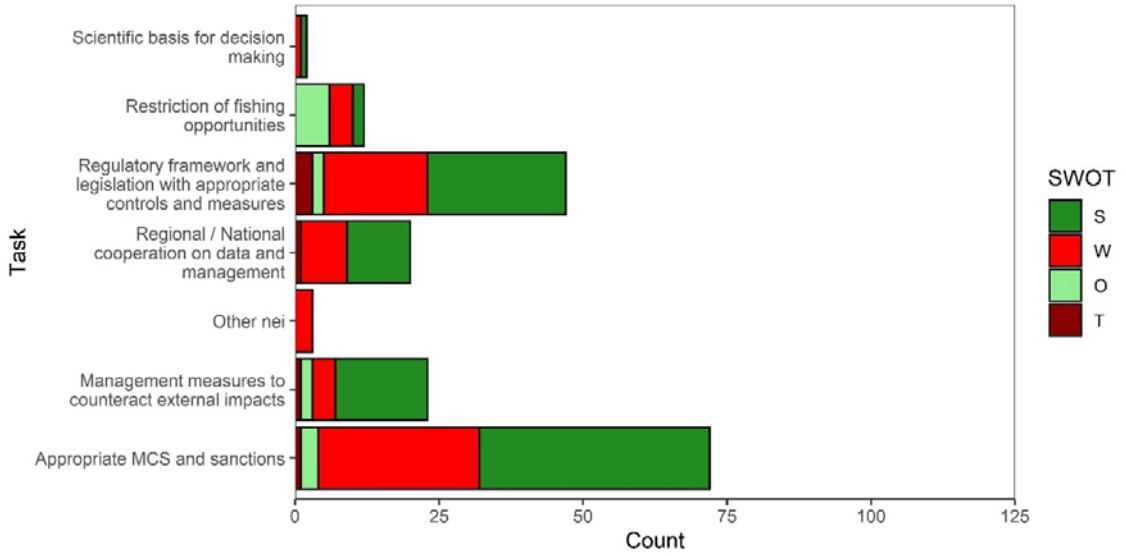

Figure 7: Breakdown of strengths, weaknesses, opportunities and threats by subtask for Task 5 (Fisheries management and conservation measures).

10.6.1 Regulatory framework and legislation with appropriate controls and measures

Regulatory frameworks across the ORs are considered to be strong, being based on national legislation and a large number of conservation measures are applicable throughout the ORs. However, the highly regulated fisheries are reported to cause uneven application across the sectors in some ORs. Technical measures are implemented across the ORs as required, including MPAs (and other closed area management measures) and protections for particular species, but some ORs report that closures and establishment of minimum sizes are not applied and would be recommended. Management measures of main stocks are not adequate to maintain stocks at sustainable levels. Management measures are reported by a number of ORs as not being fit for purpose, but the funding programmes such as EMFF cannot be used to develop mechanisms to reduce the negative impacts of the fishery (e.g. increasing fishing power, damaging fishing gears).

There may be some regulations, due to local OR specificities, that may act in opposition to that intended by the EU, and therefore reduce the strength of the overall framework. For example, in general there is no local stock status assessed, consequently no reference points or limits are known with local management then predominantly based on effort, which is also poorly estimated. Additional regulations banning or limiting fishing in certain areas (e.g. prefectural decree 2014059-004 28/02/201435 related to Guadeloupe) has a direct impact on the SSF sector to fish further and deeper. In this respect, there appears to be a need to adapt some legislation to recognise the ORs specificities, and an

opportunity to simplify the regulatory framework for ORs to make it more applicable to fleets operating in those regions.

10.6.2 Appropriate MCS and sanctions

IUU fishing is noted across the ORs and therefore there is an assumption that MCS resources and / or the level of sanctions are not sufficient (to deter IUU fishing).

10.6.3 Regional / National cooperation on data and management

Training has been identified as a benefit of national regional cooperation, e.g. MCS training in the Indian Ocean through IOTC and IOC and national training of MCS officers to the standards adopted in the EU MS.

MCS activities also benefit from national and regional cooperation through a number of channels, including joint deployments, planning (e.g. 2 year regional MCS plan in the Indian Ocean), information sharing and observer programmes implemented by the national authorities in the ORs for tuna fisheries.

10.6.4 Restriction of fishing opportunities

The majority of ORs do not have a specific individual representing the OR in the RFMOs. For both the French and Portuguese ORs, there is a national representation (although for all these ORs these are comprised of individuals from their respective mainlands). The Canaries OR is the only one with direct representation in ICCAT and CECAF. The presence of ORs-specific representatives in at least the scientific working groups could improve cooperation on data collection and approaches to management (i.e. limiting effort).

10.6.5 Management measures to counteract external impacts

No strengths were identified. Limited weaknesses were identified, but none consistent across ORs apart from a need for scientific analysis to be implemented consistently when developing management measures (e.g. MPA design, catch limits, definition of minimum landing sizes and seasonal bans for fishing for shellfish).

Table 27: Summary Synthesis SWOT for Task 5 "Fisheries Management and Conservation Measures".

	Positive	Negative
Internal	**Strength**: • Strong regulatory frameworks based on national frameworks. • Training clear benefit of national and regional cooperation. • Cooperation on MCS activities and planning.	**Weakness**: • Technical conservation measures may not be appropriate or implemented in ORs. • IUU fishing (domestic – internal) noted and may be related to insufficient MCS resources or ineffective sanctions. • Need for direct representation by ORs at RFMO working groups to allow better sharing of information. • Need for scientific analysis when defining management measures.
External	**Opportunity**: • Potential to simplify the regulatory framework for ORs to make it more applicable to the fleets operating in those regions.	**Threat**: • IUU fishing (foreign - external) noted across ORs as a threat to sustainable management.

11 CASE STUDY IN FRENCH GUIANA

This specific case study builds on the overview of the state of fisheries data collection and scientific advice in support of fisheries management for French Guiana (Annex 2) and develops a detailed roadmap of all necessary actions towards establishing a regular stock assessment of the red snapper fishery in French Guiana. The report focuses on the red snapper fishery as it is managed under the SMEFF Regulation (EU) 2017/2403 under the EU Council Decision 2015/1565[62].

The aim of this work is to map the science-policy circle from stock assessment to implementation of management measures, conduct a gap analysis to understand the shortcomings, obstacles and impediments in the science-policy process for this fishery and thereby identify the necessary actions and tasks to support evidence-based decision-making for developing fisheries management and conservation management measures (CMMs). The outcomes of this work are potentially applicable to the range of stocks fished within the SMEFF Regulation. The assessment was completed primarily through:

- A literature review focusing on assessment reports and publications on the red snapper fishery by Ifremer, theses and outputs from specific projects such as ORFISH;
- Undertaking a stakeholder consultation, where four main interviews were conducted. One with DPMA, two with Ifremer (scientists based in Brest and French Guiana) and one with IRD. In addition, a meeting was held with the Ifremer stock assessment scientist in French Guiana to further understand the science-policy process and whether there are studies/data to assess the economic importance of the red snapper fishery; and
- Utilising published data on the fishery in a Management Strategy Evaluation (MSE) to explore different options for data collection and harvest control. Full report is provided in Annex 2.

Findings from this assessment show that there are two main uncertainties in the science-policy process:

- According to the most recent stock assessment by Ifremer, the red snapper stock status in French Guiana is uncertain. However, previous assessments showed that the stock was being overfished. In particular, the stock is experiencing growth overfishing due to fishers targeting mostly small fish to supply restaurants with dinner plate-sized fish. The most recent stock assessment has therefore recommended the adoption of management measures such as a limit on fishing effort and use of larger hooks.
- At the moment, the stock is assessed as if it were not a shared stock because there is lack of data from countries neighbouring French Guiana. The fact that catches by neighbouring countries are not taken into account means that the current assessment of red snapper may not give the true picture of the resource. There is therefore a need to understand the stock structure and how it impacts the jurisdiction of the stock. Efforts towards research cooperation among the nations adjacent to French Guiana are required to enhance data and evidence towards the sustainable management of the stock.

62 Council Decision (EU) 2015/1565 of 14 September 2015 on the approval, on behalf of the European Union, of the Declaration on the granting of fishing opportunities in EU waters to fishing vessels flying the flag of the Bolivarian Republic of Venezuela in the exclusive economic zone off the coast of French Guiana (OJ L 244, 19.9.2015, p. 55–57).

Below, the report summarises the findings from the case study review based on four subtasks.

11.1 Information sources and data review

The red snapper fishery in the waters of French Guiana has traditionally been carried out by foreign fishers, especially by Venezuelan vessels (Caro, 2010). This fishery has been undertaken since the 1970s and remains an important contemporary fishery for French Guiana. The red snapper resource is fished mainly using bottom-set hand lines drifting on hard ground within the EEZ. Historically, three fishing techniques have been used. Trawling, focused on the red snapper, which was developed in the mid-1970s but banned in 1983 due to suspected overfishing (Caro, 2010; Caro and Lampert, 2011). Shrimp trawls are still undertaken within the waters of French Guiana and red snapper are caught as bycatch within this fishery. However, shrimp trawling has declined significantly in recent years (Baulier et al., 2017), with trap fishing, which is practised essentially by a few Martinican vessels and bottom-set hand lines drifting on hard ground by vessels from Venezuela are now predominant.

The EEZ of French Guiana covers an area of 130 000 km^2 (the EEZ of mainland France covers 340 400 km^2). It extends over a rectangle delimited by two lines perpendicular to the coast: to the north-west at the level of the Maroni River and to the south-east at the level of the Oyapock River, up to a distance of 200 nm (approximately 370 km) from the coast. It comprises a very gently sloping continental shelf (about 1%) over an average width of 150 km, which represents an area of about 50 000 km^2, followed by a steeper continental slope that begins at a depth of 90 m.

Before the creation of the EEZ in Guyana, the red snapper fishery was subject to occasional landings in the Caribbean. Prior to the effective application in French Guiana of the "regime for the conservation and management of fisheries resources in the Exclusive Economic Zones (EEZs) of the Member States of the European Community" in 1983, the exploitation of snapper was not controlled and there were no statistics available to assess the impact of this fishery on the resources of the plateau. From 1983-1984, the fishery was subject to a management system where only passive gear was authorised through a limited licensing system. The fishery expanded until 1998, after which annual catches declined until 2002 before recovering again to 2006 and seem to have broadly stabilised since then.

The red snapper fishery is managed solely through effort limitation based on numbers of licences only issued to Venezuelan vessels targeting red snapper under the SMEFF regulation between French Guiana and Venezuela (EU Council Decision 2015/1565). Current regulation requires Venezuelan vessels to land 75% of their catch in French Guiana, which must be sold to only two fish processors in Cayenne (Caro and Lampert, 2011). Literature shows that the Venezuelan fishers land the minimum of their catches in French Guiana. This is because they are paid less per kilogram in French Guiana than they are when they sell the catch back in Venezuela or in other markets in the West Indies (Caro and Lampert, 2011). Stakeholder consultation revealed that to stay within the regulation, a vessel undertaking four trips per month will land catches of the first three trips in French Guiana, then land the catch of the fourth trip elsewhere (quantity and location unknown).

When the red snapper fishery was incorporated into the SMEFF regulation in 1983 a data collection system was set up (Caro and Lampert, 2011). This involved a system of fishing sheets to be filled in by the Venezuelan fishers, as well as contacts with processors and the DPMA. Every fisher is required to fill in a fishing form for each trip and provide spatial information on their fishing effort and catch. Therefore, for each day of fishing, the Venezuelan fishers usually indicate the area and zone in which they fished as well as the number of hours fished and the weight of the catch. These forms are usually submitted to

Ifremer which has been monitoring and sampling landings and effort of the Venezuelan fishers since 1985. From 2020 onwards, the 45 Venezuelan vessels have all been equipped with e-logbooks and Vessel Monitoring System (VMS). It is worth noting that the Venezuelan vessels are the only foreign vessels fishing in French Guiana waters, and their fishing technique (bottom-set hand lines with up to 15 fishers per boat) is highly targeted, with red snapper comprising 95% of their catch. However, a small number of trap fishing boats from Martinique also fish for the red snapper in French Guiana's EEZ, but land their catch in Martinique. Caro and Lampert (2011) reported that the catch of this trap fishery is just under 10% of the total red snapper landings in Martinique and French Guiana.

Literature shows that the number of authorised licences targeting the red snapper resource increased from 25 to 40 between 1986 and 1990, after which they were revised to 45 in 2007 when five licences that had been granted to Barbados became available (Caro and Lampert, 2011). The number of licences allocated to Venezuelan vessels (45) has been stable since 2012. Each year, the local fishing industry provides DPMA with a list of contracts for the Venezuelan vessels. Stakeholder interviews also indicate that the fishing industry has been requesting the DPMA to increase the number of authorized vessels fishing the stock. Following advice from Ifremer, the DPMA and CRPMEM have been refusing this increase and therefore the EU regulation has not been amended.

All landings and biological data for the red snapper fishery in French Guiana are collected by Ifremer. These data are available from 1986 to 2019 and consist of total catches, an abundance index and length compositions. They are collected within the framework of the biological sampling programme of the Ifremer Fisheries Information System (SIH) at the time of landing. To optimise sampling, Ifremer uses a protocol where the number of boats as well as the number of individual fish sampled varies from year to year (Tagliarolo, 2020). This implies that the French Guiana red snapper fishery is not a data limited fishery, since there is a considerable and continuous catch data gathered on the fishery. These data have allowed ad-hoc stock assessments to be undertaken based on virtual population analysis (VPA), and most recently (2019 onwards) by a statistical catch at age model, i.e. (Stock Synthesis 3 - SS3) (Tagliarolo, 2019, 2020; Tagliarolo et al., 2018).

The same assessment procedure has been followed since 2018, where two sampling operations per month (encompassing between 1 and 3 vessels) have been carried out to measure samples of approximately 150 kg of fish per vessel. Given that it is difficult to distinguish between males and females at landing sites since the catch is usually gutted, stock assessment has been applied to the total catch with both sexes combined. Further, given that the gear used by the Venezuelan fishers (bottom-set hand lines with multiple hooks) is selective, discards are thought to be negligible. Therefore, landings are thought to represent total catches. In the absence of data on the size distribution of the proportion of catch not landed in French Guiana (according to the SMEFF agreement, 25% of fish caught in Guianese waters but landed abroad, but the actual amount is not known), stock assessment has assumed that their size composition is the same as for the 75% of the catch that is landed in French Guiana.

Findings from the current stock assessment (Tagliarolo, 2020) indicate that current data on the red snapper fishery are too uncertain to draw conclusions on the state of the stock and the fishery, and therefore to provide precise recommendations on management measures. Tagliarolo (2020) therefore recommend the use of precautionary management involving the maintenance or reduction in the current fishing opportunities and setting a fishing effort ceiling based on the total number of days at sea or a TAC (tonnage). Further, findings from current assessment show that the red snapper catches are dominated by juveniles (individuals less than 4 years old). Tagliarolo (2020) therefore recommend that regulatory tools including change in selectivity by using larger hook sizes or a temporary reduction in effort are adopted to reduce the fishing mortality on juveniles.

Another priority measure recommended by the Ifremer stock assessment scientists is the removal of data uncertainties. Tagliarolo (2020) suggests that these data uncertainties will require scientific studies such as survey on possible changes in fishing practices, experimental studies comparing different hook sizes but also possible changes to the regulations, particularly by increasing the proportion of the catch landed in French Guiana (currently 75%) and/or by imposing size sampling of these catches. Further, the current stock assessment assumes that the red snapper forms a single stock in French Guiana, and therefore stock assessment has only used catches landed in French Guiana, thereby providing information towards management of the stock at the national level. Analysis of stock assessment findings by Caro and Lampert (2011) suggested that recruitment of the stock was increasing due to a natural external supply of larvae on the coast. Caro and Lampert (2011) also assessed the spatial distribution of the Venezuelan vessels and found that they tend to fish in areas with greater abundance of smaller individuals which tend to be further away from the Brazilian border where the largest individuals were caught. These findings indicate that there is an external supply of the red snapper stock in French Guiana through a migration of larvae from the Brazilian brood stock carried by the North Brazilian Current. Further work is therefore needed to understand the life cycle of the red snapper in French Guiana, particularly with regard to this larval recruitment process and the location of nursery areas. Such an assessment falls within WECAFC mandate in terms of co-ordinating management and research, including the harmonization of data reporting standards for shared stocks in the region. However, there is very little information from neighbouring countries and therefore a strategy and action plan need to be developed to address this lack of data.

11.2 Economic importance of fishery sector

Fishing activities in French Guiana are concentrated on shrimp, red snapper and coastal white fish (see Annex 2 for more detail). In 2018, the licensed vessels included 13 charter vessels for shrimp, 45 Venezuelan trollers for snapper, and 110 inshore fishing vessels exploiting white fish. In French Guiana, fishing represents the main export commodity in the primary sector. This sector generates 800 direct jobs. It has been estimated that one direct job roughly generates three indirect jobs, and therefore fishing activities locally supports a predicted 2 400 indirect jobs within the fishing sector (Plan Compensation Surcoût 2014/2020).

According to the 2020 red snapper stock assessment report, a total of 1 969 tonnes of gutted snapper were landed in French Guiana in 2019, 91% of which were red snapper (1 797 tonnes) (Tagliarolo, 2020). The remaining comprised of vermilion snapper and lane snapper. These 2019 snapper landings are higher than the historical average (1 208 tonnes, landed 1986), despite a decline in the annual number of days at sea by Venezuelan trollers since 2012 (4 279 days at sea in 2019 compared to 5 734 in 2012) (Tagliarolo, 2020).

In 2013, fish exports from French Guiana to the European market reached 1 535 tonnes compared to 1 507 tonnes in 2012, an increase of 1.9%. These exports had a value of EUR 7.9 million compared to EUR 7.5 million in 2012, representing a 5.1% increase. These exports consisted mainly of shrimp, snappers and white fish. As for shrimp exports, which have declined in recent years, 80% are exported to the West Indies and Europe. The average selling price is EUR 8 per kilo providing a turnover, in 2011, of approximately EUR 9 million.

French Guiana has five processing companies, producing Level 1 and 2 products. Level 1 processing includes scaling, heading, cutting and filleting using fresh or frozen catch, while Level 2 processing is where the fish are processed for minced, steak, meatball, skewer etc., using fresh, frozen, dried, salted or smoked fish. These companies buy and process approximately 40% of landed white fish and shrimp and 100% of landed snapper. On

average, these five processing companies release 1 300 tonnes of finished products per year. Under the SMEFF regulation, the Venezuelan vessels must land 75% of their catches in French Guiana to one of only two approved processors. Stakeholder consultation indicates that only a small part of this catch is sold in the Guianese market; the majority is sold in Martinique and Guadeloupe. There are three local marketing operators in French Guiana that usually undertake mass distribution with trucks to reach various markets throughout French Guiana. The vessel owners and professional fishers also sell fresh catch directly to consumers at the local markets.

In terms of socio-economic data, Ifremer has developed economic and social indicators for monitoring the fisheries in each OR and evaluating the consequences of management measures on the sustainability of fisheries. These include information related to the vessel, gear, costs, earnings and crew remuneration. Ifremer has also provided guidance on sampling procedures and how to collect socio-economic information through surveys (Leonardi et al., 2020). Despite this, our review shows that the majority of the data to assess the economic importance of the fishery are not collected and/or available. There are some ad hoc collaborations with fisheries economists, such as PhDs on the economics of the coastal or shrimp fisheries, but nothing routine. It is therefore difficult to base any policymaking on socio-economic information, even though socio-economic needs are discussed biannually during meetings between fishers and the national and regional administrations (M. Tagliarolo, Ifremer stock assessment scientist, personal communication, 2020).

11.3 Mapping science-policy circle

Findings from the stakeholder consultation show that the red snapper fishery is not fished by local fishers from French Guiana, due to lack of skills for bottom handline fishing and cost, i.e. it is too expensive to develop a local fishery for the red snapper. The current fishery is economically viable because the vessels and staff operate under Venezuelan regulations, salaries etc., with little input from French Guiana officials and the wider fishing population. Therefore, there are no conflicts between local fishers and Venezuelan (i.e. third-party) vessels; the management priority of French Guiana is to recover as much of the benefit from the catch as possible, including by requiring Venezuelan vessels to land in French Guiana and to charge such vessels licence fees. Ifremer organises joint meetings up to two twice a year with all the stakeholders (Ifremer, DM, CRPMEM, French Guiana fishing industry) to discuss fisheries issues. These meetings are used to inform and raise awareness among the fishing community on the results of stock assessment and management efforts before the findings are published, and to avoid negative/adverse reactions. This process has been showing promising results, but the Covid-19 pandemic prevented it in 2020/2021.

As discussed in Section 11.1, Ifremer is responsible for collecting data from the red snapper fishery, and the data collection is integrated into the national sampling work programme. It uses information from the processing factories, logbooks and vessels register, hosted by DM, to cross-check and improve the data collection. Under the SMEFF regulation, the data collected from foreign vessels include EEZ entry/exit and the catch (75%) that has to be landed in French Guiana as per the EU agreement. This proportion of the catch is usually randomly sampled by Ifremer twice a month. Ifremer never sees the remaining 25% of the catch as it is directly exported to the destination market.

Literature review and stakeholder consultation show that there is an ongoing stock assessment of the red snapper resource by Ifremer. Stock assessment has used a variety of methods, including length-cohort analysis, age-based assessments using virtual population analysis (VPA) and more recently a statistical catch-at-age model of the SS3 type (Methot, 2009) to provide information on the status of total biomass and spawning stock biomass (Charuau and Die, 2000; Blanchard, 2012). It is worth noting that while

the stock assessment is ongoing, it is not routinely scheduled, i.e. it is only done on request from DPMA. Recently, however, the DPMA has been issuing requests on an annual basis. In fact, regular stock assessment of the red snapper fishery was conducted in the last 3 - 4 years.

According to the 2020 stock assessment performed by Ifremer, the current management measure (limits on number of vessels) is not adequate to properly manage the red snapper stock. Indeed, the stock is subject to growth overfishing, due to the nature of the fishery - fishing selectively for single-portion fish (i.e. dinner plate), which mostly entails landing juvenile-sized fishes. According to Ifremer, consideration could be given to setting a fishing effort ceiling (total number of days at sea), and a TAC (tonnage), with an opening between July and December. Ifremer has also suggested that management of the fishery could adopt regulatory tools to reduce fishing mortality on juveniles, such as a change in selectivity by using larger hooks. However, that would reduce the viability of the fishery, as it is based solely on providing single-portion fish.

The SS3 model currently used by Ifremer is an integrated age-structured statistical model which estimates population dynamics parameters and is capable of including multiple sources of data and uncertainty. For the current assessment, it has been adapted to fit total catch, length and an abundance index (catch-per-unit-effort) data. No age data are available. Because it can be adapted to fit to the available data components, SS3 may be suitable in some data-limited situations (e.g. where there is no age data, no fishery-independent data (Methot Jr and Wetzel, 2013)). The main observations and parameters used in the model for red snapper are: total catch estimates (1976-2019), CPUE (1986-2019), length composition (1986-2019), growth parameters (sourced from the literature), reproduction parameters (estimates sourced from the literature) and a selectivity curve. Within this model, the selectivity curve is a "dome shape" selectivity, as it better represents a fishery which is capable of targeting a specific size class of the population, (i.e. neither the very small nor the very large) by the hook size choice.

Discussions with the Ifremer stock assessment scientist indicate that there is a level of disagreement, where the SS3 approach is seen as a "new and improved" model, while Ifremer reviewers were uncertain how the new model relates to the previous VPA approach. However, Ifremer has been using the SS3 method to assess the red snapper stock over the last 2 years (replacing the use of VPA). In the opinion of the contractors, the SS3 model is a significant improvement on the previous VPA. This is because VPA requires catch-at-age data, which needs length compositions to be converted to age compositions, a highly uncertain procedure. SS3 avoids this, but requires explicit functional forms for selectivity among other things. Further, SS3 characterises the uncertainties much better than VPA, since it does not overfit selectivity, maintains a clearer distinction between the observations and model and provides better diagnostic tools to assess uncertainties.

Outputs from the SS3 model used by Ifremer have two important uncertainties in the interpretation of the data: the catch-per-unit-effort is assumed proportional to stock size, and selectivity has clearly changed over time and this may be difficult to account for robustly. To evaluate uncertainties, catch data published in Caro and Lampert, (2011) were used to run a Management Strategy Evaluation (MSE), using the DLMtool package (Annex 3 in Carruthers and Hordyk, 2020). Management strategy evaluation (MSE) is the process of evaluating the performance of alternative management strategies. Real world experiments in fisheries management are extremely difficult, primarily because two of the most important components of an experiment, replication and control groups, are usually not possible. For this reason, comparison and evaluation of the performance of alternative fisheries management procedures are conducted with computer simulation, with models that are conditioned on the existing knowledge of the target stock dynamics, the characteristics of the fishing fleet and the existing management framework. With the aid

of computer simulation, it is possible to run many hundreds of simulation runs – each representing a different possible "reality" and to take into account the uncertainty in knowledge of the stock and fishery, (i.e. errors in observation), as well as the uncertainty in future environmental and ecological conditions that are likely to affect the stock dynamics. Through these simulations users can see the relative impacts of specified management approaches to their fishery decades into the future and choose the approach that best achieves their management objectives.

The DLMtool Toolkit contains an integrated management strategy evaluation function to identify acceptable harvest control rules based on user-specified stock type, fishing fleet, management type and performance criteria. DLMtool is limited to management procedures (index-based) for data-limited fisheries. The software is not exhaustive, but it is possible to set up an MSE without a significant investment in writing code. Using FLR software package would be preferable, but as far as is known it does not yet support many data limited methods (see recommendations). The MSE evaluates management procedures, generates explicit guidance for fisheries managers based on those procedures and evaluates the current data and potential new data collection priorities to improve management.

The aim here was not to conduct a stock assessment, (i.e. the model was not fitted to the data), but to explore different options for data collection and harvest control to inform options for the management of the red snapper fishery. The inputs to the MSE were broadly the same as those used in the stock assessment and therefore results, such as the depletion levels, are very similar, although the time series for the MSE only runs to 2011 (Figure 8). The MSE covered a wide range of exploitation levels at the beginning of the time series, but these made little difference to the final stock status. The most critical issue in the MSE is selectivity and when selectivity changed. More selectivity changes were included in the MSE than estimated in the stock assessment.

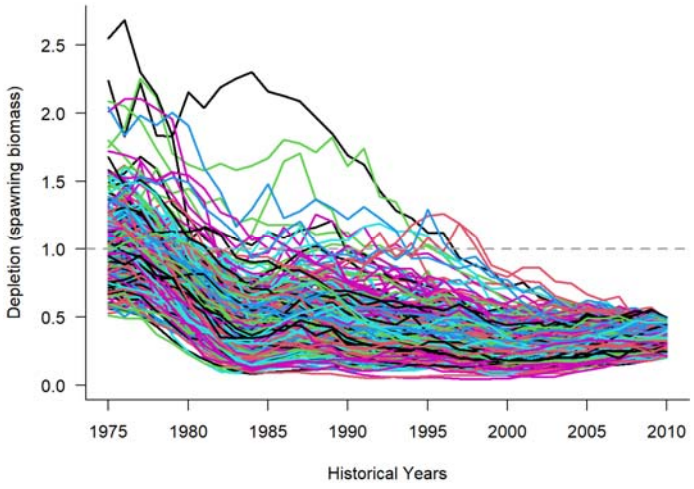

Figure 8: Relative depletion of spawning stock biomass calculated in the stochastic MSE simulations. It shows a general decline in biomass from the early part of the fishery, reflecting the increase in sustained catches. The results on stock status are similar to the stock assessment, but incorporate a progressive change in selectivity which the stock assessment did not include.

Findings from the MSE approach indicate that some of the change in length composition over time can only be explained by change in fishing selectivity. This is because the length compositions show a clear shift to the left, (i.e. towards smaller fish; see modelled data from Caro 2010 as an example of such a change in selectivity, Figure 9). If the sustained change in size was only due to increased mortality, the length compositions would only

show increased truncation on the right. A change to smaller sized fish can only be explained (if growth is constant) by increased recruitment, higher mortality or change in selectivity. Change in size would not be sustained as a result of higher recruitment. Increased mortality would only produce fewer larger fish, truncating the right-hand side of the distribution. Sustained increases in small fish can only be explained by a change in selectivity.

Caro (2010) reported that the decline in size occurred over several short periods (Figure 9). Therefore, selectivity is critical to understanding the observations. This was demonstrated by the stock assessment, where the estimated status of the stock changed significantly when a single change in selectivity was estimated (Tagliarolo, 2020). Different selectivity for each of these periods was estimated from the data and included in the MSE representing the likely ranges of these changes. Selectivity change not only affects the mortality-at-age but also the interpretation of the CPUE as an abundance index because the exploitable biomass changes with selectivity (exploitable biomass = selectivity multiplied by population biomass-at-length).

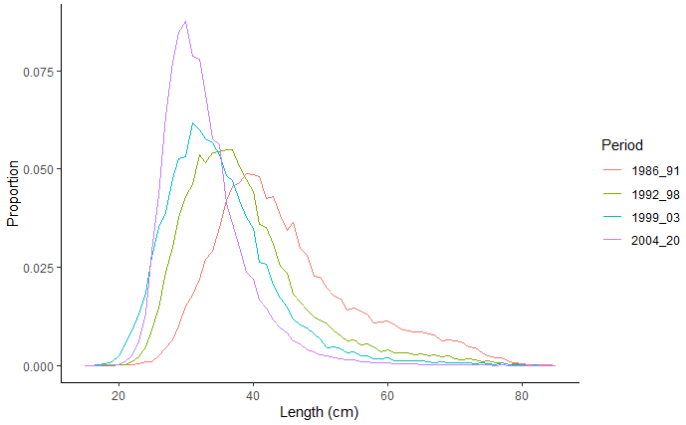

Figure 9: Length composition data accumulated over four periods approximating periods of fairly constant length compositions in the data (Caro 2010) used in the MSE to simulate the population change since the start of the fishery. Caro (2010) subjectively based these separate periods on observing the length composition over multiple years.

The MSE, run using the DLMtool package, only allows simple index-based harvest control rules (HCR) to be used in projections (referred to in DLMtool as 'Management Procedures'). However, a wide range of index-based HCR are available, with any HCR that uses an abundance index and/or length compositions able to be used. A simple index-based HCR is an alternative to conducting full stock assessments, so stock assessments can be conducted less frequently, releasing technical resources in terms of staff time to carry out other work.

To look at the relative performance of different approaches to using HCR, the report considered three stochastic projections with different HCR:

- EU_MP: A simple HCR based on an abundance index that adjusts the effort dependent on whether the index is trending up or down. It is similar to that used for "Category 3" stocks in Europe which carries out adjustments of TAC based on the survey index;
- Lratio_BHI: A simple index based on mean length, that adjusts the TAC based on the observed mean length compared to a reference length, the expected mean length at MSY; and

- LBSPR: Length based spawning potential ratio that adjusts fishing effort to obtain a SPR target of 0.4.

Table 28 shows the performance indicators for these different HCR. In terms of HCR, the Lratio_BHI was more precautionary, producing a higher spawning stock biomass for lower average yield. The EU_MP and LBSPR gave similar results, with LBSPR setting more precautionary effort levels compared to the EU_MP. However, the most important result compares the most recent selectivity function with the older 1986-1991 selectivity. The older selectivity catches larger fish, but is also much less narrow than the more recent selectivity. This means that under this selectivity the exploitation of larger fish was not negligible. In contrast, the recent selectivity is narrow, and exploitation of larger fish is negligible, implying that fish are escaping exploitation by growing; the spawning stock biomass (SSB) is less affected directly by fishing. Therefore, changing the selectivity to catch larger fish may not necessarily lead to better stock status, if the range of exploitation over lengths increases the relative vulnerability of the older fish overall. This was also demonstrated by the index-based HCR being less precautionary if the 1986-1991 selectivity is assumed in the projections (Table 28).

Table 28: MSE performance indicators for the three tested HCR, using the last selectivity function estimated for 2004-2010 (left) and the earlier 1986-1991 (right) selectivity function. SB is spawning stock biomass, "AAVE" is the average annual variability in effort, "AAVY" is the average annual variability in yield.

	Harvest Control Rule					
	2004 - 2010			1986 - 1991		
Performance Indicator	EU_MP	Lratio_BHI	LBSPR	EU_MP	Lratio_BHI	LBSPR
Prob. AAVE < 20% (Years 1-30)	1.00	0.01	1.00	1.00	0.02	1.00
Prob. AAVY < 20% (Years 1-30)	0.27	0.85	0.28	0.24	0.91	0.26
Prob. SB > 0.1 SBMSY (Years 1 - 30)	1.00	1.00	1.00	1.00	1.00	1.00
Prob. SB > 0.5 SBMSY (Years 1 - 30)	0.95	0.99	0.97	0.77	0.92	0.79
Prob. SB > SBMSY (Years 1 - 30)	0.60	0.88	0.70	0.31	0.73	0.31
Prob. F < FMSY (Years 1 - 30)	0.62	0.94	0.74	0.32	0.85	0.31
Prob. Yield > 0.5 Ref. Yield (Years 1-10)	0.85	0.50	0.83	0.91	0.62	0.92
Mean Relative Yield (Years 1-30)	0.96	0.36	0.93	0.97	0.47	0.98
Prob. Yield > 0.5 Ref. Yield (Years 21-30)	0.93	0.07	0.93	0.94	0.14	0.95

The most significant uncertainty in the use of MSE for red snapper is the selectivity function and how it has changed over time. A significant problem is that selectivity is estimated as domed-shaped, as a double-normal function in the SS3 stock assessment. This makes sense for the gear used (hooks) and the way the fishery operates. However, the downward slope on the selectivity function is confounded with mortality, making estimation of selectivity (and fishing mortality) uncertain. Therefore, improved understanding of the fishery may lead to a significant revision in stock status and scientific advice (Figure 10).

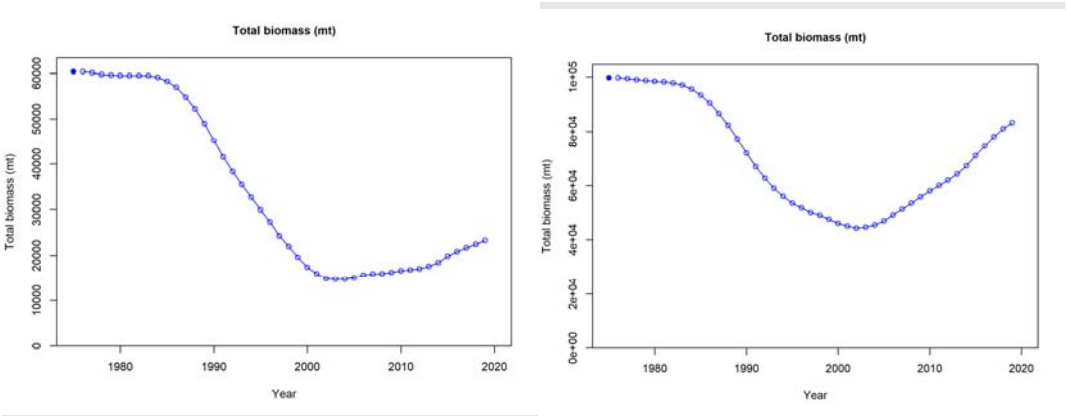

Figure 10: Alternative scenarios run in the stock assessment where one selectivity is applied through the entire time series (left) and with two blocks (right) which allows the selectivity to change once (source: Tagliarolo, 2020).

The latest stock assessment fitted two selectivity's as an alternative scenario, with the modelled change in selectivity happening in 1997 (Figure 11). The resulting model fitted the data better (with more parameters), but more importantly the perception of stock status changed dramatically, with the stock being in a much better state when including the selectivity change. This is broadly in line with the results above, where a change to a narrower selectivity has offered some protection to the spawning stock. Although there is concern over whether assuming a change in selectivity is precautionary, as noted above, it is difficult to explain the observed length composition without allowing for selectivity change. While more than two selectivity periods might be desirable, this may be difficult to include in the stock assessment because the right-hand side of the selectivity curve is likely confounded with mortality estimates.

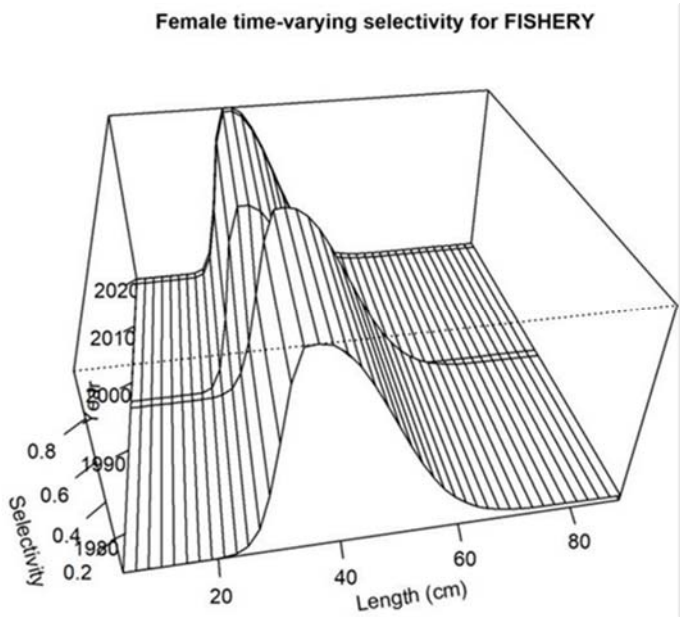

Figure 11: Female selectivity change estimated in the SS3 stock assessment (source: Tagliarolo, 2020).

11.3.1 Shortcomings, obstacles and impediments in the science-policy process

Based on the review above and on stakeholder consultation, the following shortcomings, obstacles and impediments are evident in the science-policy process for undertaking stock assessments of red snapper:

- Routine stock assessment is not conducted since the red snapper stock is not covered by DPMA's convention cycle;
- While the SS3 model is a significant improvement compared to? the previous VPA, it is a significant departure from the VPA model and requires explicit functional forms for selectivity;

- Clear delineation of the stock remains to be done, as there is a lack of biological and genetic information. WECAFC holds meetings on shared stock assessment, but neighbouring countries have very little data from the red snapper fishery to contribute. Any alternative stock definitions will need to be co-ordinated through WECAFC so that data can be shared. There is a lack of scientific evidence on how the number of licenses permitted under the EU agreement (45) was estimated;

- There are some ad hoc collaborations with fisheries economists, such as PhDs on the economics of the coastal or shrimp fisheries, but no routine social and economic data collection process. It is difficult to base any policymaking on socio-economic information;

- The removal of data uncertainties is a priority to ensure sustainable fishing. This will require scientific studies (e.g. survey on possible changes in fishing practices, experimental study comparing different hook sizes), but also possible changes to the regulations, particularly by increasing the proportion of the catch landed in French Guiana (currently 75%) and/or by imposing size sampling of these catches. The key uncertainty identified from the MSE exercise is selectivity, which was also identified by Ifremer's stock assessment scientist but not supported by the Ifremer's internal review, which proposed a more precautionary view.

The fishery appears to be poorly regulated, where neither French Guiana nor Venezuela is implementing adequate controls to ensure sustainable utilisation of the resource. Adequate enforcement of existing regulations such as minimum sizes and effort regulations is needed.

No full assessments of the red snapper have been undertaken in Brazil, Suriname, Guyana, Trinidad or Venezuela. High priority should be given to utilising whatever data are currently available in each country in order to assess the resource on a national basis, as well as to attempt a regional assessment to allow consideration of alternative stock structures.

11.3.2 Recommendations towards sound advice for fisheries management

The following recommendations are based on the stock assessment, including using the MSE approach above.

Stock assessment

The latest stock assessment demonstrated the importance of estimating selectivity in determining stock status and management advice. The MSE suggested that because the recent fishing effort (2004 to 2010) is capturing a narrow range of small-sized individuals, larger-sized individuals are escaping exploitation, compared to previous periods (1986 to 1991). This may be because fishers are actively targeting particular sized fish based on

market demand (single portion whole fish demanded by restaurants). So market demand may be protecting spawners, or spawners (through the growth overfishing) are so depleted in French Guiana waters that there are none to be caught. It is not clear which applies, but the models currently favour the former hypothesis. Therefore, it is important to consider alternative selectivity in the stock assessment to improve the assessment and management advice. The following suggestions may help understand the situation better:

- Try more selectivity blocks based on length composition residual patterns. The single selectivity block appears to have improved model fit. This may improve understanding of when and how selectivity has changed;
- Consider more than one selectivity for different trip groups based upon their fishing locations. Grouping length frequency in this way might improve selectivity estimates. Trips might then be grouped based on the length compositions they are landing, improving selectivity estimates. This in turn may allow hypotheses to be made linking size composition with the area fished, time of year and individual vessels;
- Examine the parameter correlation matrix, particularly correlation between selectivity double-normal right-side parameter and fishing mortality. This will help understand model fitting problems as a source of uncertainty and indicate what information might be required to reduce it; and
- Consider using the time series approaches to changing selectivity parameters available in SS3 (autoregressive or moving average estimation). This may help improve selectivity estimation by preventing unrealistic changes over time.

Consider a bespoke stock assessment model, that will be able to try alternate approaches to modelling selectivity that are not available in SS3. These could include but not be limited to:

- Adjusting the selectivity model, so it is possible to use the covariance between selectivity parameters to allow progressive change as well as controlling the way selectivity changes reflect changes in the fishery and so selectivity parameters are not independent;
- Developing a selectivity random-effects model to allow for differences among vessels while preserving parsimony;
- Using a non-linear CPUE model that accounts for potential gear saturation and other non-linear effects;
- Including in the stock assessment model standardisation of the CPUE. For example, a random-effects model of catchability can account for average as well as individual vessel changes in catchability. Otherwise, CPUE standardisation needs to take place outside of the stock assessment; and
- Converting the assessment to a Bayesian model that would better assess risks of management actions in projections.

While it would be possible to fit a surplus production or biomass dynamics model to the data (the length data would not be used in this type of model), the exploitable biomass has changed due to changes in selectivity rather than due only to exploitation, which would make this approach unreliable. It is recommended any model make use of the length composition data.

Data Collection

The most useful data for informing the stock assessment would be obtained by conducting a fishery independent survey. This would be useful to estimate selectivity, even if not

continued as a time series. Selectivity is the most important source of uncertainty for the management of this fishery. A single vessel fishing in a stratified randomised design in different areas at different depths, employing several hook sizes simultaneously, would provide important data testing assumptions about selectivity in the stock assessment and management advice. The survey could be conducted in various ways, including:

- Chartering a vessel from the current fleet to conduct the survey with fisheries scientists aboard to direct and monitor operations. This is the most expensive approach; or
- Linking a licence condition to co-operation with an annual scientific survey. This would allow vessels given access to share the burden for the survey. So, the survey would be conducted with fisheries scientists aboard, but only one trip per vessel, say, every few years so that the burden is shared. The vessel would be allowed to keep and sell the catch and could in addition be compensated. However, the main objective for vessels would be to protect their access to the fishery, so co-operating vessels would be guaranteed priority licensing, for example (see stakeholders below).

The abundance index (CPUE) could be standardised to account for different fishing power. This would require obtaining relevant information on vessels, such as vessel length and crew size, that can be linked to landings. Although this is always valuable to do, it is not clear this will make much difference in this case because vessels may not vary enough, which would imply significant differences in fishing power. In addition, critical historical information on fleet structure and fishing operations may be lacking, so that the full time series cannot be standardised. Differences in catch rates would most likely reflect the number of lines that could be set, which would be dependent on the crew and vessel size. However, standardisation can be extended to selectivity as well and in terms of accounting for the spatial distribution of effort, this might make more sense. This would attempt to some extent to account for selectivity differences among vessels and among areas (i.e. catchability-at-length rather than average catchability).

Interviews of the fishers may improve understanding of how fishing power and selectivity might have changed since 1986, and the causes for these changes. This could be done as formal interviews or through a meeting of vessel captains gathered (e.g. in Cayenne) as stakeholders (see below).

If up to 25% of landings do not take place in French Guiana, and fisheries outside French Guiana do not co-operate, the stock size may be significantly over-estimated and mortality estimates biased. Therefore, there may be a need to undertake a tagging programme (suggested by STECF). A successful tagging project could provide significant information on population size, growth and movement, but would be costly and have a high risk of failure.

Management

A simpler index-based assessment of status, with infrequent full stock assessments, may provide a more efficient approach than that currently being applied. For example, annual CPUE and spawning potential ratio may be estimated each year to guide management decisions or apply a pre-agreed harvest control rule. Then, every 5 years, a full stock assessment in SS3 might be conducted to evaluate performance and adjust the harvest strategy accordingly. While the full annual stock assessment that has been conducted recently is the best approach, it is expensive and may use up scarce scientific resources whilst other stocks remain unassessed.

Stakeholders should be extended to include the Venezuelan fishers. One of the problems with allowing foreign access to fish stocks is the foreign fishers may not feel they have a

long-term stake in maintenance of the resource. If there is no interest in developing a local capture fleet for this resource, it would be worth developing a long-term relationship with the fishers and fishing companies that have access. Therefore, the Venezuelan fishers and fishing companies should be recognised as full stakeholders in the fishery and consulted on management decisions. Access to the fishery could be linked to co-operation with the science and management. This could improve compliance with any further management initiatives in the long term.

A management strategy evaluation would be useful to explore alternative efficient and robust approaches to management. The DLMtool used in this report was limited to exploring index-based management approaches, using a model very similar to that used in the stock assessment. It may be worth developing a more sophisticated approach within the Fisheries Library in R project framework (https://flr-project.org), which could be expanded to include a length-based stock assessment approach (currently unavailable as far as is known). This might mean using different software to SS3 which is not consistent with the FLR model. Developing an approach in FLR would require considerably more resources than for DLMtool, but may be useful for other fisheries within the outermost regions.

Input controls, such as fishing effort and hook size limits, rather than output controls, such as catch or minimum landing size, is probably the best approach. Vessels have no incentive to make all landings in French Guiana, so applying a TAC may be difficult to enforce. Effort control is effective unless fishing power increases. In this case, big increases in fishing power are unlikely (in contrast to trawl) because there are few opportunities to do so for hook and line.

Limiting licences is not, by itself, sufficient. Fishing effort has not increased in line with licences issued, presumably because licences are used opportunistically and are also used to improve flexibility in vessel operations, rather than to increase exploitation. Nevertheless, some cap is required on numbers of trips or fishing days to prevent overfishing.

If selectivity is dependent on hook size and area fished, it may be possible to control selectivity by placing licence conditions on hook size and using VMS (or other location and time monitoring) to limit where fishing takes place. This has been recommended as a long-term approach by STECF (PLEN-21-01). Such a management decision would greatly benefit from including the current fishers as stakeholders, which would help with compliance, particularly given their experience in controlling capture size.

There is little doubt that the red snapper population in French Guiana may be connected to populations in neighbouring countries and across the Brazil-Guiana shelf. While STECF recommends identifying stock boundaries as "paramount" (PLEN-21-01), obtaining regional co-operation has been very slow. At present there has been no joint management agreed for any stock, although there are good examples of scientific co-operation. In practice, while international co-operation should be sought to improve stock definitions, this should not delay any management actions for the French Guiana red snapper. Any study should be carried through WECAFC to ensure cooperation from all countries in the region, and given French Guiana's access to technical support from Ifremer, French Guiana could take on a leading role in strengthening technical capacity in the region.

11.4 Development of a roadmap

To address the shortcomings, obstacles and impediments in the science-policy cycle identified, the report below provides a detailed roadmap which identifies a series of necessary actions, timeline and institutions necessary to establish regular stock

assessments to determine the status of red snapper populations as a basis for future management and conservation measures.

Vision - The vision for this roadmap for red snapper stock assessment is "A red snapper fishery that is effectively managed, based on evidence-based assessment and knowledge".

Goal - To establish a regular stock assessment for the red snapper fishery to support evidence-based decision-making towards the development of fisheries management and conservation measures.

Objectives

Objective 1: To enhance data collection, research and monitoring efforts in the red snapper fishery (detailed in Table 29)

Objective 2: To make stock assessment a routine activity conducted using cutting-edge methods and tools (detailed in Table 30)

Objective 3: To effectively manage the fishery based on scientific evidence (detailed in Table 31)

Table 29: Implementation matrix for the roadmap for red snapper stock assessments: 2021-2030: Objective 1.

Objective 1: To enhance data collection, research and monitoring efforts in red snapper fisheries					
Outcome 1.1: On-going collection of accurate and adequate catch, effort, size frequency and age data of red snapper in French Guiana					
Purpose: To collect the full set of data from the Venezuelan fishery catching the red snapper					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe
Collect all landings (including the 25% landed outside of French Guiana), effort, size frequency and age	Catch sampling involving a proportion of the catch from all fishing trips Collection of fishing effort Collection of length frequency of catch Collection of age data from catches	Accurate estimate of removals Complete data set on catch, effort, sizes and age of catch	More accurate landing statistics, effort and length frequency data Proportion of trips sampled per year Data that meets DCF requirements	Ifremer	Short term
Experimental surveys to explore the use of different hook sizes and fishing grounds/depths. This helps estimate selectivity which is the critical uncertainty for this fishery.	Conduct a fishery independent survey	Improved estimate of selectivity (Selectivity is the most important source of uncertainty for the management of this fishery)	Number of trips conducted using a charter vessel from the current fleet to conduct the survey with fisheries scientists on board to direct and monitor operations Number of licences linked with condition to cooperate with an annual scientific survey	Ifremer	Medium term
Stakeholder consultation to understand changes in fishing gear and vessel operations.	Conduct interviews and meetings with the fishers	Knowledge of changes in fishing power and selectivity and the causes for these	Number of interviews conducted Number of meetings/focus group discussions held with fishers	Ifremer	Short term
Collect information on population size, growth and movement of the red snapper	Tagging programme	Data on population size, growth and movement of the red snapper	Number of tags recaptured and returned	Ifremer	Medium term

Objective 1: To enhance data collection, research and monitoring efforts in red snapper fisheries					
Use of remote electronic monitoring where observers cannot be deployed	Sampling of total catch including accurate measures of effort	Accurate estimate of catch and effort	Number of vessels using REM Proportion of footage analysed	Ifremer	Long term
Outcome 1.2: Cooperation in data collection with neighbouring countries (Brazil, Suriname, Trinidad, Guyana & Venezuela) that target red snapper					
Purpose: To coordinate national data collection programmes from fisheries that catch the red snapper					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe
Coordinate the collection of landings, effort, size frequency and age data with neighbouring countries catching the red snapper	Discuss and agree the need to set up a national programme in each country to collect the data Establish protocols to be adopted by each country Collect data on catch, effort, size and age	A regional programme of data collection for the red snapper National data sets that are compatible / comparable	A regional database for the red snapper Ongoing monitoring of catches and effort	Ifremer and national fisheries authorities in Brazil, Suriname, Guyana and Venezuela, and WECAFC	Long term
Regular regional reconciliation of all information across the different states to ensure accuracy and completeness	Workshops to discuss and standardise data and information from each country (Could take place as Working Party meetings within WECAFC)	On-going monitoring and exchange of data and information Regular updates of national data sets	Updated regional database	Ifremer and national fisheries authorities in Brazil, Suriname, Guyana and Venezuela, and WECAFC	Long term

Table 30: Implementation matrix for the roadmap for red snapper stock assessments: 2021-2030: Objective 2.

Objective 2: To make stock assessment a routine activity conducted using cutting-edge methods and tools					
Outcome 2.1: Stock assessment of the red snapper in French Guiana routinely done as part of the DPMA convention cycle					
Purpose: To ensure stock assessment is routinely conducted that provides advice towards the implementation of management and conservation measures					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe
Stock assessment of the red snapper fishery is included in the DPMA's convention cycle	Draw up an agreement between Ifremer and DPMA that lists red snapper among the stocks that are covered by the conventional assessment cycle	Red snapper stock assessment conducted as part of the DPMA's cycle	Red snapper assessment listed in DPMA's work plan	DPMA, Ifremer	Short term
Estimate selectivity and determine stock status and provide management advice	Use data collected under Objective 1 to improve estimates of current and past selectivity	Management advice based on reliable estimates of stock status	Better management advice for the red snapper fisher More appropriate policy decisions made for the fishery	Ifremer	Medium term
Update the full stock assessment to evaluate fishery performance	Use data collected under Objective 1 to update the stock assessment	Improved estimate of stock status history	Better management advice for the red snapper fisher More appropriate policy decisions made for the fishery	Ifremer	Medium term
Conduct simple MSE explore alternative harvest strategies	Use data collected under Objective 1 to perform an MSE assessment	More appropriate harvest control rule	Better management advice for the red snapper fisher More appropriate policy decisions made for the fishery	Ifremer	Medium term
Outcome 2.2: Coordinated national efforts on red snapper assessment between French Guiana and neighbouring countries					
Purpose: To coordinate national assessments to determine the status of stocks and desirable management measures					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe
Hold working group meetings with scientists from Brazil, Suriname,	Use data in regional data base and MSE (if	Joint advice and management recommendations	Number of recommendations / pieces of advice	Ifremer and national fisheries authorities in	Long term

Objective 2: To make stock assessment a routine activity conducted using cutting-edge methods and tools					
Trinidad, Guyana and Venezuela and run assessment of red snapper	developed) to assess red snapper stock			Brazil, Suriname, Guyana and Venezuela, and WECAFC	
Regular integration of national assessments into regional assessments to examine regional status and management strategies	Use data in regional database and MSE (if developed) to assess red snapper stock			Ifremer and national fisheries authorities in Brazil, Suriname, Guyana and Venezuela, and WECAFC	Long term

Table 31: Implementation matrix for the roadmap for red snapper stock assessments: 2021-2030: Objective 3.

Objective 3: To effectively manage the red snapper fishery based on scientific evidence					
Outcome 3.1: Control, enforcement and management measures are implemented effectively					
Purpose: To improve the scientific evidence underpinning each management / conservation measure					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe
To ensure effective control and enforcement of existing regulations	To use scientific evidence to establish, monitor and control key inputs such as fishing effort, hook size and areas fished	Reduced overfishing due to effective enforcement of a cap in number of trips and fishing days	Effective implementation of capacity and effort controls Capacity and effort controls (hook size limits, number of days fishing) adapted to stock status	Ifremer, DM and CRPMEM	Short term
Outcome 3.2: Venezuela trollers integrated as full stakeholders in the fishery					
Purpose: To recognise the Venezuelan fishers and fishing companies as full stakeholders in the fishery and consult them on management decisions and access to the fishery					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe
Integrate the Venezuela trollers as full stakeholders	Set up a working group for annual or biannual meetings of all stakeholders.	Improved management and compliance	Meeting minutes and reports.	Ifremer, DM and CRPMEM	Medium term
Consultations with the Venezuela trollers to provide findings and discuss management measures for the fishery	Initiate meetings to discuss long term access requirements	Improved management and compliance	Meeting minutes and reports.	Ifremer, DM and CRPMEM	Medium term
Outcome 3.2: There is joint management of the red snapper stock with neighbouring countries					
Purpose: To seek international co-operation to improve stock definition, assessment and management of the red snapper fishery					
Actions	Key Activities	Outcomes	Outputs/OVI	Institution	Timeframe

Objective 3: To effectively manage the red snapper fishery based on scientific evidence					
Discuss and develop management approaches through CRFM based on WECAFC recommendations	Develop an approach to provide more targeted management of the red snapper fishery at the regional level	Regional management measures supported by clear and consistent advice from WECAFC	Published advice for different areas in the region as needed Number of management / conservation measures enforced	CRFM, WECAFC	Long term
Maintain links between local national actions and regional action plan on management and conservation measures	Highlight and link local national actions of relevance with regional action plan on management of the red snapper	Shared best practice from the different areas Cross-country working and promotion of national level management	Reports from CRFM, WECAFC	CRFM, WECAFC	Long term

12 CONCLUSIONS AND RECOMMENDATIONS

This study has provided a detailed overview of the structures in place within each OR for data collection and scientific advice based on 2017-2019 EU-MAP and 2020-2021 EU-MAP. This includes a description of the main target stocks, what data are collected for different métiers and how it is currently used to inform scientific advice. In the case of French Guiana, this has been extended to provide a more detailed analysis of the deep-water red snapper fishery as an example where foreign fishing from a third country occurs within EU waters. The analysis includes a number of specific recommendations to support stock assessment, data collection and management.

A series of separate OR Profile Reports (Annex 2) describe what data obligations are currently implemented, including a series of recommendations to address any gaps in the implementation. These extensive information sources are used to develop a series of OR-specific SWOT analyses that show how to improve data collection and scientific advice in support of fisheries management. The results from each SWOT (Annex 3) highlight a number of observations and recommendations for activities and projects that could improve data collection and the provision of scientific advice across ORs. These results and recommendations have been used to provide a synthesis across all ORs.

The following table provides a summary of the main conclusions of the study through a series of projects to address key issues and main recommendations that apply to one or more OR. Clearly some activities may only be applicable to one region or métier, whilst others are common across all ORs (see Table 32).

Table 32: Project recommendations to improve data collection and scientific advice across ORs based on main conclusions from the study.

Category addressed	Project description	Beneficiaries	Timeframe	Milestones / Indicators
Identify SWOT categories that would be addressed by project	A short paragraph describing the proposed project	The OR or ORs that would benefit from this project	Duration of project[63]	Indicate any milestones or indicators
Fish stocks and other marine organisms and associated fishing activities	Improve biological and effort data collection on non-assessed species of interest to address knowledge gaps and allow stock assessments to be conducted. This could include species' life histories and stock delineation.	All ORs	Long	Most important species are assessed within 5 years.
Fish stocks and other marine organisms and associated fishing activities	Collect data on depredation of catches for pelagic species by marine mammals and sharks to improve longline catch data.	Réunion	Medium	Estimates of depredation rates for the main pelagic species are available.
Fish stocks and other marine organisms and associated fishing activities	Improve data collection for recreational and/or informal fisheries through field or phone surveys. Effective monitoring and control for these fisheries should also be implemented.	All ORs	Medium	Data are collected and fisheries catches are properly monitored and controlled to feed into stock assessments.
Fish stocks and other marine organisms and associated fishing activities	Improve knowledge of composition of landed catches through capacity building of field samplers.	Mayotte French Guiana Guadeloupe Martinique	Medium	Species composition of landings is improved to feed into stock assessments.
Fish stocks and other marine organisms and associated fishing activities	Develop a national web-based system allowing self-service access to all fisheries data.	All French ORs (potential to extend to Spain and Portugal)	Long	Self-service access to data from SIH (for France) is available to registered users with appropriate confidentiality rules.

63 Short (<2 years), Medium (2-5 years), Long (5 years)

Category addressed	Project description	Beneficiaries	Timeframe	Milestones / Indicators
Fish stocks and other marine organisms and associated fishing activities	Deploy a system to collect data for the 20 fishers active in St Martin to have baseline data for fisheries in St Martin, including recreational fisheries.	St Martin	Short	Stocks are defined, topology and level of exploitation of these stocks are known (description of metiers), including for recreational fisheries.
Institutional Structure	Capacity building and awareness activities targeted at fishers to improve logbook submission and quality.	All French ORs	Medium	Small-scale fishers logsheet submission rate and quality are improved.
Institutional Structure	Harmonise reference / code lists used by the various actors involved in data collection.	Mayotte	Short	All actors involved in fishery data collection in Mayotte use the same code lists.
Institutional Structure	Increase number of field samplers to improve coverage (and representation) of landings.	Mayotte French Guiana	Medium	Coverage of landings is improved.
Current state of data collection obligations	Improve data collection of socio-economic data to include all 2017-2019 EU-MAP requirements through various means, including phone surveys and on-site surveys where in person data collection may not provide the data required. This may require recruitment of new and qualified staff.	All ORs	Medium	Socio-economic data required by 2017-2019 EU-MAP are available.
Current state of data collection obligations	Use logbook data to produce basic indicators on catch and effort by métier and species, and assess statistics quality by comparing with current data collection / statistics raising system.	Martinique Guadeloupe	Short	Logbook data are used as either main source of data or complement to current sampling system to increase quality and quantity (better disaggregation to species level) of fisheries statistics.
Current state of data collection obligations	Improvement of first sale data accuracy to avoid misidentification and errors in	Canary Islands	Medium	Accurate species and fishing gear labelling at first sale points.

Category addressed	Project description	Beneficiaries	Timeframe	Milestones / Indicators
	the species and fishing gear labelling at the first sale points.			
Current state of data collection obligations	Improve estimation of last trip catches by Venezuelan vessels through mandatory sampling in port or at sea.	French Guiana	Medium	Estimations of red snapper catches by Venezuelan vessels from latest trips are available for stock assessment.
Current state of data collection obligations	Scientific surveys and where possible, onboard observer programmes.	Madeira	Long	Fishery independent survey are established to support data collection. Development of an onboard observer programmes or use of alternative technologies for small-scale vessels where observers may not be appropriate.
Fisheries management and conservation measures	Fishery-independent study (e.g. Scientific trawl sampling) of the shrimp stock to properly assess the fishery.	French Guiana	Medium	Information required to properly assess the shrimp stock is available.
Fisheries management and conservation measures	Management measures are revised to ensure consistence and sustainability goals. Management measures are not fully based on science e.g. Management of Marine Reserves is not supported by monitoring by a scientific institution of reference since 2011-2012. Additional Marine Reserves are necessary on islands that lack these management measures. Potentially unbalanced fleet due to (i) poor estimation (probably underestimated) of local fishing products value because the sale and marketing system devalue prices; (ii)	Canary Islands	Medium	Management measures revised and updated by proposals in line with sustainability goals. Developed by Regional and National Fishing Administrations.

Category addressed	Project description	Beneficiaries	Timeframe	Milestones / Indicators
	underestimation of the fishing ground size as it is standardized to 1 mile because there is no VMS, and (iii) great underestimation of the fishing effort as it is estimated using the first sale data (existence of fishing days in which fish is not landed because is kept frozen for several days, or because is caught by traps that are still in the water).			
Fisheries management and conservation measures	IUU fishing quantification and developing a control system (e.g. recreative fishing selling the captures and/or without license, unreported catches not registered in first sale points, IUU fishing from foreign vessels).	Canary Islands Azores Madeira	Long	IUU quantified and an effective monitoring system in place. Developed by Regional and National Fishing Administrations.
Red snapper is assessed as a single stock inside French Guiana	Asses as a shared stock. Ensure data from countries neighbouring French Guiana are collected and included in the stock assessment. Efforts towards research cooperation among the nations adjacent to French Guiana are required to enhance data and evidence towards the sustainable management of the stock.	French Guiana	Long	Red snapper assessed as a shared stock.
Red snapper stock status is uncertain	Adoption of management measures such as a limit on fishing effort and use of larger hooks.	French Guiana	Medium	Red snapper stock status improved.

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Commission Implementing Decision (EU) 2021/1168 of 27 April 2021 establishing the list of mandatory research surveys at sea and thresholds as part of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors from 2022 C/2021/2801 (OJ L 253, 16.7.2021, p. 92–99).

ANNEX 2: OUTERMOST REGIONS PROFILE REPORTS

Macraronesia

- Azores
- Madeira
- Canary Islands

Caribbean

- Martinique
- Guadeloupe
- Saint Martin
- French Guiana

Indian Ocean

- Mayotte
- Réunion

Azores

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Azores Profile Report

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Acronyms

Term	Description
AMP	Azores Marine Park
ARDITI	Regional Agency for Research and Technology Development and Innovation
CECAF	Committee for the Eastern Central Atlantic Fisheries
CFP	Common Fisheries Policy
DCF	Data Collection Framework
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DRP	Regional Directorate for Fisheries
EASME	Executive Agency for Small and Medium Sized Enterprises
EEZ	Exclusive Economic Zone
EMFF	European Maritime and Fisheries Fund
EMODnet	European Marine Observation and Data Network
ERDF	European Regional Development Fund
EU	European Union
FAO	Food and Agriculture Organization
FAOSTAT	The Food and Agriculture Organization Corporate Statistical Database
GDP	Gross Domestic Product
GNR	Republican National Guard
ICCAT	International Commission for the Conservation of Atlantic Tuna
ICES	International Council for the Exploration of the Sea
INE	National Institute for Statistics
IPMA	Portuguese Institute for the Sea and the Atmosphere
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unregulated or Unreported
LOTAÇOR	Auction markets of the Azores, S.A.
MARE	Marine and Environmental Sciences Centre
MCS	Monitoring, control and surveillance
MPA	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
NGO	Non-governmental organisation
OR	Outermost Region
OSPAR	Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
PCP	Política Comum de pescas
PSP	Public Security Police

Term	Description
SIGMAR	Azores Marine Geographic Information System
SMEFF	Sustainable management of external fishing fleets
SREA	Regional Statistical Office of the Azores
STECF	Scientific, Technical and Economic Committee for Fisheries (EU)
SWOT	Strengths, Weaknesses, Opportunities, Threats
TAC	Total Allowable Catch
VMS	Vessel Monitoring System
WGDEEP	Working Group on the Biology and Assessment of Deep-sea Fisheries Resources

List of Species

Common name	*Scientific name*
Albacore tuna	*Thunnus alalunga*
Alfonsino	*Beryx spp.*
Arrowhead dogfish	*Deania profundorum*
Atlantic blue marlin	*Makaira nigricans*
Atlantic bluefin tuna	*Thunnus thynnus*
Atlantic bonito	*Sarda sarda*
Atlantic chub mackerel	*Scomber colias*
Atlantic sailfish	*Istiophorus albicans*
Atlantic white marlin	*Kajikia albida*
Axillary seabream	*Pegellus acarne*
Azorean limpet	*Patella aspera*
Barracuda	*Sphyraena spp.*
Basking shark	*Cetorhinus maximus*
Bigeye threasher shark	*Alopias superciliosus*
Bigeye tuna	*Thunnus obesus*
Birdbeak dogfish	*Deania calcea*
Black scabbardfish	*Aphanopus carbo*
Blackbelly rosefish	*Helicolenus dactylopterus*
Blackspot seabream	*Pagellus bogaraveo*
Blacktail comber	*Serranus atricauda*
Blue fish	*Pomatomus saltatrix*
Blue jack mackerel	*Trachurus picturatus*
Blue ling	*Molva dypterygia*
Blue shark	*Prionace glauca*
Bluntnose sixgill shark	*Hexanchus griseus*
Bottlenose dolphin	*Tursiops spp.*
Callogorgia	*Callogorgia verticillata*
Common dolphin	*Delphinus delphis*
Common lobster	*Homarus gammarus*
Common mora	*Mora moro*
Conger eel	*Conger conger*

Common name	*Scientific name*
Dusky grouper	*Epinephelus marginatus*
European pilchard	*Sardina pilchardus*
Forkbeard	*Phycis phycis*
Gorgonia	*Acanthogorgia armata*
Great lanternshark	*Etmopterus princeps*
Greater amberjack	*Seriola dumerilli*
Grey triggerfish	*Balistes capriscus*
Gulper shark	*Centrophorus granulosus*
Hexacorals	*Leiopathes spp.*
Imperial blackfish	*Schedophilus ovalis*
Intermediate scabbardfish	*Aphanopus intermedius*
Island grouper	*Mycteroperca fusca*
John dory	*Zeus faber*
Killer whale	*Orca orca*
Kitefin shark	*Dalatias licha*
Leafscale gulper shark	*Centrophorus squamosus*
Loggerhead turtle	*Caretta caretta*
Long-finned squid	*Loligo forbesii*
Lowfin gulpershark	*Centrophorus lusitanicus*
Mediterranean moray	*Muraena helena*
Mediterranean parrotfish	*Sparisoma cretense*
Mediterranean rainbow wrasse	*Coris julis*
Mediterranean slipper Lobster	*Scyllarides latus*
Moray eel	*Family Muraenidae*
Offshore rockfish	*Pontinus kuhlii*
Orange roughy	*Hoplostethus atlanticus*
Porbeagle	*Lamna nasus*
Portugese dogfish	*Centroscymnus coelolepis*
Purple sea urchin	*Paracentrotus lividus*
Red porgy	*Pagrus pagrus*
Red scorpionfish	*Scorpaena scrofa*
Risso's dolphin	*Grampus griseus*
Roughskin dogfish	*Centroscymnus owstonii*

Common name	*Scientific name*
School shark	*Galeorhinus galeus*
Sea cucumbers	*Holothuria sp.*
Seabream	*Family Sparidae*
Sharpnose sevengill shark	*Heptranchias perlo*
Shortfin mako shark	*Isurus oxyrinchus*
Silver scabbardfish	*Lepidopus caudatus*
Skipjack tuna	*Katsuwonus pelamis*
Smooth hammerhead	*Sphyrna zygaena*
Smooth lanternshark	*Etmopterus pusillus*
Spanish ling	*Molva macrophthalma*
Spiny lobster	*Panulirus spp.*
Splendid alfonsino	*Beryx splendens*
Striped red mullet	*Mullus surmuletus*
Swordfish	*Xiphias gladius*
Thicklip grey mullet	*Chelon labrosus*
Thornback ray	*Raja clavata*
Tunas	*Thunnus spp*
Velet belly lanternshark	*Etmopterus spinax*
Wahoo	*Acanthocybium solandri*
White seabream	*Diplodus sargus*
White trevally	*Pseudocaranx dentex*
Wreckfish	*Polyprion americanus*
Yellowfin tuna	*Thunnus albacares*

1 Introduction

The archipelago of Azores (hereafter 'Azores') is an Autonomous Region of Portugal, endowed with political and administrative statutes and self-governing bodies. The archipelago is an isolated group of nine volcanic islands situated in the north Atlantic along the mid-Atlantic ridge and part of the Macaronesian islands. The Azores, and in general all volcanic insular regions, are characterised by the absence of a continental shelf and adjacent areas of great depths. Potential fishing grounds are essentially restricted to the narrow belt of shallow water around the islands and to nearby banks and seamounts.

The Azorean fishing fleet is comprised of small and large-scale operations competing for the same limited resources, fishing grounds and markets. The two sectors are different, not only in the scale of operation but also in the level of technology, employment generation and the degree of capital intensity and investment. Most of the Azorean fisheries are characterised as being small-scale and artisanal, with reduced vessel sizes, limited areas of operation and the use of traditional passive fishing gears e.g. longliners and small purse seiners targeting blue jack mackerel. These artisanal fisheries are considered sustainable, with the absence of less selective and damaging gears such as trawls and bottom gillnets (Carvalho et al., 2011). The situation within the Azores has recently changed, with the introduction of large commercial vessels undertaking a multi-gear fishery, with several demersal/deep-water target species but being mostly driven by the dynamics of the high-value species, blackspot seabream (Santos et al., 2019).

1.1 Geographic and economic characteristics

The Azores have been classified as a temperate warm or subtropical region. Ocean circulation around the Azores is complex, but overall the surface is dominated by the Gulf Stream water mass flowing from the west, approximately at 40°N which then splits into the North Atlantic current and the Azores current. Each of these currents divides into two further branches. The actual system is more complex, because it may change during the year, affected by the complex bottom topography of the Azores. The general current flow is west to east. However, despite the dominance of the oceanic system from the west, marine littoral flora and fauna have more affinity with the eastern Atlantic.

The Azores Exclusive Economic Zone (EEZ) occupies an area of 957 292 km^2 representing approximately 55% of the Portuguese EEZ, and 16.3% of the sum of the EEZs of the maritime spaces of the Member States of the European Union (EU), in the Northeast Atlantic (Table 1). The area has an average depth of around 3 000 m, with only approximately 7% of this area being less than 1 500 m in depth. The islands and their contiguous shelf (<500 m depth) have an estimated area of 412 km^2, representing only 0.4% of the EEZ, while seamounts (<500 m depth) account for an additional 0.3% (Morato et al., 2008). Potential fishing grounds are limited and essentially restricted to the narrow belt of shallow water around the islands and to nearby banks and highly productive seamounts (Carvalho et al., 2011). The main geographic characteristics of the archipelago including the average density of all types of vessels in 2017 is presented in Figure 1. It is also noticeable the density of vessels (fishing) in the main fishing seamounts around the archipelago islands.

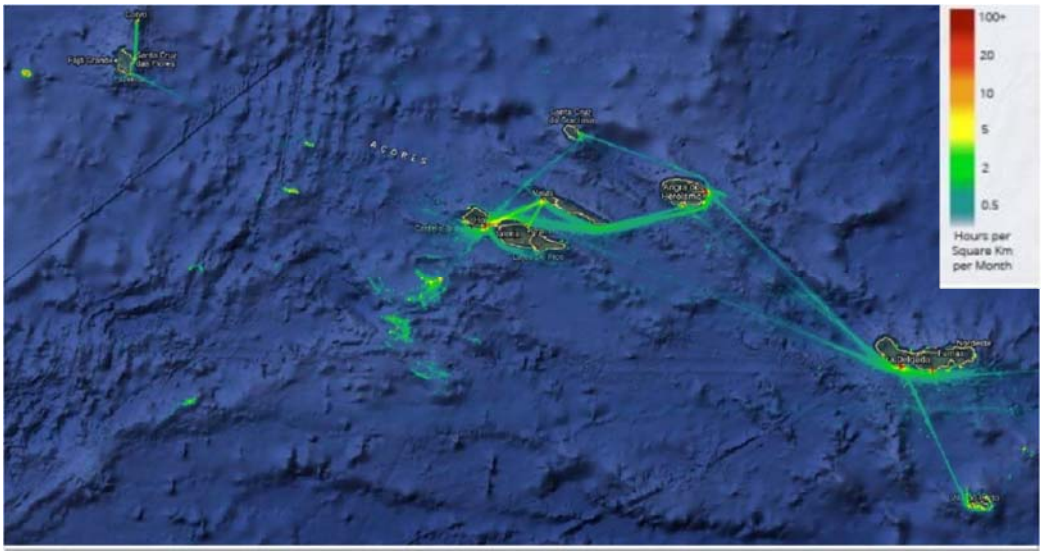


Figure 1: Geographic characteristics of the Azorean archipelago and average density of vessels in 2017 (source: EMODnet).

With regard to port and marina infrastructures, fishing ports are located in all islands of the archipelago and their numbers are proportional to the island area, with larger numbers of ports on larger islands (Figure 2).

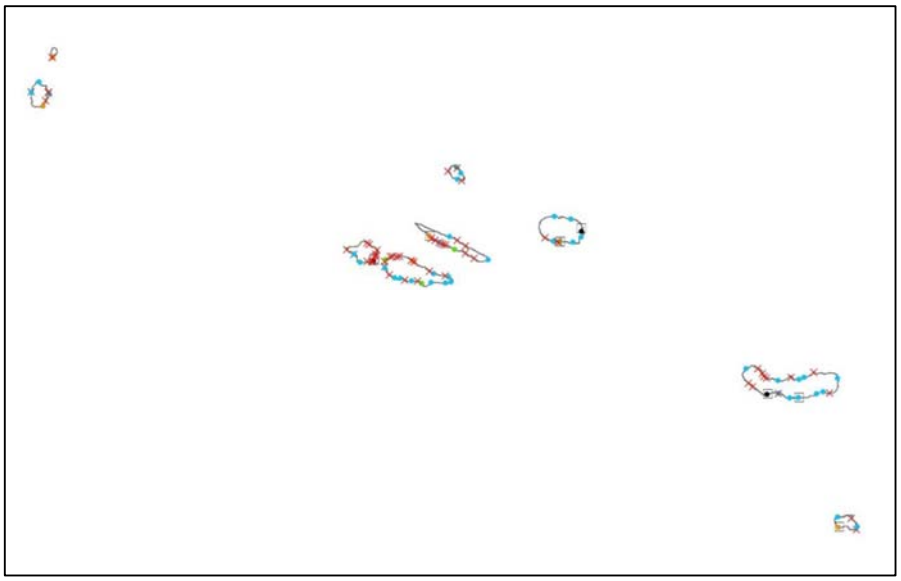


Figure 2: Location of ports and marinas on the Azores. Blue circles represent the fishing ports (source: Geoportal SIGMAR).

Recently, conditions have been created in the Azores for the installation of aquaculture establishments (most of which are still very small and in the pilot phase) located on the coastline of the islands of Faial, Terceira and São Miguel, which are intended for the production of marine species fish (greater amberjack, wreckfish and white trevally) and echinoderms (p*urple sea urchin* and *sea cucumbers*) (Figure 3).

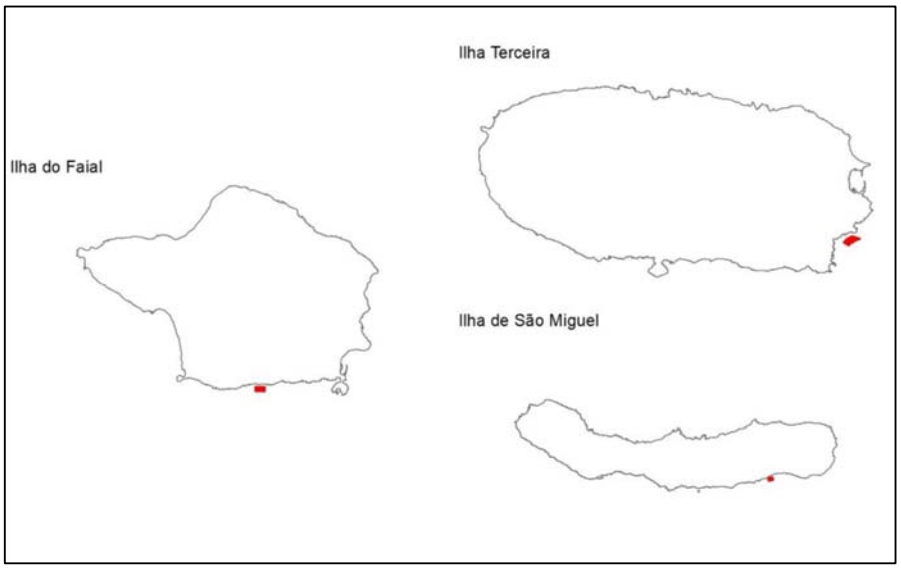


Figure 3: Aquaculture production areas in the Azores (source: Geoportal SIGMAR).

Table 1: General geographic indicators.

Description	Unit	Source
Azores Land area	2 322 km^2	INE
Population size	243 356	SREA 2019
Exclusive Economic Zone (EEZ) area	957 292 km^2	Instituto Hidrográfico

Economic indicators of the activity of sea fishing, gathering of seaweed and other sea products in the OR (Table 2), suggesting a stable number of people/activities employed in all activities related to fishing during the period 2010-2017. In terms of production and turnover a small decrease is observed but with GVA having registered an increase. It is important to mention that for the present study and at the national level much of the socio-economic information does not yet exist disaggregated at the level of the ORs in a homogenous manner that would allow a cross-cutting and representative description of the structure and dynamics of the economy of the sea in the Azores

Table 2: Economic activity of sea fishing, gathering of seaweed and other sea products in the Azores (source: adapted from INE, 2019).

	2010	2011	2012	2013	2014	2015	2016	2017
No. of companies	575	554	531	561	563	572	597	579
No. of employees	1 494	1 459	1 082	1 143	1 251	1 235	*	*
Production (EUR mil.)	40.2	39.5	38.0	38.8	38.5	39.3	*	*
Turnover (EUR mil.)	43.2	40.2	38.5	39.5	38.4	38.9	*	*
GVA (EUR mil.)	14.2	12.5	13.5	16.4	16.4	17.5	*	*

* Confidential values

1.2 Fisheries statistics

Catches within the Azores are based predominantly on large pelagic species (tuna species and swordfish), blue jack mackerel and conger eel, while crustacean (spiny lobster and common lobster) and shellfish (essentially clams) are also substantial. Fishing of deep-water species is multispecific and employs a variety of fishing gears. Most resources harvested are tuna, blackspot seabream or blue jack mackerel. Table 3 describes the fishery statistics by weight and value classified by island and each major species group in 2019.

Table 3: Total landing (tonnes) and value (EUR '000) by island and species group in 2019 (source: DRP, 2020).

Total landing by island and species group		Landings (tonnes)	Landings (EUR 000)
Santa Maria	Demersal	116.2	376.9
	Pelagic	561	813.7
	Shellfish	22	145.3
	Crustacean	0.71	26.4
	Total	**700**	**1 362.4**
São Miguel	Demersal	874.9	6 196.4
	Pelagic	2 304.9	4 045.2
	Shellfish	746.3	6 101.9
	Algae	0.102	0
	Crustacean	3.6	38.2
	other species	0.018	0
	Total	**3 929.8**	**16 381.9**
Terceira	Demersal	525.6	4 370.2
	Pelagic	416.9	629.8
	Shellfish	152.6	981.9
	Crustacean	11.5	65.4
	Algae	0.740	0
	Total	**1 107.4**	**6 047.5**
Graciosa	Demersal	80,117	849 434
	Pelagic	13 187	46 316
	Shellfish	106 030	665 504
	Crustacean	73	1,279
	Algae	5 176	0
	Tot.	204 582	1 562 534
São Jorge	Demersal	23 996	117 789
	Mollusc	59 915	429 425
	Pelagic	166 408	270 298
	Crustaceans	908	24 283
	Total	**251 228**	**841 795**

Total landing by island and species group		Landings (tonnes)	Landings (EUR 000)
Pico	Demersal	179 359	969 676
	Pelagic	1 309 479	1 820 524
	Mollusc	163 161	1 211 259
	Crustaceans	2 661	10 038
	Other species	10	75
	Algae	4,510	32
	Total	**1 659 180**	**4 011 602**
Faial	Demersal	225 317	2 321 077
	Pelagic	103 758	291 808
	Mollusc	32 982	196 494
	Crustaceans	144	1 294
	Other species	20	179
	Total	**362 222**	**2 810 852**
Flores	Demersal	41 051	483 726
	Pelagic	5 014	21 606
	Mollusc	30 231	244 227
	Other species	265	4 344
	Crustaceans	122	1 096
	Total	**76 683**	**754 997**
Corvo	Demersal	13 464	153 255
	Pelagic	2 332	10 304
	Mollusc	16	117
	Total	**15 813**	**163 677**
Total Azores	Demersal	2 079 950	15 838 616
	Pelagic	4 883 180	7 949 588
	Mollusc	1 313 279	9 976 318
	Algae	10 528	32
	Crustaceans	19 693	168 077
	Other species	313	4 597
	Total	**8 306 943**	**33 937 227**

During the period 1994 to 2017, average annual landings by weight in the auctions of the archipelago encompassed 11 994 tonnes, corresponding to approximately EUR 28.4 million. The total volume of landings at the auctions (Figure 4) shows a downward trend following 2010, because of a significant reduction in tuna catches in Azores. However, it should be noted that the fish marketed at the auctions in the OR during 2017 amounted to EUR 29.5 million, which represents a significant increase when compared to the value recorded in 2016 (SRMCT, 2018).

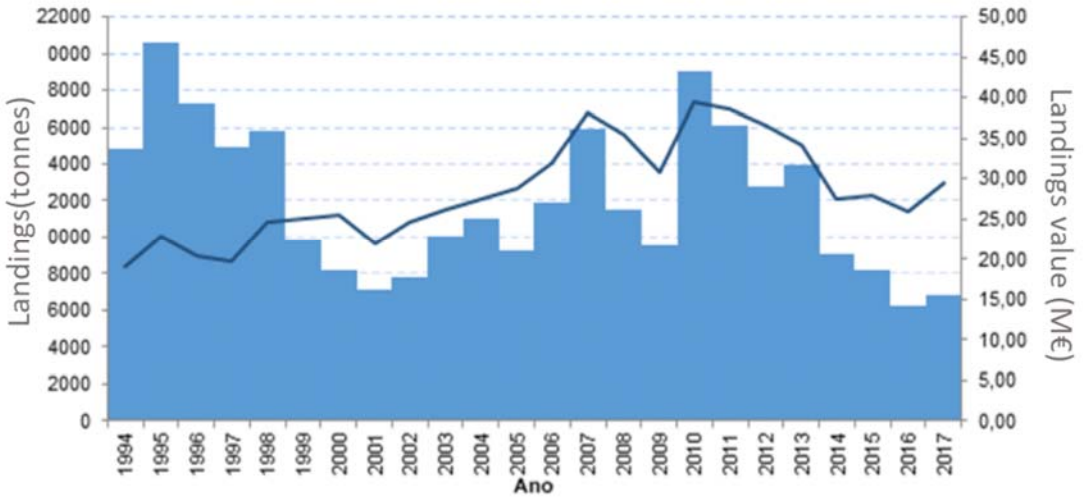


Figure 4: Evolution of landings by weight (blue bars, tonnes) and value (black line, EUR mil.) from 1994-2017 (data source: SREA - LOTAÇOR).

Some of the socio-economic information does not yet exist disaggregated at the OR level in a homogenous manner that would allow a cross-cutting and representative description of the economy of the sea in the Azores. This is the case of the total imports and exports of fish and fishery products for which consistent statistics are only available for Portugal.

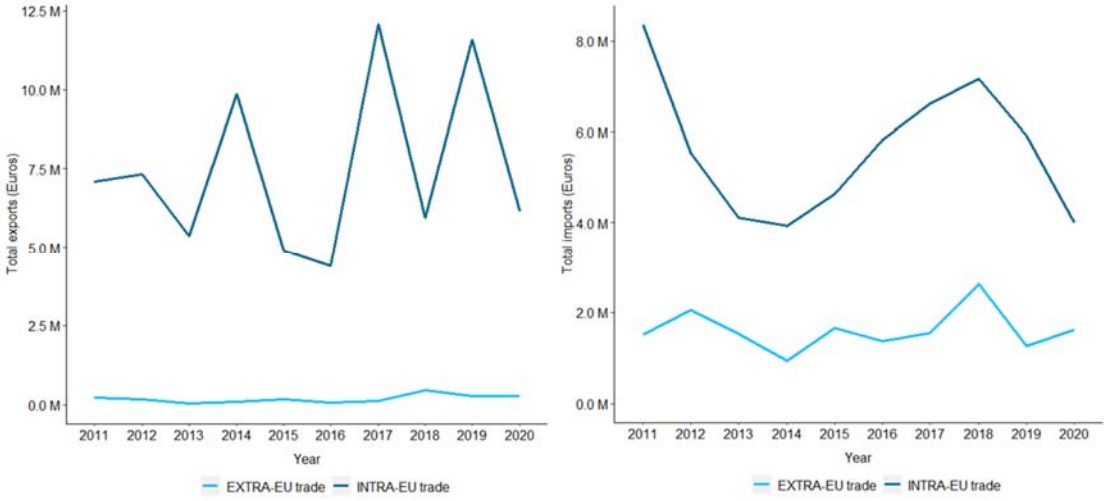


Figure 5 shows the national imports and exports of fish and fishery products from 2011 to 2020. FAO estimates for the per capita supply of fishery products from 2001 and 2013 from Portugal are compared to the world average in Figure 6 and Figure 7. Portugal has the third highest per capita fish consumption in Europe (approximately 53.8 kg per person per year in 2013), after Iceland and the Faroe Islands (FAOSTAT). Of the only study available, Silva and Goulding (2003) estimated that the Azores had the highest consumption per capita in the country with 76.3 kg per person per year.

There is some anecdotal information for import/export in the Azores, stating that the bulk of fresh fish landings in the region is exported (70-75% SREA, 2016), mostly tuna and high quality demersal fish. From the recent enquiries throughout this study project, there is also indication that this value could have reached 90% in some years but the recent

touristic boom in the archipelago might have decreased these values to 70-80%. The COVID-19 pandemic could have returned the fresh fish exports back to the previous highest levels.

Tuna and canned tuna are the more important export as the canning industry plays an important role in the economy of the Azores. Canned tuna products account for between 40% and 60% of fishery related exports from the region. In years with less available tuna, the majority of fishing related imports is tuna to feed the canning industry (SREA, 2016).

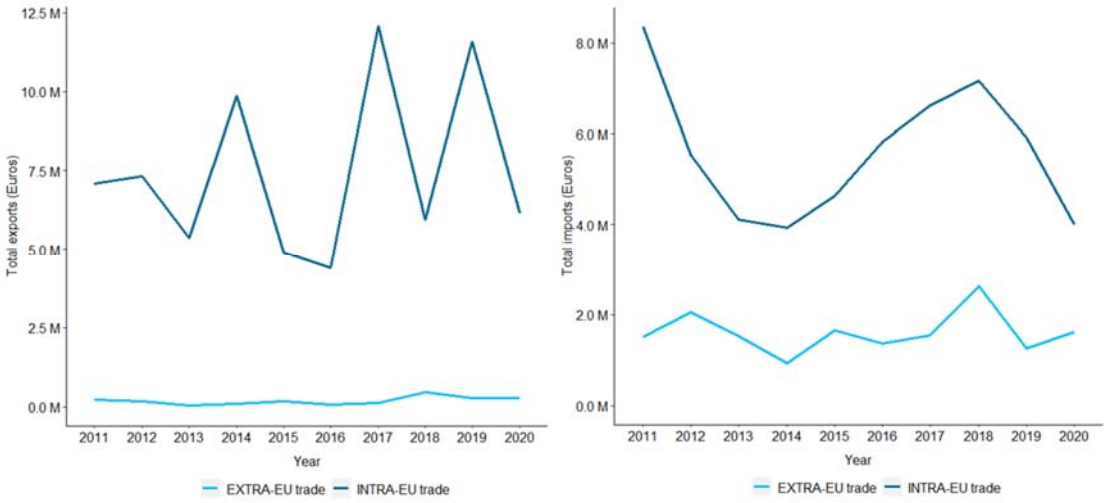


Figure 5: Total imports[2] (left panel) and exports[3] (right panel) of fish and fishery products. Definitive data from 2011 to 2019 and preliminary data 2020 (data source: INE 2021).

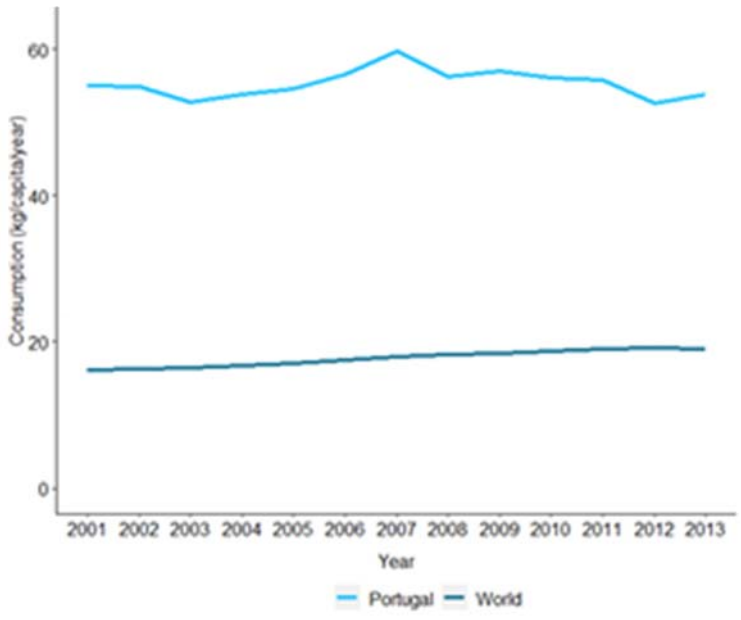


Figure 6: Per capita supply of fishing and fishery products for Portugal (blue) and World (orange) (data source: FAOSTAT).

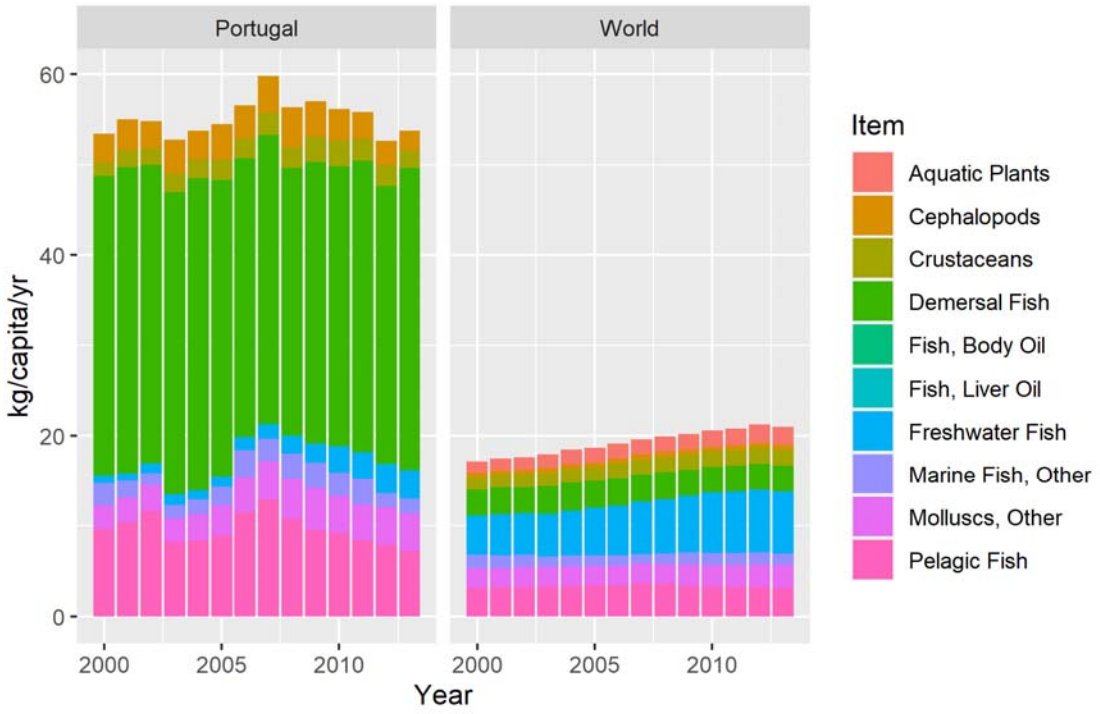


Figure 7: Composition of per capita fish supply for Portugal and the World (data source: FAOSTAT).

1.3 Regional fisheries management

Fisheries are currently managed under the EU Common Fisheries Policy (CFP). This is implemented primarily through the use of Total Allowable Catches (TACs), but also with technical measures. Such technical measures include minimum landings sizes or weights, minimum mesh sizes, allowable percentage of bycatch species, area and temporal closures and a ban on deep-sea trawling. Fisheries management within the Azores is based on the CFP (Regulation (EU) 1380/2013, 11 December), which meets the requirements of the Marine Strategy Framework Directive (MSFD) (Directive No. 2008/56 / EC of the European Parliament and of the Council, 17 June). Management also aligns with the United Nations (UN) Sustainable Development Goals within the EU, requiring Member States to implement efficient management measures that ensure the social, economic and environmental sustainability of extractive activities, including the regular monitoring of exploited resources and their habitats (Guerreiro and Rodrigues, 2020). In general, specific to the Azores, there are several regional regulations that regulate fishing activities in various marine areas of the region and on the several specific islands, based either on the minimization of pressures and impacts (biological and physical) or the adaptation of regulations to allow new areas or expansion of fishing areas.

Total allowable catches (TACs) have been implemented for several species, including red sea bream, alfonsinos and various sharks. In addition to TACs allocated to some stocks, the regional government has implemented several technical measures, such as minimum landing sizes or weights, minimum mesh sizes, limitation of licenses for specific gears (e.g. gillnets) and space time bans for certain fishing gears, such as bottom trawling. A

reduction in vessel number has also been recently occurring, likely reducing fishing effort and thereby increasing protection of marine resources, as well as increasing the per capita income of fishermen.

Overall, the fisheries management structure associated with this oceanic ecosystem is complex and the region is covered by the OSPAR convention, Northeast Atlantic Fisheries Commission (NEAFC), International Committee for the Exploration of the Sea (ICES), International Committee for Conservation of Atlantic Tuna (ICCAT) and Fisheries Committee for the Central East Atlantic (CECAF). The Azores are at the southern limit of the areas covered by OSPAR, ICES and NEAFC and at the north of the CECAF area, this transitional area includes border limit (north and south) of the distribution of some resources, such as tuna. Pinho et al. (2017) comment that these characteristics create difficulties in the implementation of monitoring measures and management because the governance structure is not adjusted to the definitions of management units of resources. The management and conservation system of the Azores fishing resources is complex and is still in development, which is partly due to the status of this Autonomous Region and as an EU Outermost Region (OR), leading to limited local powers to legislate in some areas and matters related to fisheries and marine conservation.

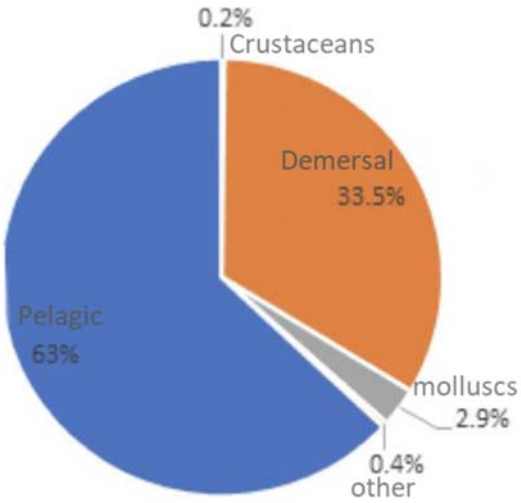
2 Fish stocks and other marine organisms and associated fishing activities

2.1 Commercial fish stocks

The fishery within the Azores is relatively small scale, dominated by small sized vessels (<12 m; 90% of the total fleet). The ecosystem is a seamount and island slope, with fishing activities occurring from the islands coast to the multiple seamounts within the Azorean EEZ. The fishery takes place at depths up to 1 000 m, catching species from different assemblages, with an average depth of fishing activity between 200–600 m strata, which is where the most commercially important species occur. There are some local differences across the islands, but the pelagic and demersal fishery are the most important fisheries in this OR. The commercial Azores fishing industry is mainly composed of a fishery for small pelagic species (e.g. blue jack mackerel) using small purse seine nets, pole-and-line, and a pelagic longline fishery, mainly focusing on large bodied pelagic species, such as tuna and swordfish. Bottom longline and handline is the main gear utilized to target several demersal and deep-water species, but this activity is mostly driven by the dynamics of the main target and high-value species, the blackspot seabream with major export markets such as Spain and Italy.

The data presented in Figure 8 (left panel) shows the landings in weight by species group between 1994 and 2017. Landings by weight are dominated by pelagic species (63%) and demersal species (33.5%). Crustaceans (0.2%), molluscs (2.9%) and other species (0.4%) account for the remaining 3.5% in weight. In respect to the value of landings, demersal species are the most important (60.9%) followed by pelagic fishes (32.1%) and Molluscs (6.1%). Crustaceans only account for 0.9% of the landed value and the others species group have residual importance[1].

a. Landings weight



b. Landings value

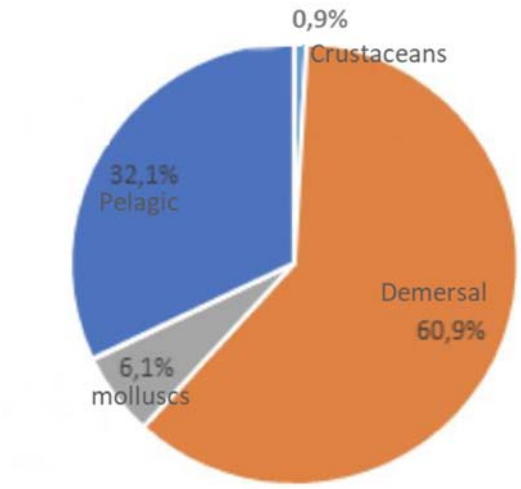


Figure 8: Relative composition of landings in weight (left panel) and value (right panel) from 1994 to 2017 from the main species group in Azorean waters (source: adapted from SREA - LOTAÇOR).

1 Although not provided here, yearly and total revenue (1994-2017) is available by demand to SREA - LOTAÇOR

The only commercial fishing activity not entering local statistics is the activities of regional vessels and other Portuguese mainland and foreign pelagic longliners, which land their catch outside the Azores (Morato et al., 2012; MM, 2020).

2.1.1 Small and medium pelagic

One of the most important fisheries in the Azores is the small pelagic fishery targeting young blue jack mackerel, with bycatch of Atlantic chub mackerel and to a lesser extent sardine. The blue jack mackerel has traditionally been one of the favourite species for consumption in the Azores and the bulk of catches are close to the shores of the Azorean islands using artisanal purse seiners. The demersal bottom longline fleet also catch adults of both blue jack and chub mackerel. Additionally, small pelagic species are also the main species used as live bait by the demersal/deep-water longline fleet, as well as the local bait boat fleet, which target tuna species.

2.1.2 Large pelagic

There are two main gears targeting the large pelagic species in the region. Pole and line tuna fishery is one of the most important fisheries in the Azores. The tuna fishing is generally concentrated around the islands, especially around the central and eastern groups of the archipelago, and around offshore seamounts. The importance of this fishery to the total catch is highly variable from year to year, due to changes in tuna abundance and in migration routes (Morato et al., 2011). The fishery is highly seasonal with the bulk of landings occurring in the summer (Table 4) and lasts from April to October, the period when tuna migrate through the region.

The pelagic longline fleet operating in the Azores region traditionally targets swordfish. Other species might include blue shark and short-fin mako sharks. Fishing for shortfin mako shark was forbidden in 2019. Although there is no information of why this species was forbidden to be fished, it may be associated with this species being listed in 2019 as ‘Endangered’ on the IUCN Red List. Other medium sized pelagic fish are occasionally caught, but rarely exceed >1 % of the total catch. Catch statistics also highlight the strong seasonality in pelagic landings, driven by the abundance of tuna species (and also jack mackerel) between seasons, with increased abundance during summer months.

2.1.3 Demersal and deep-sea

The demersal and deep sea fisheries are characterised by the use of multi-gears, with several demersal/deep-water target species but being mostly driven by the dynamics of the main target species, the blackspot seabream (Santos et al., 2019). The majority of demersal/deep-water species are caught by bottom longliners around seamounts, where they target blackspot seabream, wreckfish, alfonsinos and blackbelly rosefish.

Since 2000, the use of bottom longlines in the coastal areas has been significantly reduced, as a result of the banning of its use in the coastal areas (up to 3 nm from shore). As a consequence, the smaller boats that operate in this area have changed their gears to several types of handlines which may have increased the pressure on some coastal species (Morato et al., 2011), including parrotfish which was the second most landed species during April 2019 - March 2020 period (Table 5). The landings of the main demersal species in the region by month are shown in Table 5. Although the landings in the summer and also during the Christmas period (increased exports to Spain of blackspot seabream) are higher due to an increase in demand of Azorean fish by the international market, there is less evidence of seasonality in this fishery than is apparent in the pelagic fisheries.

Table 4: Main pelagic species landed (tonnes) 2019-2020 by month. Species are ordered by landings importance (source: adapted DRP, 2020).

Pelagic species	2019									2020			total
	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	
Tunas	0.0	20.4	66.6	438.6	1459.6	897.6	141.4	200.1	76.8	0.6	52.9	6.8	3361.5
Blue jack mackerel	62.7	81.4	75.0	105.9	97.3	93.1	79.2	96.7	36.7	69.8	81.0	76.6	955.3
Atlantic chub mackerel	20.6	21.7	34.6	26.6	21.9	22.9	8.9	5.9	3.7	15.0	29.2	25.7	236.6
Swordfish	3.1	0.1	0.1	0.2	0.6	6.5	20.3	23.5	14.8	5.7	3.3	2.2	80.4
Yellowmouth barracuda	4.4	7.4	5.5	9.2	6.1	7.7	6.9	1.4	0.2	0.2	1.4	2.4	52.8
Guelly jack (blue trevally)	0.2	0.7	3.0	11.5	5.3	2.4	1.8	1.9	0.9	0.7	0.5	0.3	29.3
Sardine	1.4	3.8	3.7	3.8	1.4	1.5	2.6	0.9	0.3	1.0	1.0	3.5	25.0
Bluefish	0.1	0.3	1.8	3.1	3.0	0.7	0.2	0.4	0.1	0.1	0.0	0.1	9.9
Greater amberjacks	0.1	0.5	1.0	1.5	1.1	0.8	0.4	0.2	0.1	0.0	0.0	0.0	5.7
Atlantic bonito	0.5	1.1	0.5	0.4	0.3	0.2	0.3	0.2	0.1	0.2	0.1	0.5	4.3
Other pelagics	3.1	2.0	6.6	19.3	14.4	24.5	11.2	6.9	3.2	2.3	1.0	1.1	95.6

Table 5: Main demersal species landed (tonne) 2019-2020 by month. Species are ordered by landings importance (source: adapted DRP, 2020).

Demersal /deep-sea	2019									2020			Total
	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	
Blackspot seabream	31.6	48.3	53.8	57.5	35.6	35.2	20.4	29.8	41.3	38.5	61.8	31.7	485.6
Parrotfish	11.5	22.8	39.7	42.8	35.0	13.4	14.8	12.2	10.3	14.3	16.1	16.8	249.6
Blackbelly rosefish	10.3	18.4	22.7	30.9	22.3	22.6	11.1	9.9	7.5	6.3	6.7	7.3	176.0
Common mora	3.8	14.3	10.6	14.2	11.1	8.6	8.4	6.8	4.5	4.7	8.7	4.1	99.8
Slender alfonsino	6.2	15.8	18.8	20.5	1.5	1.1	0.1	0.0	0.0	6.4	15.7	7.8	93.8
Forkbeard	4.9	8.4	5.5	10.5	7.1	8.4	7.4	9.7	6.9	6.1	7.8	6.2	89.0
European conger	6.4	7.7	7.6	10.9	6.6	5.5	4.5	7.7	3.8	3.5	7.4	4.9	76.5
Silver scabbardfish	2.6	6.2	4.1	6.8	5.7	5.4	6.5	12.3	9.3	6.6	6.9	3.7	76.0
Wreckfish	5.0	7.5	11.2	11.7	7.2	4.9	4.4	4.4	3.9	4.6	3.7	3.8	72.4
Alfonsino	2.9	5.5	4.6	10.0	7.3	7.6	0.2	0.0	0.0	3.9	3.7	3.4	49.0
Dusky grouper	0.4	3.2	3.0	3.7	6.4	6.0	3.3	4.9	2.4	1.3	0.7	0.7	36.2
White seabream	2.6	4.0	1.6	1.9	1.8	3.2	4.5	3.0	1.9	4.5	3.5	2.1	34.7
Offshore rockfish	1.6	2.5	2.1	3.4	2.5	2.7	2.1	2.8	3.0	2.1	2.5	2.5	29.9
Red porgy	1.9	2.9	2.0	2.9	1.2	2.2	1.7	4.2	2.7	1.1	2.5	1.4	26.8
Grouper	2.1	3.6	3.4	3.7	2.4	1.9	1.3	2.1	1.1	1.3	1.2	1.5	25.8
Red scorpionfish	1.2	1.8	1.4	2.2	1.1	1.6	0.9	2.6	1.2	1.0	1.4	1.2	17.7
Black scabbardfish	0.0	0.1	16.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.9
Common seabream	0.5	0.9	0.3	0.5	0.3	0.4	0.3	0.6	0.5	0.6	0.4	0.4	5.7
John dory	0.2	0.2	0.1	0.5	0.4	0.4	0.2	0.3	0.2	0.1	0.1	0.1	2.8
Other demersals	21.6	45.6	42.5	60.4	33.6	36.2	24.8	33.0	22.4	24.2	32.9	29.1	406.4

2.2 Fleet structure

The evolution of the number of fishing vessels in the Azores during the period 1991-2018 shows a number of important trends. As a result of a set of incentives created in the region to restructure the fishing sector (i.e., reduce fishing effort) and modernize the fleet (i.e., to enhance living conditions), the number of licensed vessels has decreased significantly over the last decade (-43%) (Figure 9). In 1992, the fishing fleet consisted of 959 vessels, while in 2018, only 548 vessels obtained a licence to fish in the region, with a total capacity of about 6 800 GRT and engine power of 41 500 kW (Figure 10).

Reductions in the number of vessels in the fleet has been occurring in recent years. Such a reduction is likely associated with reduced fishing opportunities for longliners that target seabream, although we have no detailed information/confirmation or any specific event that caused the reduction of fishing vessels. There is an overarching CFP/ European/ national/ regional objective of a reduction in fishing effort for the protection of marine resources and increase in the per capita income of fishermen (SRMCT, 2018).

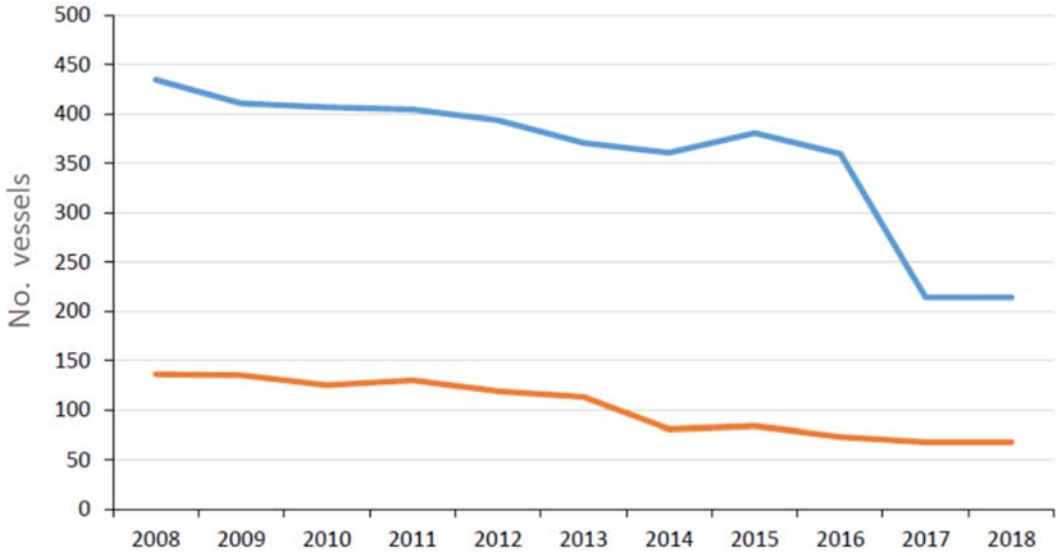


Figure 9: Evolution of the number of fishing vessels from the main fleets, bottom longline (blue line) and gillnets (orange line) in the Azores from 2008-2018 (source: DRP, 2019).

The Azores fleet is dominated by small-scale vessels of less than nine metres length overall which, despite having decreased in number over time, still represent more than half of the Azorean fishing fleet (Figure 10). In comparison, large-scale or semi-industrial vessels (length overall > 16 m) represent about 5% of the entire regional fleet (Carvalho et al., 2011; SRMCT, 2018; DRP, 2019).

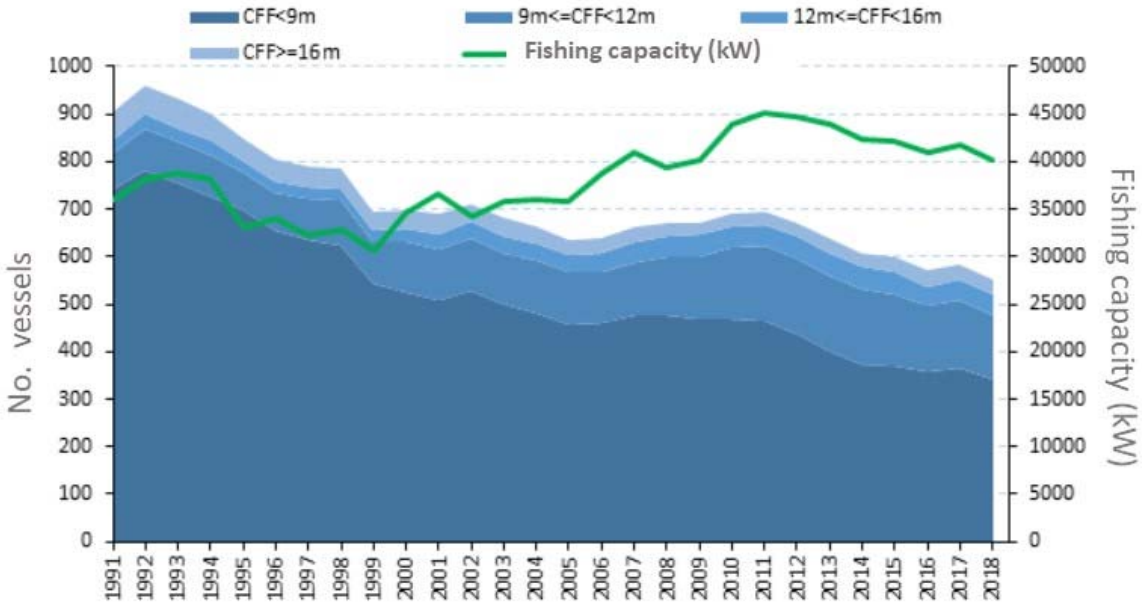
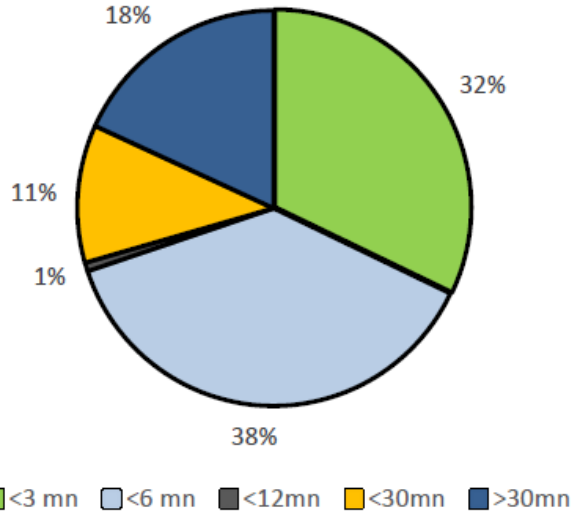


Figure 10: Evolution of the number of vessels by total length (CFF) and fishing capacity in kW between 1991 and 2018 in the Azores (source: DRP, 2019).

The vast majority of the regional fleet (70 % of vessels) due to the small boat size, has its area of operation limited to <6 nautical miles (nm) from the coast, with only 18 % of the fleet able to operate at distances greater than 30 nm from



the coast (
Figure 11). These limitations on the operating area of the regional fleet stem from the legal imposition determined by Regional Legislative Decrees, in that smaller boats cannot operate offshore greater than 6 nm.

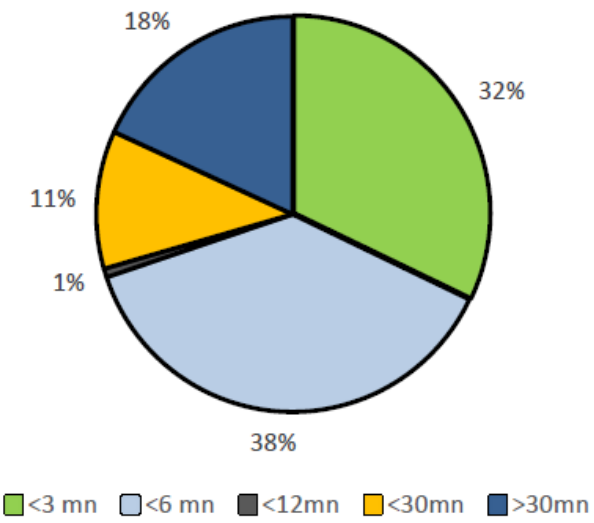


Figure 11: Fishing areas of operation in nautical miles (nm) for the Azorean fleet activity during 2008-2018 (source: DRP, 2018).

Since 2000, the use of bottom longliners and their impact on the coastal areas has been significantly reduced as a result of local authorities banning the use of this gear type in areas less than 3 nm from the coast. In consequence, smaller inshore boats have changed their gear type from bottom longline to several types of handlines. An increase in handlines however, may have increased pressure on some demersal species (Marato, 2012). Large vessels (>24 m) are restricted to fishing on seamount areas outside 30 nm from the islands.

As of August 2021, the deepwater bottom longline is only a seamount fishery. An expansion of fishing effort to further seamounts has been observed for this fleet during the last decade. Further to this, medium size boats (12–16 m), have been observed to change from bottom longline to handlines during the last decade (i.e., associated with the National decree that bans bottom longline). These observed changes in the fishing pattern of the fleet may help explain the changes in the landings of some species that were more vulnerable to the use of bottom longlines or target on specific handlines. Lastly, in order to reduce effort on traditional coastal stocks, fishers have been encouraged to exploit deeper habitats (> 700 m). Although the poor response of the market in purchasing such fishes has been limiting such expansion (ICES, 2018), such work shows that there is space for new fisheries within the Azores.

2.2.1 Domestic fisheries

Most of the Azorean fisheries are characterised as being small-scale and artisanal, with relatively small vessel sizes operating within a limited area and predominantly utilizing traditional passive fishing gears (i.e. longline). These artisanal fisheries are considered sustainable due to the absence of less selective and damaging gears, such as trawls and bottom gillnets. More recently, the situation has changed with (i) the introduction of larger commercial vessels characterised by a multi-gear fishery targeting several demersal/deep-water target species, which may be more destructive on the seabed, and (ii) the change to longliners by the medium artisanal fleet may have increased effort on other coastal stocks.

The following fishing fleets are identified by Norse et al. (2012), Carvalho (non published report) and Morato et al. (2012) as operating in the Azorean waters:

i. Bottom longliners and handliners targeting demersal/deep-sea species. Main targets are blackspot seabream, wreckfish, alfonsino species and blackbelly rosefish;

ii. Regional pelagic longliners targeting swordfish and blue shark. In the region non-domestic vessels, namely pelagic longliners from Portugal mainland and foreigner pelagic longliners also operate;

iii. Pole and line tuna (and live bait) fleet;

iv. Small scale purse seiners oriented to inshore small pelagic species. Main targets are blue jack mackerel and chub mackerel;

v. Drift bottom longliners targeting black scabbardfish;

vi. Small scale multi-gear fleet, targeting coastal shellfish and squid (mainly long-finned squid); and

vii. Recreational fisheries.

Dispite numerous interviews with key expectes and literature review , the authors were unable to find detailed fishing activity statistics (e.g. number of active vessels) separated by the relevant mentioned “métiers”. This was because records of detailed fishing activities by metier does not exist or are very difficult to assess (e.g. recreational, artisanal) because of constraints in the data collection, especiall, if small-scale fleets are the majority. These fishing activities are monitored under the DCF data collection in several métiers (for more information see section 6 of this document).

2.2.1.1 Artisanal fishery[2]

As described in the previous sections, artisanal fisheries form the majority of the Azorean fishing fleet characterized by reduced vessel sizes (Figure 10) with limited area of operations within the 6 nautical miles (Figure 11).

2.2.1.2 Industrial fishery

There are no records of industrial/commercial fishery in this OR. The OR is known for implementing several regulations that ban fishing gears with large physical (e.g. abrasion) and biological impacts on sensitive seabed habitats, which are characteristic of the Azores EEZ.

2.2.1.3 Recreational/Sports fishery

There are a number of fisheries regulations applied in the Azores to the following fisheries activities: (i) Recreational fishing [3] (ii) Sports fishing [4] (iii) Tourist fishing [5] (iv)

2 Using FAO's definition of artisanal fishery: http://www.fao.org/3/x2465e/x2465e0h.htm#ANNEX%205.%20GLOSSARY

3 https://www.azores.gov.pt/Gra/SRMCT-PESCAS/conteudos/livres/Pesca_lazer.htm

4 https://www.azores.gov.pt/Gra/SRMCT-PESCAS/conteudos/livres/Pesca_desportiva.htm

5 https://www.azores.gov.pt/Gra/SRMCT-PESCAS/conteudos/livres/Pesca_turistica.htm

Spearfishing[6], and (v) Hand collecting[7]. However, recreational and sports fishing have the most substantial impact on species stocks, so are discussed in detail below.

Summary of recreational fishing within the Azores

The main recreational fishing activities in the Azores are spearfishing, recreational boat angling, shore angling and hand collecting. Total catch by the recreational sector for th period 1950-2010 was estimated to be 38 900 tonnes, which equates to 6% of the official landing statistics reported by the commercial sector. Further, catch from the recreational sector is estimated to vary between 300 and 950 tonnes per year (Pham et al., 2010).

Pham et al. (2010) estimated for the period 1950-2010 the most important species in terms of volume taken by the recreational sector, and compared these to the reported catch of the same species by the commercial fishery. These species were white seabream, with a total catch of 6 484 tonnes (which is 220% of the total reported commercial catch), the blacktail comber with a total catch of 4 709 tonnes (83% of the total commercial catch), the chub mackerel with a total catch of 2 992 tonnes (14% of the total commercial catch) and parrotfish with a total catch of 2 967 tonnes (60% of the total commercial catch). The recent increase in white seabream catches by the recreational fisheries is believed to be caused by the increasing warming waters.

A recent pilot study under the DCF (2018-2019) was carried out in the Azores to estimate annual catches by the recreational fisheries. There were some logistics constraints to this study during the period of transition of biological data collection from DOP-University of Azores to the Regional Directorate of Fisheries that reduced the number of on-site surveys. Fishing effort and total catch estimation for spearfishing and recreational boat fishing were estimated. In terms of DCF species, it was estimated spearfishing and recreational boat fishing caught 1.8 tonnes of tuna species, 1.5 tonnes of Atlantic bonito, 1 tonne of wahoo and less than 0.1 tonnes of thornback ray (details on the pilot study methods and results are available in the 2019 National Annual Report[8]. These estimates have to be properly assessed in the future with complementary data (i.e., logbook panel and an on-site survey), since the methodology utilized was associated with fisher recall. For that reason, new procedures are being prepared to be implemented.

Summary of sports fishing within the Azores

Big game fishing for large pelagic fishes started in the mid-1980s, peaking in the 1990s with up to 8 boats registered on the island of Faial and being still active today associated with tourist activity. With the exception of one report briefly describing the activity (Pereira, 1988) there is little data on total fish removal by this fishing industry. In the early years of the industry most of the blue marlin caught were landed, but by 1989 big-game fishing became essentially a catch and release activity (Pham et al., 2010).

Total removal of blue and white marlin by the sportfishing sector from 1984–2010 in the Azores was estimated to be 91 tonnes (Pham et al., 2010). Additional to this, ICCAT have reported a maximum removal of 10 tonnes of blue marlin by the sportfishing sector in 1993, a value not present in local fishery statistics (Pham et al., 2010). Therefore, our

6 https://www.azores.gov.pt/Gra/SRMCT-PESCAS/conteudos/livres/Ca%C3%A7a+Submarina.htm

7 https://www.azores.gov.pt/Gra/SRMCT-PESCAS/conteudos/livres/Apanha+L%C3%BAdica.htm

8 https://datacollection.jrc.ec.europa.eu/ars/2019

estimates suggest that for the past ten years, the average blue marlin mortality has been 1.5 tonnes per year. Prior to 1990, many blue marlin caught by sportfishers were landed; during that period, the average blue marlin catch was estimated to be 6 tonnes per year (Pham et al., 2010).

There is a logbook survey for big game fishing in Faial Island, established since 2009 under several national and regional projects, to monitor the Condor seamount (an important site for sport fishing activities). The logbook survey in 2019 monitored the activities of two active companies in the island, and found that a total of 39 blue marlin individuals were captured, while 37 were released (the two individuals landed weighed 0.8 tonnes each). These surveys also reported the catch and release of five shortfin mako sharks and two white marlin.

2.2.1.4 Coastal and maritime/navigational tourism

The coastal tourism in the Azores, encapsulating sports-tourism fishing, water sports, diving, sailing, marine wildlife watching (e.g. marine mammals, birds) (Table 6) is considered as one of the sectors with the greatest potential for growth, independent of recent COVID-19 impacts to such tourism. As such activities covers a large and diverse number of economic activities, coastal tourism activities ultimately overlap with other sectors of the maritime economy, in terms of revenue and turnover through adding value and employment to different sectors, and is recognized by the EU Blue Growth Strategy as a sector with high and significant sustainable potential in its growth and jobs generated. As a result of this, the European Commission (EC) has developed actions focused on community-based local development strategies for such tourism, which is supported by the Maritime and Fisheries Fund (EMFF) and the EU Regional Development Fund (ERDF).

Table 6: Main activities and estimated maritime area associated with coastal tourism in 2016-2017 (source: adapted DRT, 2018).

Activity	Area (hm^2)
Sport fishing	39
Diving	24
Sailing	38
Marine wildlife watching	27
Tourism fishing	11
Number of companies running maritime tourism	151

2.2.2 Foreign fisheries

Pelagic longliners from the Portugese mainland as well as foreign pelagic longliners target swordfish and blue sharks within the Azores EEZ. This fishing activity is not monitored within Azores and do not enter the local statistics. Spain has historically been fishing in the ecoregion and currently has around ten vessels that use surface longline that retain swordfish and blue shark inside the Azores EEZ. In addition, there are vessels (unknown number) from the Spanish fleet that fish outside the 100 nm limit, as well as 5 to 6 Portuguese mainland vessels.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

The fishery for demersal species in the Azores (longline and handline) has a low incidental catch and discard rate (Gillet, 2011). Despite being considered a highly selected gear, the longline black scabbardfish fishery has the potential to capture other deep-water species, mainly deep-water sharks.

The fishery within the Azores is predominantly multispecies and so technological interactions are observed. In the past the bycatch of this fishery was considered insignificant. However, reported discards from observers in the longline fishery show that for some species, like deep-water sharks, discards do occur. Commercially valuable species, including blackspot sea bream, wreckfish and alfonsinos, are now increasingly discarded. Such discard may be due to recent management measures, particularly TAC/quotas, minimum size and fishing area restrictions, that changed the target species for the Azores fleet through expansion of the fishing areas to more offshore seamounts and deeper strata (ICES, 2018) during the last decade.

The information available for the bycatch occurrence rate of species with TAC 0 or catch prohibited by EU legislation is detailed in Table 7, following Fauconnet et al. (2019) and additional information from the regional Directorate of Fisheries. The probability of survival of released (or rejected) individuals remains unknown for most species caught in the Azores[9].

Table 7: Bycatch of species with TAC 0 or catch prohibited by EU legislation. Annual catch weight in tonnes per species, percentage of each species in the total catch of the fishery and percentage of occurrence per *n* fishery event (number of sampled fishing operations in which the species was caught in relation to the total number of fishing events, *n*) (source: adapted from Fauconnet et al., 2019; DRP, 2019).

Species	Catch (t/year)	Catch/total catch (%)	Occurence/n (%)
Bottom longline and handline (target: demersal mainly blackspot seabream); n= 993 fishing events (2004-2011, DRP)			
Centrophorus squamosus	83.26	1.912	0.60
Dalatias licha	37.8	0.868	14.63
Centrophorus granulosus	36.47	0.838	4.01
Deania profundorum	19.89	0.457	9.82
Hexanchus griseus	14.41	0.331	1.30
Etmopterus spinax	13.35	0.307	30.46
Sphyrna zygaena	9.11	0.209	0.10
Centrophorus lusitanicus	7.86	0.181	0
Deania calcea	7.21	0.166	6.81
Etmopterus pusillus	2.87	0.066	26.95
Heptranchias perlo	0.15	0.003	0
Alopias superciliosus	0.14	0.003	0

9 e.g. turtles: https://costaproject.org/en/

Species	Catch (t/year)	Catch/total catch (%)	Occurence/n (%)
Centroscymnus owstonii	0.11	0.002	0
Longline directed to deep-water species (target: black scabbard fish); n=315 fishing events (1999-2000; 2003-2005; 2009; 2012-2013, POPA*)			
Centrophorus squamosus	14.89	11.863	84.76
Centroscymnus owstonii	1.12	0.891	24.76
Etmopterus princeps	0.74	0.586	8.57
Etmopterus pusillus	0.36	0.283	14.92
Deania calcea	0.35	0.276	22.54
Deania profundorum	0.07	0.058	7.62
Dalatias licha	0.04	0.028	1.27
Centrophorus granulosus	0.02	0.018	0.32
Pelagic longline (target: swordfish and blue shark);n=122 fishing events (2008-2010 2015-2016, MADE*/POPA*/COSTA*)			
Alopias superciliosus	35.07	1.573	20.00
Sphyrna zygaena	10.01	0.449	19.13

*MADE (https://cordis.europa.eu/project/id/210496); POPA (https://www.popaobserver.org/);COSTA (https://costaproject.org/en/)

In the Azores, the incidental catch rate in the tuna pole-and-line fishery is occasionally provided, and lists the number of cetaceans caught, per year, per tonne of tuna landed. Stranding of marine mammals is also recorded, to assess the level of incidental catch in these fisheries. Bycatch of loggerhead turtle is also recorded in the surface longline fleet. However, dedicated observer programmes on board the fishing fleet are needed to estimate the bycatch mortality rate accurately for these species[10].

Other bycatch occur in areas subjected to greater bottom longline fishing effort, especially at seamounts between 200 and 400 m depth; with a number of benthic sessile species such as armoured sea fan coral, soft corals and hexacoral species predominantly caught. On the slopes of the islands the bycatch of benthic fauna is low (Sampaio et al. 2012).

2.3.2 Discards

As part of the DiscardLess project[11], discards from all fisheries occurring in the ICES sub-area 10 (Azores EEZ), including bottom longline and handline fisheries were estimated, by species. Pham et al. (2013) and Fauconnet et al. (2019) published the catch reconstruction for the region. From 1950 to 2014, an average of 784 tonne (95% CI, 588–1 008 tonnes) was discarded annually by Azorean fisheries, encompassing 5% of their total catch. Discards increased from the 1950s until the turn of the century, from 240 tonnes per year in the 1950s and 1960s to 450 tonnes per year in the 1970s and 1980s and 2 080 tonnes per year in the 1990s. Over the last 15 years, total discard have fallen and stabilised at 1 070 tonnes per year (Figure 12) (Fauconnet et al., 2019).

[10] MYSTIC SEAS, https://misticseas3.com/en
[11] http://www.discardless.eu/

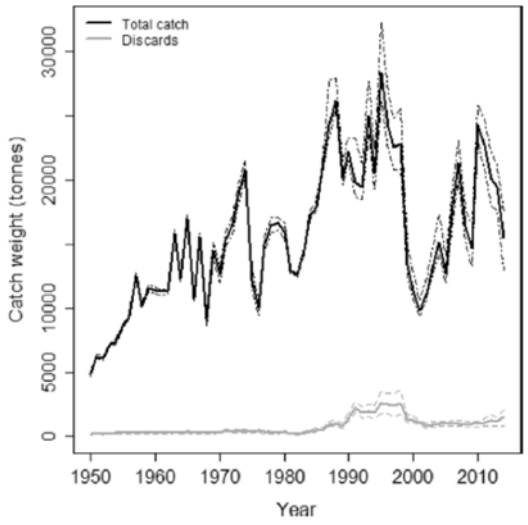


Figure 12: Time series of total catch (black line) and total discard (grey line) amounts of Azores fisheries from 1950-2014. Dashed lines display 95% confidence intervals (source: Fauconnet et al., 2019).

A programme of observers on-board commercial bottom and handline longline vessels was implemented from 2004 to 2014 and again in 2016 as part of the DCF. This information was complemented with data collected by fisheries observer programmes carried out in 2017 and 2018 under the DiscardLess, MERCES[12] and Sponges[13] projects. Under the DCF Observer Programme, vessels from the three main islands of the archipelago (São Miguel, Terceira and Faial) were randomly chosen for sampling, taking into account the volume landed, aiming for good coverage of all fleet segments. During the period 2000-2014, discards from demersal species fisheries accounted for 10.3% of the total catch. The two most valuable species, blackspot seabream and sea bass, were little discarded, while alfonsino, blackmouth and conger eel, all commercial species subject to MLS (Minimum Landing Size) were discarded in higher proportions (around 10% of their total catch). Most of the discards comprised five commercially important fish species (blackspot seabream, blackbelly rosefish, splendid alfonsino, conger eel and silver scabbardfish) and the deepwater velvet belly lanternshark (Table 8) (DRP, 2018).

Table 8: Average estimate of discards and proportion discards/total catch, for the period 2000-2014. Species are ordered by proportion discarded (source: adapted from DRP, 2018).

Common name	Species	Estimated discards (t/year)	Discard/total catch (%)
Silver scabbardfish	*Lepidopus caudatus*	104.49	33.82
Thornback ray	*Raja clavata*	24.59	22.44
Leafscale gulper shark	*Centrophorus squamosus*	17.84	21.43
Mediterranean moray	*Muraena helena*	7.63	14.57
Conger eel	*Conger conger*	68.94	13.25
Blackbelly rosefish	*Helicolenus dactylopterus*	32.65	10.88
Splendid alfonsino	*Beryx splendens*	22.01	10.55
Black scabbardfish	*Aphanopus carbo*	4.32	9.56

[12] http://www.merces-project.eu/
[13] http://www.deepseasponges.org/

Common name	Species	Estimated discards (t/year)	Discard/total catch (%)
School shark	*Galeorhinus galeus*	4.27	6.58
Forkbeard	*Phycis phycis*	13.68	5.45
Common mora	*Mora moro*	3.53	4.72
Offshore rockfish	*Pontinus kuhlii*	2.09	3.42
Blackspot seabream	*Pagellus bogaraveo*	21.27	2.17
Red porgy	*Pagrus pagrus*	1.12	1.23
Wreckfish	*Polyprion americanus*	0.81	0.26
Blacktail comber	*Serranus atricauda*	0.12	0.17
Others	Others	117.95	14.73

2.3.3 EndangeredThreatened and Protected Species (ETP)

Total biomass of sea turtles killed as a result of bycatch of the Azores fleet was estimated to average about 7 tonnes per year, the Portuguese mainland fleet add in average of 3.3 tonnes per year, and the foreign fleet about 8.8 tonnes per year (Pham et al., 2010). Not all sea turtles caught by pelagic longline fleet die, but there are no estimates of hooked loggerhead mortality after gear removal for the Azores. The impact of longline fishing on sea turtles in the Azores could be diminished through the regulation of the blue shark fishery, as well as mitigation measures to reduce turtle by-catch in the Azores, including policies that require vessels to move away from fishing areas after high catch rates of turtles, bans on longline activities in high loggerhead aggregation areas, and selected gear modifications.

Cetaceans are also often recorded in the vicinity of longline gear. Bottlenose dolphin, Risso's dolphin, killer whale and common dolphin are the most commonly observed species in the vicinity of the longline gear.

2.4 Summary of fisheries

Table 9: Description of main fisheries in Azores.

Bottom longliners (LLS_DEF)	**Pelagic longliners** (LLD_LPF)	**Artisanal handline** (LHM_FIF; LHP_MPD; LHP_CEP)	**Artisanal bottom longline** (LLS_FIF)	**Purse seiners** (PS_SPF)	**Pole and line** (LHP_LPF)	**Drifting longliners** (LLD_DWS)
Domestic commercial fisheries						
Pagellus bogaraveo, Polyprion americanus, Beryx spp., Helicolenus dactylopterus Vessels 12 < m < 18; 24 < m < 40;	*Xiphias gladius, Prionace glauca* Vessels 12 < m < 18; 24 < m < 40;	*Pagellus bogaraveo, Beryx spp., Helicolenus dactylopterus, Muraena helena, Serranus atricauda, Epinephelus marginatus, Scyllarides latus, Pontinus kuhlii, Loligo forbesii, Pagrus pagrus* Vessels < 10 m	*Pagellus bogaraveo, Beryx spp., Helicolenus dactylopterus, Muraena helena, Polyprion americanus, Serranus atricauda* Vessels < 10 m	*Trachurus picturatus, Scomber colias* Vessels < 10 m, 12 < m < 18	Tuna species (*Thunnus obesus, Katsuwonus pelamis, Thunnus alalunga*) Vessels 12 < m < 18; 24 < m < 40	*Aphanopus carbo, Aphanopus intermedius* Vessels 12 < m < 18; 24 < m < 40
Gillnets (GNS_FIF) - *Sparisoma cretense, Serranus atricauda, Diplodus sargus, Mullus surmuletus*				**Pots and traps** (FPO_CRU) - *Palinurus elephas, Muraena helena, Scyllarides latus*		
Domestic sport / recreational fisheries						
Big game fishing	*Makaira nigricans, Isurus oxyrinchus, Kajikia albida,* tuna species					
Recreational (spear fishing, rod fishing, hand collecting	Parrotfishes, seabreams, congers, Serranidae, Sparidae, Balistes spp., groupers, hogfishes, parrotfishes, Thoracica (*Megabalanus azoricus*)					
International fisheries (Portugal mainland and EU-Spain pelagic longliners)						
Pelagic longliners (LLD_LPF)	*Aphanopus carbo, Aphanopus intermedius*					

3 Institutional structures

The Archipelago of Azores is an Autonomous Region of Portugal, holding political and administrative statutes and self-governing bodies. The management of the Azorean fisheries is shared among regional and national government bodies in partnership with the associations of fishing professionals. The government bodies that manage the fisheries are the Ministry of the Sea (national) and the Secretariat for Sea and Fisheries (regional) – through the Directorate General for Natural Resources, Safety and Maritime Services (national) and the Regional Directorate of Fisheries. The Regional Secretariat for Sea and Fisheries also has the responsibility to manage all issues related to the maritime space, including fisheries, aquaculture, ocean exploration, licensing users of the sea and its funds, management of coastal areas and cooperation with the Maritime Police. The Regional Fisheries Inspection oversees, in partnership with other authorities, all maritime activities. In Azores, there are several professional fishing associations, having associations in all of the nine islands of the region. The purpose of the fishers and shipowners associations is to take appropriate measures to ensure the rational exercise of fishing, to improve the conditions of sale or recovery of the fish caught by its members and, in general take all appropriate measures to improve the income of its members. All islands have fish auctions, managed by Lotaçor, where the captured fish is landed.

The Department of Oceanography and Fisheries at the University of the Azores and the consortium Okeanos are the main Research and Development centres. These centres are designated to study the living marine resources in the Azores archipelago, to produce and publish scientific knowledge of science and technology, contribute to the advanced formation of human resources, the disclosure of knowledge and defining conservation and management policies for marine resources.

3.1 Data collection

The main objectives of the EU DCF for fisheries data collection and management is to ensure all Member States collect relevant data, which is then used for fisheries management purposes. The Ministry of the Sea and the Secretariat for Sea and Fisheries oversee through the Directorate General for Natural Resources, Safety and Maritime Services and the Regional Directorate of Fisheries, respectively, all fishery related data.

The collection of biological data on fishes within the Azores has been in a process of transition, associated with shifting of technical competences before 2018. This has led to some data collection at auction and at-sea being reduced during this period, as well as reports (e.g. sampling design documentation) also being delayed. Such a shift has been associated with the movement of such data collection from the previous institution (Department of Oceanography and Fisheries at the University of the Azores) to the Regional Directorate for Fisheries in Azores (under the umbrella of the Directorate General for Natural Resources, Safety and Maritime Services). Some data collection methods and programmes (e.g. at-sea observers) were reduced during this transitional phase.

Aware of the obligations imposed and the needs for fisheries data collection, the Regional Directorate of Fisheries now guarantees the implementation of the Azores DCF and supports several monitoring programs in close collaboration with the Department of Oceanography and Fisheries at the University of the Azores. Some of these programs have a considerable time series of data, such as the annual demersal campaign (ARQDAÇO) for estimating abundance of demersal resources, and the Azores Fisheries Observer Program

(POPA) for data collection from the regional fisheries, with special attention to pole-and-line tuna fishery. In addition to these monitoring programs, COSTA (COnsolidating Sea Turtle conservation in the Azores) in partnership with international institutions, manages data collection on turtle bycatch in the surface longline fishery.

With regard to coastal marine resources of commercial interest, the existing information is limited to specific studies (e.g. Morato, 2012), which raises some uncertainty concerning the effectiveness of the management measures implemented for some fisheries. This knowledge gap led to the regional administration, in 2019, supporting a new monitoring program for coastal resources (MoniCo), that will help to assess their conservation status and thus impose more conscious measures to allow the sustainability of these fisheries; this monitoring program is now operational. In addition to these monitoring programs, work has been carried out on the socioeconomic characterization of the fishing asset, as well as their financial well-being (Guerreiro and Rodrigues, 2020). Occasional collaborations also occur with Producer Organisations (PO) for the collection of fisheries data collection in the region.

Databases are shared on request, and although no specific indications of which databases are encompassed in such request, fisheries data is held by the regional directorate within databases comprising data from auction lotaçor, VMS inspectorate and IMAR surveys. There is no post-collection standardisation of information (e.g. DB of auction-markets vs VMS/AMS information). There were some limitations in responsibilities (who does what) during the period of transition of DCF data collection from DOP-University of Azores to the Regional Directorate of Fisheries.

3.2 Scientific advice

Maritime management in the region is complex, and advice for fisheries in the Azores are managed under the EU (ICES, STECF), with some fisheries managed by NEAFC, ICCAT, and the regional government. Scientific fisheries advice is provided by ICES, the EC's Scientific Technical and Economic Committee for Fisheries (STECF), the South West Waters Advisory Council (SWWAC), the Long Distance Advisory Council (LDAC) and the most recent fisheries advisory council created in the European Union the Outermost Regions Advisory Council (ORAC or CC-RUP). For large pelagic fishes (tuna and tuna-like species), fisheries advice is provided by ICCAT. The North Atlantic Regional Coordination Group (RCG NA) under the DCF is the main hub for regional coordination and cooperation with the other regions contributing to the fisheries Data Collection Framework.

Under the CFP, some scientific analysis and TACs were also introduced for some stocks, such as blackspot seabream, black scabbardfish, and deep-water sharks but there are no Azores stocks with validated analytical assessments and/or biological reference points within the ICES framework (details in Section 6.2.1). An exception to this rule concerns the large pelagics assessed by ICCAT, where Portugal is represented by scientists from IPMA using data collected at the national and regional level to produce the assessments for the relevant large pelagic species (see Section 6). There are no scientific management plans defined for this area. There are several marine protected areas, all of which have been established to prevent overexploitation of resources.

The Regional Directorate of Fisheries, the Department of Oceanography and Fisheries at the University of the Azores and the consortium Okeanos are the main scientific bodies for analysing the data and producing scientific advice in the Azores.

3.3 Research institutions

The area of blue technology has increased in prominence in recent years, under the European strategy "Blue Growth", the directives of Horizon 2020 and the Portuguese National Strategy for the Sea. The high biodiversity of the Azores Sea and the environments and ecosystems that characterize it, are the basis of several lines of research that have been developed mostly at the University of the Azores, with projects funded by the Foundation for Science and Technology (FCT) and the Regional Fund for Science and Technology (FRCT). Scientific marine research is mainly conducted at the University of the Azores, where the Department of Oceanography and Fisheries is the most relevant, in conjunction with satellite entities (i.e., Portuguese mainland groups, as well as international groups) that share facilities and infrastructures. Among these satellite entities, the most important are the Consortium Okeanos (which have a better financial autonomy than the university), IMAR and the LARSyS - Robotics and Systems in Engineering. The Research Centre in Biodiversity and Genetic Resources (CIBIO) in the Department of Biology of the University of the Azores also produce research in blue biotechnology.

3.4 Monitoring, control and surveillance

The Regional Directorate of Fisheries has the responsibility to manage fisheries, aquaculture, the oceanographic exploration, licensing the use of the sea and the income generated from such licensing. In Azores, the Regional Regulatory Decree No 1/2017/A of 15 March defined the Regional Fisheries Inspectorate as the competent authority for the purposes of applying penalties and the point system[14] for serious infringements derived from the Control Regulation (Council Regulation (EU) 1224/2009[15]) that could result in the suspension of fishing licenses. The Regional Fisheries Inspectorate (IRP) is a service of the Regional Secretariat for Sea and Fisheries which, is responsible for planning, coordinating and executing, in collaboration with other bodies and institutions, the supervision and control of fishing activities in the Azores. Regional Legislative Decree no. 29/2010/A establishes the legal framework for Azorean fishing. This decree has the aim of regulating fishing activities, by defining measures and penalties appropriate to the specificities of the maritime territory of the Azores. These specificities cover the conditions of access to the fishing territory, fishing activities carried out by regional vessels or undertaken within the Azores, manning and crewing of regional vessels, professional training in fishing, obtaining and approving the professional titles of seafarers and certification of workers in the regional fishing fleet. All of these activities are overseen by the Regional Fisheries Inspectorate, in partnership with other authorities (local police authorities PSP and GNR, the Navy and Maritime police). This is mainly undertaken by using VMS data and random inspections on vessels characteristics and fishing profile.

14 A system in which accumulation of points from levels of infringement may result in severe penalties and suspension of fishing licenses. Years without infringements result in the removal of points dependant on the infraction.

15 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

All islands have fish auctions, managed by Lotaçor, where fish are landed and recorded. The Regional Directorate for Fisheries also collects and analyzes landings data on commercial and recreational (through a pilot study under the 2017-2019 EU-MAP and 2020-2021 EU MAP) fisheries in Azores for regulatory purposes. Data on the activity of the fleet is also collected, as well as social and economic data.

There is still little understanding of the consequences of illegal activities, with some impunity of offenders with residual or unadjusted fines. However, the perception is that implementation of serious consequences have become more rigorous recently, with the IRP team being recently reorganized.

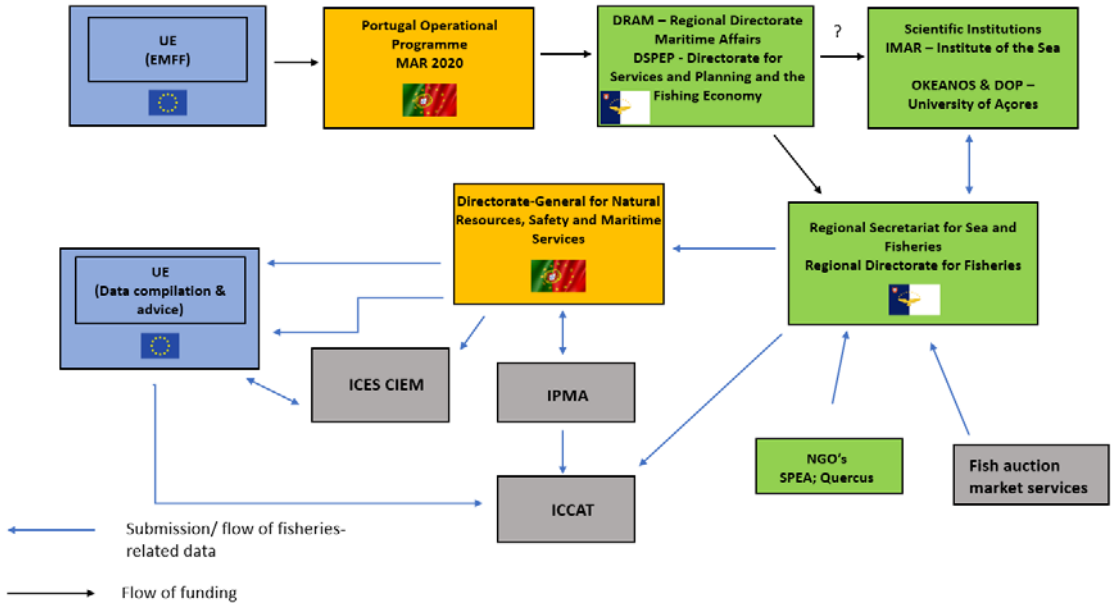


Figure 13: Institutional structure for data collection and scientific advice for fisheries in the Azores[16].

[16] Summary of several features of "Ocean Governance in Archipelagic Regions", mainly in Azores can be found here: https://revistas.rcaap.pt/arquipelago/issue/view/1067

4 Funding and funding structures for data collection

The European Maritime and Fisheries Fund (EMFF) and The European Union's Cohesion Policy funds (European Regional Development Fund, ERDF) are the key instruments to ensure the continuity of financial resources in the region. These funds are managed by the regional authorities, but there is also a long and effective tradition in the use of co-financing from European programmes in several relevant projects for the OR as detailed in Table 12 and 13. On the Cohesion Fund, the Azores and Madeira are the only two outermost regions belonging to a Member State eligible for Cohesion Fund support.

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member State funding

Two national programmes, MARE (2007-2013) and more recently the PROMAR (2014-2020) have been made under the European Maritime and Fisheries Fund (EMFF). The current operational programme aims at achieving key national development priorities along the support for the reform of the EU's Common Fisheries Policy and the implementation of the EU's Integrated Maritime Policy in Portugal. The programme main objectives include enhancing the competitiveness and viability of the fisheries and aquaculture business in Portugal, strengthening technological development, innovation and transfer of knowledge to fishery and aquaculture businesses, and improving the common markets organisation. The programme addresses the following EMFF priorities:

- Priority 1 - promoting environmentally sustainable, resource–efficient, innovative, competitive and knowledge–based fisheries
- Priority 2 - fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture
- Priority 3 - fostering the implementation of the CFP
- Priority 4 - increasing employment and territorial cohesion (CLLD)
- Priority 5 - fostering marketing and processing (compensation plans are included in this priority), this priority includes CPAC
- Priority 6 - fostering the implementation of the integrated maritime policy (IMP)
- 'Priority 7' - technical assistance to reinforce implementation and ensure efficient administration of the EU funding

The Portuguese programme funding for each of the EMFF priorities is: Union Priority 1 (UP1): EUR 103.6 million (26.4% of the total EMFF allocation); Union Priority 2 (UP2): EUR 59.0 million (15.0% of the EMFF allocation); Union Priority 3 (UP3): EUR 55.5 million (14.1% of the EMFF allocation); Union Priority 4 (UP4): EUR 35.0 million (8.9% of the EMFF allocation); Union Priority 5 (UP5): EUR 111.2 million (28.3% of the EMFF allocation); Union Priority 6 (UP6): EUR 5.3 million (1.4% of the EMFF allocation) and EUR 22.8 million (5.8% of the EMFF allocation) allocated to technical assistance.

The total budget is EUR 507 807 536 with a total EU contribution of EUR 392 485 464 and the Member State contribution is EUR 115 322 072.

4.1.2 OR funding

The level of commitment to apply to EMFF funding was low in the ORs (40%), except for compensation plans (70%). The difficulties faced in ORs regarding EMFF implementation are linked to both internal and external management of the EMFF, the low administrative capacity in ORs (and high number of small businesses as potential beneficiaries), and the lack of adaptation of EMFF measures to the local context (EU, 2019).

There are quite a few institutions involved in the management of EMFF funding among the Portuguese mainland and the ORs, which leads to a high administrative burden. The managing, certifying, paying and audit authorities are national-based, and the regional local application, quality control, administrative validation of investments and measures using EMFF funding is performed by regional intermediate bodies. The national and Azores institutions involved in EMFF funding management is presented in Table 10.

Table 10: List of organisations involved in the EMFF management in Portugal and Azores (source: adapted from EU, 2019).

Authorities	Instititutions	Role
Managing authority	MAR2020	-
Certifying authority	The institute for Financing of Agriculture and Fisheries	-
Paying authority	Agriculture and Fisheries Financing Institute (IFAP)	-
Audit authority	Inspectorate-General of Finance (IGF)	-
Intermediate bodies	IFAP	Technical opinion on proposals, quality control of the implementation of projects
	Directorate General for Natural Resources, Safety and Maritime Services DGRM	
	Directorate of Agriculture and Fisheries - National	
	Secretariat of the Sea and Fisheries - Azores	Fisheries planning and economy
	Fisheries Local Action Group (FLAG)	In charge of community-led local development (CLLD).
	Directorate of Fisheries - Azores	Analysis of the application, local quality control, local administrative validation for all measures in the Azores, except the ones dealt with by other directorates
	Cabinet of Planning of the Regional Secretariat of the Sea and Fisheries - Azores	Similar role to above specifically for: investments in fisheries, Ports, landings sites, auctions and shelters(priority 1 EMFF); aquaculture and aquaculture sites

The following table provides an overview of the state of play in EMFF funding as of the October 2018 for the Azores (and Madeira) for each of the EMFF priorities (Table 11). The total EMFF contribution for the Portuguese ORs was EUR 103 779 of which EUR 75 516 goes to the Azores and EUR 28 263 to Madiera (Table 11).

Table 11: Overview of the state of play of EMFF implementation in Portuguese ORs (Madeira and Azores) per EMFF Union Priority (EUR '000) (source: EU, 2019).

Priority	Art. of Reg. EU n°508/2014	EMFF budget for AZO[74]	EMFF budget for MAD	Total EMFF budget for OR	% of EMFF OR / EMFF PT	N° oper--ations committed	EMFF support committed	EMFF eligible paid	Commitment rate	Payment rate
P1	38	6 090	1 550	7 640	32%	12	144	30	2%	0%
	31	200	50	250	13%	0	0	0	0%	0%
	29	1 430	60	1 490	11%	0	0	0	0%	0%
	40	2 160	750	2 910	15%	2	698	489	24%	17%
	43	19 198	3 862	23 060	77%	12	12 162	1 571	53%	7%
	50	100	10	110	11%	0	0	0	0%	0%
	33	800	400	1 200	15%	0	0	0	0%	0%
	30	400	50	450	45%	0	0	0	0%	0%
	34	480	360	840	14%	0	0	0	0%	0%
	TOTAL P1	**30 858**	**7 092**	**37 950**	**37%**	**26**	**13 005**	**2 090**	**34%**	**6%**
P2	47 48 49	1 860	1 900	3 760	8%	10	2 373	414	63%	11%
	51	80	50	130	3%	0	0	0	0%	0%
	53	70	38	108	3%	0	0	0	0%	0%
	55	10	0	10	1%	0	0	0	0%	0%
	56	10	0	10	1%	0	0	0	0%	0%
	57	300	200	500	17%	0	0	0	0%	0%
	50	100	10	110	11%	0	0	0	0%	0%
	TOTAL P2	**2 430**	**2 197**	**4 627**	**8%**	**10**	**2 373**	**414**	**51%**	**9%**
P3	76	/	0	0	0%	3	2 222	1 922	/	/
	77	3 361	1 920	5 281	22%	4	1 400	704	27%	13%
	TOTAL P3	**3 361**	**1 920**	**5 281**	**10%**	**7**	**3 621**	**2 626**	**69%**	**50%**
P4	62	42	0	42	12%	0	0	0	0%	0%
	62	/	0	0	0%	0	0	0	/	/
	63	638	0	638	2%	0	0	0	0%	0%
	64	20	0	20	10%	0	0	0	0%	0%
	TOTAL P4	**700**	**0**	**700**	**2%**	**0**	**0**	**0**	**0%**	**0%**
P5	66	250	150	400	4%	0	0	0	0%	0%
	68.b	1 190	100	1 290	18%	3	140	0	11%	0%
	69	4 600	1 500	6 100	13%	3	672	0	11%	0%
	70	30 657	14 481	45 138	100%	1505	27 908	21 974	62%	49%
	67	62	523	585	19%	0	0	0	0%	0%
	TOTAL P5	**36 758**	**16 754**	**53 513**	**48%**	**1 511**	**28 720**	**21 974**	**54%**	**41%**
P6	76	/	0	0	/	0	0	0	/	/
	77	/	0	0	/	0	0	0	/	/
	TOTAL P6	**/**	**0**	**0**	/	0	0	0	**/**	**/**
P7 (AT)	78	1 409	300	1 709	7%	1	67	0	4%	0%
	TOTAL P7	**1 409**	**300**	**1 709**	**7%**	**1**	**67**	**0**	**4%**	**0%**
TOTAL		**75 516**	**28 264**	**103 779**	**26%**	**1 555**	**47 786**	**27 104**	**46%**	**26%**
TOTAL without CPAC		**44 859**	**13 783**	**58 642**	**17%**	**50**	**19 878**	**5 130**	**34%**	**9%**

The funding for Portugal's Operational Programme covering each EU Union Priority defined in the EMFF accounted for more than EUR 506 601 of which the EU contributed EUR 392 485 464[17]. The EMFF proposal for 2021-2027 envisages that Portugal will allocate at least EUR 102 million for the Azores and Madeira (26.9% of the total budget for Portugal MS) for such priorities.

In regards to EMFF Union Priority 3 and their application to Azores (Regional objectives for the implementation of the CFP), the Secretariat of the Sea and Fisheries has developed a

[17] https://ec.europa.eu/oceans-and-fisheries/system/files/2016-09/op-portugal-fact-sheet_en.pdf

set of overall objectives under the implementation of the CFP, to promote and reinforce the need to ensure responsible and sustainable fishing, to promote competitiveness and sustainability, in the long term, of companies, focusing on innovation, quality and product enhancement. In short, for the region the programme “Melhor Pesca, Mais Rendimento” is intended to: (i) Add value to fisheries products (ii) Modernise of the fishing fleet and the introduction of new technologies (iii) Enhance the environment and reduce consumption associated with fishing (iv) Increase demand for ready-made products (v) Strengthen sustainable harvesting practices (vi) Replace imports with regional/national production to meet market demand (vii) Continue to promote safe conditions at sea (viii) Further development of marine biotechnology, and (ix) enhance marine agriculture.

4.2 Other sources of funding

Additional funding for the ORs comes from the Ministry of Education and Science for the development of fisheries science and knowledge through the national Foundation for Science and Technology (FCT) and the Regional Fund for Science. The Azores Regional Government also subcontracts the science institutions in the region for service provision contracts and projects (e.g. ARQDAÇO scientific surveys, see Tables 12 and 13). In parallel, the regional scientific entities obtain regular funding through applications to specific funding avenues for projects, namely within the scope of national applications and through the FCT, as well as European funding (within the scope of initiatives such as the Seventh Framework Programme (FP7), replaced by the Horizon 2020 programme). A summary of relevant projects running on the region with application to marine fisheries data/science is presented in

Table 12.

Table 12: Project name and description of the relevant projects from 2012-2018 with application to marine fisheries data/science. Funding institution, total project budget and contribution from regional funding (EUR) (Source: Okeanos, 2019).

Project title	Project name	Objective/description	Funding institution	Total Budget (EUR)	OR Budget (EUR)		
					Total	Regional funds	EU*/others
Biodiversity in seamounts: the Madeira-Tore and Great Meteor	BIOMETORE	Gathering information in marine protected areas offshore	EEA-Grants 2014-2021 (Iceland, Liechtenstein and Norway funding)	2 654 257	13 881	2 082	11 799
Macaronesia Islands Standard Indicators and Criteria: Reaching Common Grounds on Monitoring Marine Biodiversity in Macaronesia MISTIC SEAS	MISTIC SEAS 1	Development of a common approach in Macaronesia for the implementation of the MSFD, Descriptor 1, functional groups birds, cetaceans and sea turtles	Directorate-General for Environment - European Commission; MARINE ENVIRONMENT & WATER INDUSTRY; - EMFF	649 750	42 206	8 441	33 765
Applying a subregional coherent and coordinated approach to the monitoring and assessment of marine biodiversity in Macaronesia for the second cycle of the MSFD	MISTIC SEAS 2	Applying a subregional coherent and coordinated approach to the monitoring and assessment of marine biodiversity in Macaronesia	Directorate-General for Environment - European Commission; MARINE ENVIRONMENT & WATER INDUSTRY; - EMFF	1 347 525	73 206	14 641	58 565
Developing a coordinated approach for assessing Descriptor 4 via its linkages with D1	MISTIC SEAS 3	Developing a coordinated approach for assessing Descriptor 4 via its linkages with D1 and other relevant descriptors in the Macaronesian sub- region	Directorate-General for Environment - European Commission; MARINE ENVIRONMENT & WATER INDUSTRY - EMFF;	1 085 601	136 475	27 295	109 180

Project title	Project name	Objective/description	Funding institution	Total Budget (EUR)	OR Budget (EUR)		
					Total	Regional funds	EU*/others
			MSFD – IMPLEMENTATION OF THE SECOND CYCLE. IMPLEMENTATION OF THE NEW GES DECISION AND PROGRAMME OF MEASURES				
Strategic Plan for the Marine Environment	PEAMA	Collection of adequate information for the implementation of the MSFD.	PO Açores 2020 - ERDF	715 556	715 556	107 333	608 223
Consolidating Sea Turtle conservation in the Azores: I; II; III; IV	COSTA	Ensure the continuity of partnerships that enable the Conservation sea turtles in the Azores	Marine Turtle Conservation Fund of the U.S. Fish and Wildlife Service, Division of International Conservation; ACCSTR ; DRP; IMAR; (In-kind Matching Funds); DRAM (In-kind Matching Funds)	345 801	345 801	69 465	276 336
Bases for the sustainable planning of marine areas in Macaronesia	PLASMAR	Definition of methodologies that articulate the MSFD and Maritime Maritime Spatial Planning in Macaronesia	Interreg V-A MAC 2014-2020 - European Regional Development Fund (ERDF)	1 261 885	216 440	32 466	183 974

Project title	Project name	Objective/description	Funding institution	Total Budget (EUR)	OR Budget (EUR)		
					Total	Regional funds	EU*/others
Interregional and Multidisciplinary Technologies to protect,survey and monitor cetaceans and the marine environment, and to analyse and sustainably exploit the associated Tourism activity.	MARCET	Definition of methodologies that articulate the MSFD and Maritime Maritime Spatial Planning in Macaronesia from cetacean strandings in Macaronesia	Interreg V-A MAC 2014-2020 - ERDF	1 212 490	111 257	16 689	94 568
Light pollution and conservation in the Macaronesian archipelagos: Reducing the harmful effects of artificial light on seabird populations	LUMINAVE S	Mitigation of artificial light effects on seabirds in Macaronesia	Interreg V-A MAC 2014-2020 - ERDF	1 123 269	56 703	8 505	48 198
Macaronesian Maritime Spatial Planning - MarSP	MARSP	Maritime Spatial Planning in Macaronesia	EASME/EMFF/2016/1.2.1.6/03/SI2.763106 (Maritime Spatial Planning) - EMFF	2 149 613	395 140	79 028	316 112
Risk-based approaches to good environmental status	RAGES	Defining a coordinated approach coordinated approach to define a risk analysis methodology for the assessment of the environmental status of the marine environment.	Directorate-General for Environment - European Commission; MARINE ENVIRONMENT & WATER INDUSTRY - EMFF; MSFD – IMPLEMENTATION	854 770	81 644	2 015	79 629

Project title	Project name	Objective/description	Funding institution	Total Budget (EUR)	OR Budget (EUR)		
					Total	Regional funds	EU*/others
			OF THE SECOND CYCLE. IMPLEMENTATION OF THE NEW GES DECISION AND PROGRAMME OF MEASURES				
Promotion of the ecotouristic activity whale watching as a model of sustainable economic development through the protection and conservation of cetacean populations cetacean populations and their value as natural heritage of Macaronesia	MARCET2	To promote the ecotouristic activity of whale watching whale watching as a model of sustainable sustainable economic development through the protection and conservation of cetacean groups resident in protected protected marine areas and of interest for the activity, and its value as a natural heritage of Macaronesia	Interreg V-A MAC 2014-2020 - ERDF	2 135 194	203 315	30 497	172 818
Interactive Aquatic Interfaces for the Detection and Visualisation of Atlantic Marine Megafauna and Vessels in Macaronesia using Radio-Transmitter Markers	INTERTAG UA	Study of distribution and patterns of movement patterns cetacean species based on radio transmitter technology.	Interreg V-A MAC 2014-2020 - ERDF	480 014	135 186	20 278	114 909
Management of coastal protected natural areas coastal protected areas affected by marine litter in oceanic archipelagos - OCEANLIT	OCEANLIT	Reducing marine debris through knowledge, improvement of the waste management and raising awareness among users and the general public, favouring the conservation and recovery of natural	Interreg V-A MAC 2014-2020 - ERDF	2 160 000	270 000	40 500	229 500

Project title	Project name	Objective/description	Funding institution	Total Budget (EUR)	OR Budget (EUR)		
					Total	Regional funds	EU*/others
		coastal coastal and marine protected natural spaces in oceanic archipelagos.					
mpact assessment of microplastics and pollutants pollutants on Macaronesian beaches	IMPLAMAC	Creation of an observatory to generate quantitative and qualitative data qualitative data on the impact of microplastics and emerging contaminants on the beaches of the Canary Islands Canary Islands, Cape Verde, Madeira and the Azores.	Interreg V-A MAC 2014-2020 - ERDF	2 263 465	225 277	33 792	191 485
Improving Coastal and Bathing Water Quality	ABACO	Improving the quality of bathing and coastal waters for tourism promotion and conservation of natural spaces	Interreg V-A MAC 2014-2020 - ERDF	1 708 537	225 500	33 825	191 675
Progress of Sustainable Marine Area Planning in Macaronesia Macaronesia	PLASMAR +	Contribute to the advancement of the Maritime Spatial Planning (MSP) process (MSP) process in the Macaronesian archipelagos developing new tools based on scientific and technological technological knowledge, in the implementation period (post 2021) and to support the sustainability of blue growth.	Interreg V-A MAC 2014-2020 - ERDF	1 500 000	200 043	30 006	170 037
Consolidating the Central Atlantic Alliance for SME	SMARTBL URF	blue economy through the implementation of a transnational network of	Interreg V-A MAC 2014-2020 - ERDF	1 580 000	90 000	13 500	76 500

Project title	Project name	Objective/description	Funding institution	Total Budget (EUR)	OR Budget (EUR)		
					Total	Regional funds	EU*/others
competitiveness in the blue economy		innovation support agents that promotes innovative culture and internationalization by taking advantage of synergies, capacities and shared resources.					
LIFE17 IPE/IPE/000010 – LIFE-IP AZORES NATURA	AZORES NATURA	Concerted action for nature conservation conservation in the Autonomous Region of the Azores.	European Commision – Executive Agency for Small and Medium-sized enterprises - LIFE	19 087 522	4 382 983	1 753 193	2 629 790
Total				**41 660 992**	**7 906 732**	**2 321 470**	**5 585 262**

4.3 OR funding for data collection

Besides the national work plan for the collection of data under the DCF and "Programa Nacional de Recolha de Dados" (PNRD) according to the Regional Directorate of Fisheries, the programs/projects POPA, COSTA, CONDOR, ARQDAÇO and the recently created MONICO, are those which contribute the most for the collection of relevant data collection in support of fisheries management.

In regard to scientific data collection, to improve management, the region supports several data collection programs/projects with regional (and/or national) and EU funding through the several available programmes. A summary of the identified projects with contributions to data collection is presented in Table 13.

Table 13: Relevant projects with data collection for fisheries management.

Project	Objective / description	Funding source
POPA	Programme for the observation of fishing activities in the Azores	EU (DCF)
ARQDAÇO DEMERSAIS	Annual monitoring survey of demersal	EU (DCF)
ARQDAÇO DEMERSAIS CONDOR	Annual monitoring survey of demersals - seamount Condor	EU (DCF)
AOTTP ICCAT	Tagging Programme of in the frame of the Atlantic Ocean Tropical tuna Tagging Programme	EU, ICCAT
AOTTP - Recuperação	Tagging Programme of in the frame of the Atlantic Ocean Tropical tuna Tagging Programme	EU, ICCAT
MISTIC SEAS III	Provision of data collection services for the Marine Mammals and Sea Turtles Monitoring Program in the Azores Archipelago: subprogramme Marine Mammals - Abundance and demography of coastal cetaceans and subprogramme Sea Turtles - Body Condition	EU (DCF)
MONIZEC II	Monitoring of marine protected areas in the Azores with regulations restricting fishing activity	EU
MONICO	Azores Coastal Resources and Environment Monitoring Programme	EU (DCF)
COSTA	Consolidating Sea Turtle conservation in the Azores	Marine Turtle Conservation Fund - US Fish and Wildlife
SPONGES	Deep-Sea Sponge Grounds Ecosystems of the North Atlantic	Horizon 2020 programme
MERCES	Marine Ecosystem Restoration in Changing European Seas	

Project	Objective / description	Funding source
ATLAS	A Trans-Atlantic Assessment and deep-water ecosystem-based spatial management plan for Europe"	
MEESO	Ecologically and economically sustainable mesopelagic fisheries	
SUMMER	Sustainable management of mesopelagic resources	
iATLANTIC	Integrated Assessment of Atlantic Marine Ecosystems in Space and Time	
ISLAND SHARK	Ocean islands habitat for migratory sharks	Mar2020 and FCT
BECORV	Ecological Basis for the Sustainable Management of Meagre	
RECO	Recolonization potential hosted by seamounts for faunal recovery in disturbed deep-sea environments	
MapGes	Mapping deep-sea biodiversity and "Good Environmental Status" in the Azores: assisting with the implementation of EU Marine Strategy Framework Directive	
Ocean Biometrics	An innovative data collection solution for oceanic megafauna	
SOS TubaProf	Assessment of the sustainability of deep-sea shark catches	
MARFOR	Functional variability and dynamics of Responses of marine	

5 Current state of data collection and other reporting obligations

Some features of the current state of data collection by fishing gear was already addressed in section 2 and 4. The following depictions are based on the National Annual Report for the DFC (2019, update 2020[18]).

The sources of information on landings of fresh or refrigerated fish in Azores ports is LOTAÇOR EP. These entities electronically register all the data from 1st sale, and then send the information to the national administration, accordingly to the rules laid out in the EU Control Regulation (Council Regulation (EC) No 1224/2009).

At-market and at-sea sampling of metiers LHP_CEP (handlines, targeting cephalopods including squid), LHP_LPF (pole and line, targeting pelagic fish), LLD_LPF (drifting longlines, targeting pelagic fish), FPO (pots and traps), GNS_FIF (gillnets, targeting coastal demersal and pelagic fish), and PS_SPF (purse seine, targeting small pelagic fish) are extremely selective fisheries without occurrence of by-catch. Metiers LHP_DWS (handlines, targeting deep water species), LHP_FIF (handline, targeting coastal demersal and pelagic fish), LLS_DWS (set longlines, targeting deep water species) and LLS_DEF (set longlines, targeting demersal fish) are multispecies fisheries. At-market sampling for ICCAT (tunas) is performed within the Azores. Sampling strategy targets AZM24 - LHP_LPF _<12m; AZM25 - LHP_LPF _>12m (poles and lines); AZM29 – LLD_LPF (longline). At market and at sea sampling design is documented as an internal document. Both sampling design and protocols follow EU recommendations. Quality control assessment analysis are implemented on the database. Quality checks and validation procedures implemented are: (i) All samples are checked by a coordinator before the input of data (iii) All data introduced in database is checked (iii) A random check of the data is executed by inspecting the registered data for logical errors, and (iv) Length distributions are then connected with the market landings for examination and fisheries studies. Portuguese central administration cross-checks all the information from VMS, logbooks and sales notes, complying with the cross-checks foreseen under the control legislation. The cross-check between landed species (name and weight) and the ones declared in the logbooks is performed on a daily base.

There is no sampling protocol specifically directed to incidental by-catch of birds, mammals, reptiles and fish. However, when they are observed during regular onboard sampling protocol (ICES X/Azores) they are registered.

For effort, the primary data source is logbooks and the sales notes are the secondary data source, especially for vessels below 10 m. Those are reporting obligations under the Control Regulation and data are facilitated to DCF related stakeholders (mainland and OR). For the Azores Region, a complementary reporting of fisheries data is run with the aim of completing the information for effort variables with a sampling coverage of 5% of the fishing trips from all harbours where technicians/samplers are located. Under the DCF and the EU-MAP the information to be collected on effort refers to: days at sea, fishing days, number of fishing trips, number of fishing gears, number of fishing operations, number and size of nets, number of hooks and lines and number of traps.

18 In September 2021, the national annual reports for DCF covering 2020, although evaluated by STECF, are not publicly available.

The Azores at sea observer scheme collects comprehensive data on species composition and length composition of all retained and discarded components of the catch on a haul-by-haul basis. All interactions with vulnerable fauna (e.g. sea-birds, sea-turtles and marine mammals) are recorded, as well as the conditions when they are released. Landings from vessels with an observer on board will be sampled by the samplers present at the landing port. Non-responses and refusal rates are recorded.

Onboard observer protocol instructs to check for all catch (target + incidental bycatch + discards) during the hauling process in gill nets and longline. The sampled and non-sampled fraction of the gear is recorded in order to have estimates at haul level (ICES X/Azores).

The annual spring bottom longline survey - ARQDAÇO - was established since 1995, targeting demersal and deep water species up to 1 200 m depth in the areas near all the nine islands of the archipelago, and various seamounts in the Azores Exclusive Economic Zone. The main aim of the monitoring surveys is to monitor the abundances of the main demersal fishes in Azores.

Under the 2017-2019 EU-MAP and the extension to 2020-2021 EU-MAP, Member States ran pilot studies on different topics (e.g. marine recreational fisheries, impact on the ecosystem, social variables, and aquaculture). During 2018 and 2019, Azores performed a pilot study to estimate the total catch of elasmobranches and tuna species by recreational fishing. There were some constraints to this study during the period of transition of biological data collection from DOP-University of Azores to the Regional Directorate of Fisheries. Nevertheless, these estimates should be properly assessed in the future with complementary data (i.e., logbook panel and an on-site survey) since they present typical problems of recall and non-response bias. For that reason, new procedures are being prepared to be implemented.

6 Fisheries management and conservation measures

6.1 Management and conservation measures

6.1.1 National

In the Azorean EEZ, fisheries management is based on regulations issued by the European community, by the Portuguese government, and by the Azores regional government. For example, under the EU, TACs were introduced for some species in 2003, e.g. blackspot sea bream, black scabbardfish, and deep-water sharks (Council Regulation (EU) 2340/2002[19]) and have been revised/maintained thereafter. Specific access requirements and conditions applicable to fishing for deep-water stocks were also established (Council Regulation (EU) 2347/2002[20])). Fishing with trawl gears has been forbidden in the Azores EEZ. An area of 100 nm has been demarcated for vessels registered in the Azores to undertake deep-water fishing. This was created in 2003 under the management of fishing effort of the CFP for deep-water species (Council Regulation (EU) 1954/2003[21]). Technical measures have also been introduced by the Azores regional government since 1998, including fishing restrictions by area, vessel type and gear, fishing licences based on landing thresholds, minimum lengths and closed seasons, and have been updated thereafter (ICES, 2018). Since 2012, the Regional Government has been reinforcing a series of legislative initiatives aimed at promoting the sustainable exploitation of resources.

In the Azores, the activity associated with fishing includes not only fishing with a vessel, but also the gathering of marine animals and onshore fishing on foot. However, potentially one of the most important fishing activities, in terms of pressure on fish stocks, is professional fishing using vessels, with stakeholder consultation showing that the recreational fisheries may account for between 6 - 20% of catch in volume. This is why such activities have the majority of laws and restrictions enacted on them.

According to Regional Legislative Decree no. 331 28/2010/A, of 9 November the fishing methods are able to be carried out either on or off vessels registered in the Azores: (i) onshore fishing (ii) line fishing (iii) trap fishing (iv) use of lifting gear, (v) encircling (purse seine) gear, and (vi) gillnet fishing. The following fishing methods are prohibited within the Azores: (i) use of trawl gear (ii) use of gillnets at depths greater than 30 m (iii) use of drift-nets, and (iv) use of gillnets made up of more than one set.

Since 2012, the Regional Government has been presenting a series of legislative initiatives aimed at promoting the sustainable exploitation of resources within the Azores. The initiatives mentioned are essentially based on the diversification of fishing techniques, limitations on access to certain fishing grounds, prohibition of the use of certain fishing gear and limitation of fishing possibilities for some species (complete list provided within the Directorate of Fisheries website[22]).

19 Council Regulation (EC) No 2340/2002 of 16 December 2002 fixing for 2003 and 2004 the fishing opportunities for deep-sea fish stocks (OJ L 356, 31.12.2002, p. 1–11).

20 Council Regulation (EC) No 2347/2002 of 16 December 2002 establishing specific access requirements and associated conditions applicable to fishing for deep-sea stocks (OJ L 351, 28.12.2002).

21 Council Regulation (EC) No 1954/2003 of 4 November 2003 on the management of the fishing effort relating to certain Community fishing areas and resources and modifying Regulation (EC) No 2847/93 and repealing Regulations (EC) No 685/95 and (EC) No 2027/95 (OJ L 289, 7.11.2003, p. 1–7).

22 https://www.azores.gov.pt/Gra/SRMCT-PESCAS/menus/principal/Legisla%C3%A7%C3%A3o/

The range of fisheries conservation measures for the Azores are appropriate to promote the sustaibability of the resources (wich also includes CMMs under the CFP and MSFD directives), but the main difficulty witin the islands is the practical implementation and enforcement, as well as local monitoring .

We highlight the following initiatives as being representative of the range of (island specific) legislative management and conservation measures in the Azores, with the majority supported by scientific evidence:

i. Portaria 116/2018 - establishes more restrictive areas of operations for vessels with an angling licence. CFF vessels up to 14 metres are prohibited from fishing within 1 nautical mile of the coast and CFF vessels over 24 metres are only allowed to fish beyond 30 nautical miles from the coast;
ii. Portaria 13/2017 - clarifies that the closure of any fishery, for having reached the established fishing opportunities, implies an immediate prohibition of recreational fishing; defines the closed seasons for blackspot seabream between 15 January and 29 February, which coincides with the breeding season of the species in the Azores and has as its main objective the protection of the spawning biomass.
iii. Portaria 87/2014 - establishes specific rules and restrictions on access to the several seamounts.
iv. Ordinance 74/2015 - eliminates the margin of tolerance of 15% below the minimum landing size in the total catch of blackspot seabream, previously established.
v. Portaria n. No. 94/2017 - Approves the specific access regulation for the exercise of fishing and stay of vessels in the Condor Bank to ensure the continuity of scientific projects for monitoring and stock recovery;
vi. Commission Delegated Regulation (EU) - establishes derogations from the landing obligation under the International Convention for the Conservation of Atlantic Tuna and the Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries.
vii. Portaria 157/2015, of 4 December - establishes the criteria for the allocation of the quota of blackspot seabream by the islands of the archipelago guaranteeing the management of the quota by island.
viii. Portaria 53/54 2016 - establishes specific rules for fishing in the marine areas of "Monte da Guia", on the island of Faial, and "Ilhéus da Madalena" and "Baixa da Barca", on the island of Pico, including a total ban on fishing for demersal species and applying specific rules to fishing in the areas of Ribeira Quente, on the island of São Miguel, including a ban on fishing for demersal species.
ix. Portaria 70/2016 - establishing specific restrictiverules for fishing in "Baixo do Ferreiro" and "Ilhéus" in Graciosa island.
x. Portaria 12/2017 - altered the allocation of the blackspot seabream quota for 2017 and 2018 by the different islands of the archipelago.
xi. Portaria 2250/2017 - Modified the distribution of the quota among vessels in the different islands of the archipelago;
xii. Ordinance 2608/2017 - Identifies the quotas not used or not exhausted, in 2017, by local and coastal fishing vessels;
xiii. Portaria 2897/2017 - Identifies the fishing opportunities not used or not exhausted, in 2017, for all fishing local and coastal fishing vessels with regular activity;

xiv. Ordinance 2250/2017 - allocation of the quota of blackspot seabream per vessel (IVQ), maintaining the maximum limit of 3% of the total catch per vessel, in accordance with the provisions of paragraph d) of Article 7.1.

xv. Regulation (EU) 2017/2107 [23] of the European Parliament - laying down management, conservation and control measures applicable in the Convention area of the International Commission for the Conservation of Atlantic Tunas (ICCAT), and amending Council Regulations (EC) No 1936/2001, (EC) No 1984/2003 and (EC) No 520/200.

xvi. Commission Implementing Regulation (EU) 2178/2017 - Amends Regulation (EU) 468/2010 establishing the list of EU vessels involved in illegal, unreported and unregulated fishing.

Fishing areas

There are, specifically for the Azores, several regulations that regulate the exercise of fishing in several marine areas of the region and on several islands. These are based either on minimizing biological and physical disturbance, or adaptation of regulations to allow new areas or expansion of fishing areas:

i. Portaria n.º 68/2019- adopt the Regulation for the exercise of fishing activities in the maritime area of the LUSO hydrothermal field.

ii. Portaria n.º 70/2016 - Amends and republishes Portaria n.º 55/2016, de 21 de junho which approves the regulation for the exercise of fishing in the maritime area around Graciosa Island.

iii. Portaria n.º 54/2016 - Approves the regulations governing fishing in the Ribeira Quente marine area.

iv. Portaria n.º 53/2016 - Approves the regulation on fishing in the protected areas in the maritime area around the islands of Faial and Pico

v. Regional Regulatory Decree no. 24/2015/A - Creates the Canarias Underwater Archaeological Park, on the island of Santa Maria

vi. Regional Regulatory Decree nr. 17/2015/A - Creates the Slavonia Underwater Archaeological Park, on the island of Flores.

vii. Portaria n.º 87/2014 - Approves the Regulation for the Use of Protected Areas in the Maritime Area of Santa Maria Island.

viii. Regional Regulatory Decree no. 15/2014/A August - Creates the Caroline Underwater Archaeological Park on Pico Island.

ix. Commission Implementing Decision (EU) 2016/2330 - adopting the sixth update of the list of sites of Community importance for the Macaronesian biogeographical region.

x. Portaria n.º 97/2018 - Approves the regulation for fishing in the maritime area of Quatro Ribeiras, Terceira island.

xi. Portaria n.º 94/2017 - Approves the specific access regulations for fishing and the access and permanence of vessels in Banco Condor.

23 Regulation (EU) 2017/2107 of the European Parliament and of the Council of 15 November 2017 laying down management, conservation and control measures applicable in the Convention area of the International Commission for the Conservation of Atlantic Tunas (ICCAT), and amending Council Regulations (EC) No 1936/2001, (EC) No 1984/2003 and (EC) No 520/2007 (OJ L 315, 30.11.2017, p. 1–39).

6.1.2 International

For demersal and small pelagic stocks outside the Azores EEZ, the relevant fisheries body for management is CECAF. However, CECAF is an advisory body providing science-based advice but management recommendations are not legally binding. Thus, it cannot establish conservation and management measures as an RFMO but scientific recommendations could be provided for the CECAF area 34.1.2, where the Azores are located. A NEAFC regulation (Council Regulation (EU) 2016/2336) exists establishing specific conditions for fishing for deep-sea stocks (including *Hoplostethus atlanticus*, *Molva dypterygia*, grenadiers and deep-water shark species) in the NEAFC regulatory area.

Many fisheries in the Azores are managed under the EU's CFP, with others (e.g. transboundry stocks or non-quota species) under the remit of relevant RFMOs (e.g. NEAFC, ICCAT) or regional government departments. Fisheries scientific advice is provided by ICES and STECF, while other technical advice is also provided by SWWAC,LDAC and ORAC (aka CC-RUP). For large pelagic fish (tuna and tuna-like species) fisheries advice is provided by ICCAT. Environmental policy is handled by national agencies and OSPAR, with advice coming from various national agencies, OSPAR, the European Environment Agency (EEA), and ICES. IMO is responsible for international shipping , while whaling falls to the IWC (ICES, 2019).

6.1.3 Marine Protected Areas

In the Archipelago of the Azores, over 110 000 km^2 of marine areas presently benefit from some form of protection, including a suite of coastal habitats, offshore areas, seamounts, hydrothermal vents, and large parcels of mid-ocean ridge (Figure 14, Figure 15). These areas stand as the cornerstone of Azorean marine conservation policies and the islands of the Azores along with Australia and USA were the pioneer nations in the establishment of Marine Protected Areas (MPAs).

Marine protected areas within the Azores are composed of 15 MPAs included in the Azores Marine Park (AMP) and a further 35 coastal MPAs integrated in the island natural parks. Combined, these areas include 19 Natura 2000 sites, 11 OSPAR areas, 2 wetlands of international importance (RAMSAR) and 4 Biosphere reserves (Portiero et al., 2020). There are also 13 areas restricted to fisheries and 5 underwater archaeological parks, which constitute important spatial measures for the protection of marine ecosystems. The management of the Azorean Sea must be endowed with its own clear and realistic legal framework, reflecting an efficient operationalization of management measures and an active involvement of stakeholders, ensuring transparency in the forms of consultation and information. For this reason, MPAs in the Azores are currently undergoing a reevaluation and reorganization, to create a '*network of MPAs in the Azores'* (RAMPA). This process includes a reassessment of conservation objectives through stakeholder consultations and mapping of natural and socio-economic values to define new priority areas for conservation. The reorganization and expansion of MPAs into ecologically coherent networks aims to guarantee the representativeness of natural values and ecological processes, allowing continuity between important areas for the conservation of species and habitats, ensuring resilience and promoting the sustainability of uses. In this context, RAMPA should reflect a vision based on the ecosystem, recognizing human activities as an integrated part of the system. The establishment of RAMPA is a priority for the regional government, and is expected to contribute to regional, national and international marine conservation policies. The process is being developed by the Regional

Directorate for Sea Affairs, and has a technical-scientific partnership with the University of the Azores (Okeanos center). It is also supported by the Oceano Azul Foundation and the Waitt Foundation (through the BLUE AZORES program) and the LIFE IP AZORES NATURA project (DRAM, 2019).

Monitoring of some of the MPAs that have regulations that restrict fishing activity was established under the project MONIZEC-ARP of the regional government. However, monitoring and surveillance do not always provide the needed protection mainly from the fishery fleet.

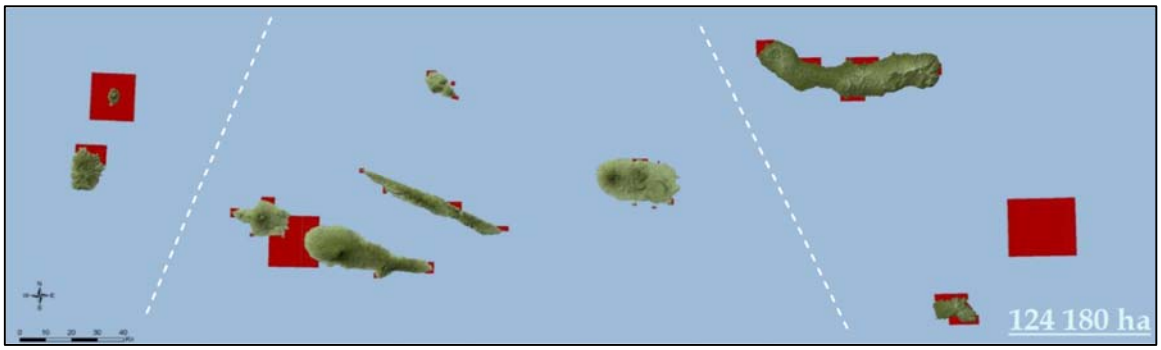


Figure 14: MPAs included in the Azores Marine Park (Source: DRAM, 2017).

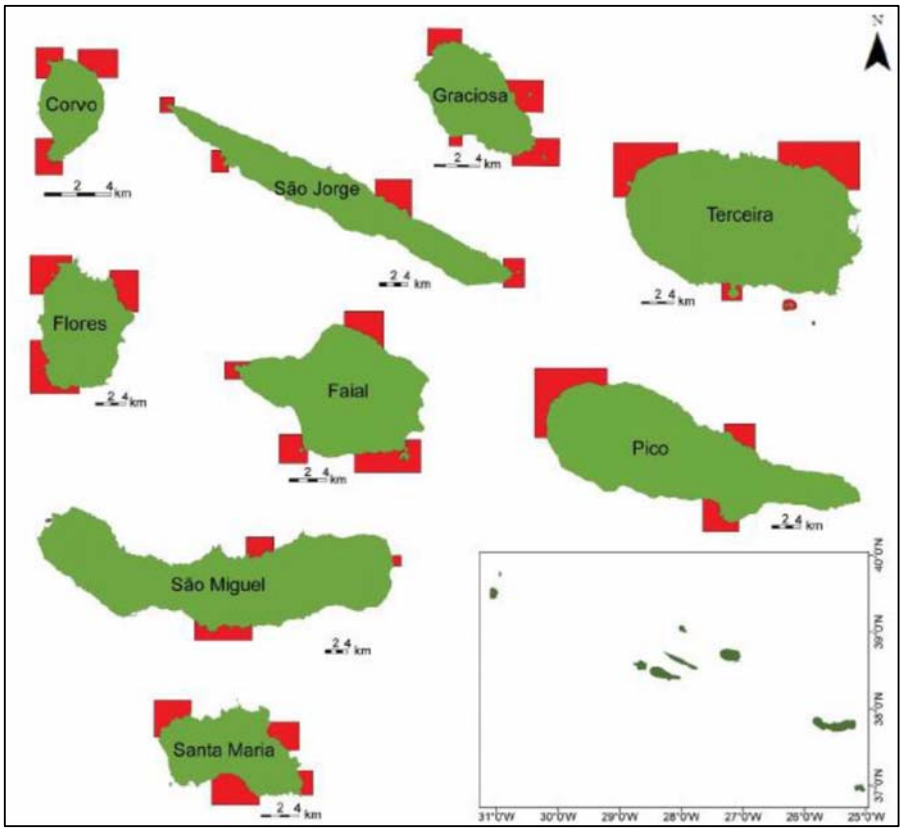


Figure 15: Coastal protected areas to fisheries (Source: DRAM, 2017).

6.2 Background to scientific advice and data requirements

6.2.1 National

The majority of the Azores stocks have not undergone an analytical assessment, therefore do not have biological reference points (i.e., within the ICES framework). An exception to this rule concerns the large pelagic stocks within Azores waters that are assessed by ICCAT. Scientists from IPMA, using data collected at the national level participate in the assessments for such species and regional representatives at the Standing Committee on Research and Statistics for the allocation of TACs and quotas that are annually allocated to the fisheries that capture tunas in the area. The Regional Directorate of Fisheries, the Department of Oceanography and Fisheries at the University of the Azores and the consortium Okeanos are the main scientific bodies for analysing the data and produce scientific advice in the Azores with representatives in some of the aforementioned scientific bodies (e.g. ICES).

From the 138 recorded species landed in the Azores during the period 2009-2019, twenty-two (18 fishes, 2 molluscs and 2 crustaceans) have been selected as priority stocks for local assessment and monitoring based on collaborative work from Regional Directorate of Fisheries and scientific bodies in the area in the context of MSFD (Table 14). According to available scientific evidence, half of the selected stocks have their distribution inside the Azores EEZ (ICES Subdivision 27.10.a.2), but the other half have no clearly defined distribution. Twelve stocks have been classified as ICES category 5 (i.e. stocks for which only landings or a short series of catches are available), while 10 stocks have been classified as ICES category 3 (i.e. stocks for which survey-based assessments or exploratory assessments indicate trends). Among all these, only four stocks are assessed using data limited approaches: blackspot seabream, black scabbardfish, and thornback ray (category 3) and blue jack mackerel (category 5). However, no biological reference points are defined and stock status relative to maximum sustainable yield (MSY) are not assessed for any of these stocks (as reference points for all selected stocks are not known). The current stock size is available for 11 stocks, and most of them (blackspot seabream, blackbelly rosefish, red porgy, conger eel, splendid alfonsino, and thornback ray) show decreasing abundance trends (Santos et al. 2020).

There are a range of demersal and small pelagics species relevant landed within the area for which there is little information, including management area, responsible RFMO and stock name (Table 15). In addition, there are a number of large pelagic species assessed by the ICCAT and relevant/charismatic/endangered cartilaginous species in the Azores, which have data on stocks collected through the DCF and/or from survey based information (Table 16).

Table 14: Priority species identified by FAO and ICES criteria. Data collection through the DCF (marked *), survey based information (marked *). Management area responsible RFMO and stock name.

Species	FAO Code	Scientific bodies /stock Cat.	Assessment area	DCF data	Survey data	Stock name	Management Unit
Phycis phycis	FOR	ICES / Cat.3	ICES 10.a.2	*	*	for.27.10.a2	Atlantic NE (27.10.a.2)
Beryx splendens	BYS	ICES / Cat.3	ICES 10.a.2	*	*	bys.27.10.a.2	Atlantic NE (27.10.a.2)
Helicolenus dactylopterus	BRF	ICES / Cat.3	ICES 10.a.2	*	*	brf.27.10.a.2	Atlantic NE (27.10.a.2)
Pagellus bogaraveo	SBR	ICES /Cat.3	ICES 10.a.2	*	*	sbr.27.10.a.2	Atlantic NE (27.10.a.2)
Beryx decadactylus	BXD	ICES / Cat.5	ICES 10.a.2	*	*	bxd.27.10.a.2	Atlantic NE (27.10.a.2)
Trachurus picturatus	JAA	ICES / Cat.5	ICES 10.a.2	*	*	jaa.27.10.a2	Atlantic NE (27.10.a.2)
Conger conger	COE	ICES / Cat.3	ICES 10.a.2	*	*	coe.27.10.a.2	Atlantic NE (27.10.a.2)
Pagrus pagrus	RPG	ICES / Cat.3	ICES 10.a.2	N/A	*	N/A	Atlantic NE (27.10.a.2)
Lepidopus caudatus	SFS	ICES / Cat.5	ICES 10.a.2	N/A	*	sfs.27.10.a.2	Atlantic N
Aphanopus carbo	BSF	ICES / Cat.3	ICES 10.a.2	*	*	bsf.27.nea	Atlantic NE (27.10.a.2)
Scomber colias	MAS	ICES / Cat.5	ICES 10.a.2	*	*	mas.27.10.a2	Atlantic NE (27.10.a.2)
Sparisoma cretense	PRR	N/A / Cat.5	N/A	N/A	*	N/A	N/A
Scorpaena scrofa	SER	N/A / Cat.5	N/A	N/A	*	N/A	N/A
Pontinus khulii	POI	ICES / Cat.3	ICES 10.a.2	N/A	*	poi.27.10.a.2	Atlantic NE (27.10.a.2)
Raja clavata	RIB	ICES/ Cat.3	ICES 10.a.2	N/A	*	rib.27.10.a.2	Atlantic NE (27.10.a.2)
Loligo forbesi	SQF	ICES/ Cat.5	ICES 10.a.2	N/A	N/A	sqf.27.10.a.2	N/A
Palinurus elephas	SLO	N/A / Cat.5	N/A	N/A	N/A	N/A	N/A
Scyllarides latus	YLL	N/A / Cat.5	N/A	N/A	N/A	N/A	N/A
Seriola spp	AMX	N/A / Cat.5	N/A	N/A	N/A	N/A	N/A
Serranus atricauda;	WSA	ICES/ Cat.5	N/A	N/A	N/A	N/A	N/A
Patella aspera	LQY	N/A / Cat.5	N/A	N/A	N/A	N/A	N/A
Mora moro	RIB	ICES / Cat.3	N/A	N/A	*	N/A	N/A

Table 15: Demersal and small pelagic species identified in DRP, 2020. Data collection through the DCF (marked *), survey based information (marked *). Management area responsible RFMO and stock name.

Species	FAO Code	Scientific bodies	Assessment area	DCF data	Survey data	Stock name	Management Unit
Pomatomus saltatrix	BLU				*		
Pagellus acame	SBA				*		
Polyprion americanus	WRF		ICES 10.a.2	*	*	wrf.27.10.a.2	Atlantic NE (27.10.a.2)
Schedophilus ovalis	HDV				*		
Pseudocaranx dentex	TRZ				*		
Mycteroperca fusca	MKF				*		
Seriola dumerili	AMB				*		
Phycis blennoides	GFB			*	*		
Seriola dumerili	AMB				*		
Mora moro	RIB	ICES	ICES 10.a.2		*	rib.27.10.a.2	Atlantic NE (27.10.a.2)
Epinephelus marginatus	GPD	ICES	ICES 10.a.2		*	rpg.27.10.a.2	Atlantic NE (27.10.a.2)
Muraena helena	MMH				*		
Zeus faber	JOD				*		
Balistes capriscus	TRG				*		
Coris julis	COU				*		
Molva macrophthalma	SLI				*		
Scorpaena scrofa	SER				*		
Mullus surmuletus	MUR				*		
Sardina pilchardus	PIL				*		
Diplodus sargus	SWA				*		
Sarda sarda	BOM				*		
Chelon labrosus	MLR				*		

Table 16: Large pelagic species and cartilaginous species relevant in the OR. Data collection through the DCF (marked *), survey based information (marked *). Management area responsible RFMO and stock name.

Species	FAO Code	Scientific bodies	Assessment area	DCF data	Survey data	Stock name	Management Unit
Large pelagic species							
Xiphias gladius	SWO	ICCAT	ICCAT BIL94B/BIL94C	*		SWO - N	Atlântico Norte
Thunus albacares	YFT	ICCAT	ICCAT YF02	*		YFT-A	Atlântico
Thunnus obesus	*BET*	ICCAT	ICCAT BE01	*		BET - A	Atlântico
Thunus thynus	BFT	ICAAT	ICCAT BF57	*		BFT-E	Atlântico Este e Mediterrâneo
Thunnus alalunga	ALB	ICCAT	ICCAT AL31	*		ALB - N	Atlântico Norte
Katsuwonus pelamis)	SKJ	ICCAT	ICCAT SJ01	*		SKJ - E	Atlântico Este
Makaira nigricam	BUM	ICCAT	BIL 94B/BIL94C	*		BUM-A	Atlantico
Kajikia albida	WHM	ICCAT	BIL 94B/BIL94C	*		WHM-A	Atlantico
Istiophorus albicans	SAI	ICCAT	BIL 94B/BIL94C	*		SAE	Atlantico Este
Cartilaginous species							
Galeorhinus galeus	GAG		ICES 10.a.2		*	gag.27.nea	Atlântico NE (27.10.a.2)
Dalatias licha	SCK		ICES 10.a.2		*	sck.27.nea	Atlântico NE (27.10.a.2)
Centrophorus squamosus	GUQ		ICES 10.a.2		*	guq.27.nea	Atlântico NE (27.10.a.2)
Raja clavata	RJC		ICES 10.a.2		*	raj.27.nea	Atlântico NE (27.10.a.2)
Prionace glauca	BSH	ICCAT	BIL 94B/BIL94C	*		BSH-N	Atlântico Norte
Alopias spp.	THR		ICES 10.a.2		*	thr.27.nea	Atlântico NE (27.10.a.2)
Centroscymnus coelolepis)	CYO		ICES 10.a.2		*	cyo.27.nea	Atlântico NE (27.10.a.2)
Cetorhinus maximus	BSK		ICES 10.a.2		*	bsk.27.nea	Atlântico NE (27.10.a.2)
Lamna nasus	POR		ICES 10.a.2		*	por.27.nea	Atlântico NE (27.10.a.2)
Mustelus spp	SDV		ICES 10.a.2		*	sdv.27.nea	Atlântico NE (27.10.a.2)
Isurus oxyrinchius	SMA	ICCAT	BIL 94B/BIL94C	*		SMA-N	Atlântico Norte

Future studies should evaluate which methods for assessment may be suitable for each stock and identify what additional data are needed to improve the analyses. However, the region has a large number of ecological and fisheries scientific studies that form the basis for local regional management measure for several species (e.g. blackspot seabream, alfonsinos and various deep sharks). In addition, the Regional Government has implemented several technical measures, such as minimum landing sizes or weights, minimum mesh sizes and space-time bans based on scientific data. Altough Azores have a lot of information, scientific analysis is lacking for lack of manpower.

Coastal species (grouper, moray eel, squid, lobster), *Pontinus kuhlii* (offshore rockfish), and algae harvesting (recent catches for food, cosmetics and reducing gases (methane) in cow feed demand some MSP) have a growing importance in the regional economy and small-scale fisheries and have been identified by regional stakeholders as species that require more scientific knowledge and better management.

6.2.2 International

IPMA scientists participate in the ICCAT working groups and in the assessment of large migratory pelagic species and regional representatives at the Standing Committee on Research and Statistics. There are no regional experts attending CECAF working groups.

Regional scientists often attend ICES assessment working groups based on their expertise for the assessment of several stocks; ICES WGDEEP for black scabbardfish, blackspot seabream and thornback ray (category 3 stocks) and ICES WGHANSA for jack mackerel (category 5 stock). No regional scientists attend NEAFC working groups.

7 Shortcomings or obstacles to fisheries management

Category	Shortcoming or obstacle
Stocks	The majority of stock boundaries unknown. Stock connectivity unknown in the region. Gaps in knowledge in some important stock for the region (see 6.2.1). Patella spp. unknown status (relevant recreational, socio-economic). Coastal species (grouper, moray eel, grouper, squid, mackerel, lobster). Black scabbard fisheries should be reinforced as there are indication of fishing opportunities. Coastal species (grouper, moray eel, grouper, squid, mackerel, lobster), Pontinus kuhlii and algae harvesting (recent catches for food, cosmetics and reducing gases (methane) in cow feed, require some kind of MSP) were also identified as critical for improvement in scientific knowledge. The Azores stocks have no resources with validated analytical assessment and/or biological reference points within the ICES framework. Scientists have partial estimates of IUU that have not been used directly in fisheries management (e.g. to revise catch estimates). Locla fisheries in the Outermost Regions are characterised by the predominance of artisanal, subsistence or recreational fishing. Many of the species that sustain these fisheries (e.g. small neritic tunas), are not subject to comprehensive data collection under regular programmes (ICCAT-M.Aranda).
Institutional structures	Azores have a lot of information, but scientific analysis is lacking for lack of manpower. There are no coordination tools/platforms in place to facilitate communication amongst scientists and managers. Some dispersion of responsibilities. Some similar and parallel work between institutions and within institution at times. Databases are shared on request. No standardisation of information (DB of auction-markets vs VMS/AMS info). There were some temporary limitations in responsibilities (i.e., who does what) during the period of transition of DCF data collection from DOP-University of Azores to the Regional Directorate of Fisheries The currently existing infrastructures are found adequate although the staff (researchers and technicians) from several institution is still considered understaffed and precarious. There is a general need to improve the communication amongst stakeholders and fisheries managers. Although shared on request, information is not public and sometimes fisheries scientist are not aware of existence.

Funding and funding structures	Insufficient/opaque information. OR disaggregated data. The majority of funding is used (not always well) for ports and infrastructure. Only SMEs can currently apply for EMFF subsidies which might prevent some companies from applying for processing and/or marketing projects. Disconnection between the selection criteria decided at national level and the real needs of the local fishermen in the Azores (e.g. engine replacement, liveability on board).
Data reporting obligations	There were some constraints to data collection during the period of transition of DCF data collection from DOP-University of Azores to the Regional Directorate of Fisheries Typical problems of recall and non-response bias in recreational fisheries gathering of data. No regular information on fishing mortality by recreational fisheries. Recreationally has unknown métiers data and is very important in the area (~6-20% of the commercial total depeding on the source of information). Gaps in cross-referencing VMS/AMS BDs vs. auction landings to spatially characterize catch by length. Improve MSP, VME, and MPA Azores collect a lot of data. Not always with time (manpower) to analyse all the information. Transversal and socio-economic data are limited and/or missing for metiers within small-scale fisheries. There is a need to increase surveys for effort/fishing grounds/socio-economic data (no. of crew members, contracts etc.). In addition, Auction market on-site questionnaires could be reinforced to better assess this fishing effort by metier levels 3, 6. More data/targets needed to identify Vulnerable Marine Ecosystems

Management and conservation measures	Management measures are useful and effective, in some cases technical measures such as closures and establishment of minimum sizes are not applied for some important fisheries in the Region. Fisheries conservation measures are appropriate but the main difficulty is the practical implementation and enforcement. Local monitoring of the large small scale fleet operating in the archipelago requires a lot of effort to gain reliable information on the catch, effort and fishing areas Monitoring resources are not enough to assure compliance with the management regulations inside the large Azorean EEZ. European regulations, by defining rules (fleets, minimum catch sizes, prohibiting the use of certain gears or banning certain species) does not always take into account the specific artisanal fishery characteristics of the ORs lack of facilites for processing discards Very few stocks have analytical assessments and TACs which hampers conservation measures

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8.3 Additional data sources

INE	www.ine.pt https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_unid_territorial&menuBOUI=13707095&contexto=ut
SRMCT	http://www.azores.gov.pt/GRA/srmct-mar

	https://www.azores.gov.pt/Gra/SRMCT-PESCAS/menus/principal/documentos http://www.azores.gov.pt/Portal/pt/entidades/srmct-drp/ https://www.azores.gov.pt/Gra/SRMCT-PESCAS/menus/principal/Legisla%C3%A7%C3%A3o/
OKEANOS	http://www.okeanos.uac.pt http://www.okeanos.uac.pt/relatorios-internos/
LOTAÇOR	https://lotacor.pt/
DRP	https://portal.azores.gov.pt/web/drp/geral
DRAM	https://portal.azores.gov.pt/web/dram
ORFISH	https://orfish.eu/
FAO	http://www.fao.org/faostat/en/
GPS AZORES	www.gpsazores.com

Madeira

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Madeira OR Profile Report

Contents

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Acronyms

Term	Description
ARDITI	Regional Agency for Research and Technology Development and Innovation
ARM	Autonomus Region of Madeira
CECAF	Committee for the Eastern Central Atlantic Fisheries
CFP	Common Fisheries Policy
CIIMAR	Interdisciplinary Centre of Marine and Environmental Research
COOPESCAMADEIRA	Fishing Cooperative of Madeira Archipelago
DCF	Data Collection Framework
DG-MARE	Directorate-General for Maritime Affairs and Fisheries
DGRM	Directorate-General for Natural Resources, Safety and Maritime Services
DRM	Regional Directorate for the Sea
DRP	Fisheries Regional Directorate
DSDAMP	Directorate of Development Services, Administration and Modernization of Fisheries
DSIC	Inspection and Control Services
EASME	Executive Agency for Small and Medium Sized Enterprises
EEZ	Exclusive Economic Zone
EMFF	European Maritime and Fisheries Fund
ERDF	European Regional Development Fund
EU	European Union
FAO	Food and Agriculture Organization (United Nations)
ERDF	European Regional Development Fund
GDP	Gross Domestic Product
GNR	Republican National Guard
ICCAT	International Commission for the Conservation of Atlantic Tuna
ICES	International Council for the Exploration of the Sea
INE	National Institute for Statistics
IPMA	Portuguese Institute for the Sea and the Atmosphere
IUU	Illegal, Unregulated or Unreported
MARE	Marine and Environmental Sciences Centre
MCS	Monitoring, control and surveillance
MPA	Marine Protected Areas
NGO	Non-governmental organisation
OR	Outermost Region

Term	Description
OSPAR	Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
SCRS	Standing Committee on Research and Statistics (International Commission for the Conservation of Atlantic Tuna)
SFPA	Sea Fisheries Protection Authority
SMEFF	Sustainable management of external fishing fleets
SPEA	Sociedade Portuguesa para o Estudo das Aves
SRAAC	Regional Secretariat for Environment, Natural Resources and Climate Change
SRMar	Regional Secretariat for Sea and Fisheries
STECF	Scientific, Technical and Economic Committee for Fisheries (EU)
TAC	Total Allowed catch
VMS	Vessel Monitoring System
WGDEEP	ICES Working Group on the Biology and Assessment of Deep-sea Fisheries Resources

List of Species

Common name	Scientific name
Albacore tuna	*Thunnus alalunga*
Amberjack	*Seriola spp.*
Atlantic blue marlin	*Makaira nigricans*
Atlantic bluefin tuna	*Thunnus thynnus*
Atlantic chub mackerel	*Scomber colias*
Atlantic mackerel	*Scomber scombrus*
Atlantic white marlin	*Kajikia albida*
Azorean limpet	*Patella aspera*
Barracuda	*Sphyraena spp.*
Barred hogfish	*Bodianus scrofa*
Bigeye tuna	*Thunnus obesus*
Black scabbardfish	*Aphanopus carbo*
Blacktail Comber	*Serranus atricauda*
Blue jack mackerel	*Trachurus picturatus*
Boarfish	*Capros aper*
Bogue	*Boops boops*
Common dentex	*Dentex dentex*
Common dolphinfish	*Coryphaena hippurus*
Common octopus	*Octopus vulgaris*
Curled picarel	*Centracanthus cirrus*
Deep-water red crab	*Chaceon affinis*
Deep-water shrimp	*Plesionika edwardsii*
Dusky Grouper	*Epinephelus guaza*
European Anchovy	*Engraulis encrasicolus*
European pilchard	*Sardina pilchardus*
Forkbeard	*Phycis phycis*
Intermediate scabbardfish	*Aphanopus intermedius*
Island grouper	*Mycteroperca fusca*
Kitefin shark	*Dalatias licha*
Leafscale gulper shark	*Centrophorus squamosus*
Limpet	*Patella spp.*
Longnose velvet dogfish	*Centroscymnus crepidater*
Longspine pipefish	*Macroramphosus scolopax*
Madeiran sardinella	*Sardinella maderensis*
Mediterranean monk seal	*Monachus monachus*

Common name	Scientific name
Mediterranean parrotfish	*Sparisoma cretense*
Northern prawns	*Plesionika spp.*
Pink dentex	*Dentex gibbosus*
Pompano dolphinfish	*Coryphaena equiselis*
Red porgy	*Pagrus pagrus*
Rough limpet	*Patella ulyssiponensis*
Salema porgy	*Sarpa salpa*
Seabream	*Family Sparidae*
Silverfish	*Trachinotus ovatus*
Skipjack tuna	*Katsuwonus pelamis*
Smooth lanternshark	*Etmopterus pusillus*
Sun limpet	*Patella candei*
Swordfish	*Xiphias gladius*
Topshell spp.	*Phorcus atratus selvagensis*
Topshells	*Phorcus sauciatus*
Wahoo	*Acanthocybium solandri*
White seabream	*Diplodus sargus*
Wreckfish	*Polyprion americanus*
Yellowfin tuna	*Thunnus albacares*

1 Introduction

The Madeira archipelago is one of the two autonomous regions of Portugal, consisting of four islands (Madeira, Porto Santo, Desertas and Selvagens). Only Madeira and Porto Santo are inhabited, with Madeira proper as the largest island. The archipelago is spread over 801.51 km^2 and is home to 254,254 inhabitants, accounting for ~2.5% of the Portuguese population. These islands are located to the northwest of Africa, and are relatively isolated by oceanic depths reaching 4000 m (Menezes, 2003). The Selvagens Islands, a small archipelago which includes two major islands, Selvagem Grande and Selvagem Pequena, each surrounded by a cluster of islets and reefs, is the scene of an enduring administrative conflict between Spain and Portugal, dating back to the fifteenth century. Although Spain has recognized the Portuguese sovereignty on the surface, the dispute now focuses on the waters surrounding the archipelago. For legal reasons, the delimitation of the Exclusive Economic Zones (EEZs) of both countries, and the consequent exploitation rights, depends on the classification of the islands as inhabited (as Portugal maintains) or uninhabited (Spain's position). To this day, the conflict remains irresolvable, despite various proposals being presented to the United Nations (EU, 2017).

The Autonomous Region of Madeira (ARM) is endowed with political and administrative statutes and self-governing bodies. The archipelago is located in the Atlantic Ocean, between 32°22.3'N, 16°16.5'W and 33°7.8'N, 17°16.65'W. It is 579 kilometres from the African coast, 861 kilometres from Lisbon, 370 kilometres from Gran Canaria, and 772 kilometres from Santa Maria, the nearest island of the archipelago of the Azores.

The geographical, physical and biological characteristics of the archipelago of Madeira are characterized by a narrow continental shelf, reduced continental slope, an abyssal plain with an average depth of around 4,000 metres, volcanic seafloor features and oligotrophic waters. Despite the extensive oceanic area, the oligotrophic waters predominantly restrict fishing activity to the EEZ area. The predominantly deep and low productive waters in addition to the narrow continental shelf limits available habitats for coastal and demersal species and therefore fishing methods. The main exploited species consist of deep-water fish and migratory pelagic fish, including tuna, black scabbardfish (*Aphanopus carbo* and *Aphanopus intermedius*) and, to a much lesser extent, blue jack mackerel (*Trachurus picturatus*). The fishery sector is predominantly artisanal. There is relatively little aquaculture in Madeira, but with a high potential, due to favourable climatic and environmental conditions. Fishing activity is a very old activity in the region, rooted in the island lifestyle, which includes fishing communities that depend directly on this activity, as is the case of Câmara de Lobos and Caniçal. The low rate of bycatch, the incidence of fishing on adult species as well as the reduced environmental impact due to the prohibition of trawling, determines its artisanal, selective and sustainable character.

To collect key information on data collection for fisheries advice, relevant stakeholders on local fisheries were consulted. These included representatives from Management and Control Authorities, RFMOs and Fishing Sector operating in the Madeira Islands. They were contacted/interviewed by email and phone due to COVID pandemic limitations. A total of 17 stakeholders were contacted and a specific designed questionnaire by sector was sent to each one. Collaboration and responses were difficult to obtain, some stakeholders said they were willing to collaborate but in the end didn't (e.g. Fishing companies). Others replied that they didn't have enough information about the subject (e.g. NGOs). A total of five stakeholders completed the questionnaires.

1.1 Geographic and economic characteristics

The islands of Madeira and Porto Santo have subtropical oceanic climates, while the Selvagem Islands have a desert climate. In 2019, the population of the Autonomous region of Madeira was 254 254 (53% are women), which was an increase of 0.12% compared with the previous year, the first year with an increasing trend in the island since 2010 (INE, 2020). The region is characterised by a relatively high population density (317.2 inhabitants/km^2 in 2019), which is almost three times higher than the national average. The population is concentrated on the two main islands, Madeira and Porto Santo (797 and 43 km^2 respectively), with the highest density in Funchal municipality (1.367 inhabitants/km^2) and the lowest in Port Moniz (28.3 inhabitants/km^2). The other four islands are uninhabited nature reserves. The total Gross Domestic Product (GDP) of Madeira region for 2019 was EUR 5 069 million, which is 13% higher than Azores and accounts for 2.4 % of the total Portuguese GDP (INE, 2020). The per capita GDP of the Madeira region for 2019 is EUR 24 266, which is 8.4% higher than in the Azores region (EUR 22 386) and 4% lower than in continental Portugal (EUR 25 299).

The regional economic activities are strongly based in the tertiary sector, which has grown over the years mostly due to tourism related activities. Tourism is the major source of revenue to the regional economy. Approximately 77% of the jobs within the Autonomous region of Madeira are in the tertiary sector. The secondary sector represents 14.3% of jobs in the region. The primary sector only account for 9% of total jobs, with the majority corresponding to agriculture related activities.

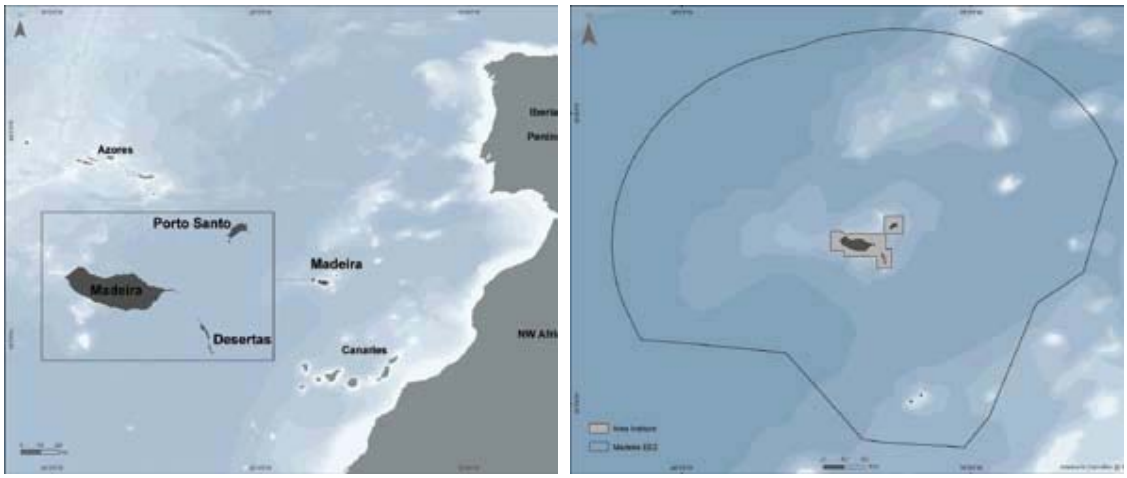

Figure 1: Map of the Autonomous region of Madeira in the context of the north-east Atlantic and the identification of its main islands (left panel) and map illustrating the OR exclusive economic zone (Madeira EEZ) (right panel).

Table 1: General geographic indicators.

Description	Unit	Source
Land area	801.51 km^2	INE, 2021
Population size	254 254	INE, 2020
Exclusive Economic Zone (EEZ) area	442 248 km^2	DGRM, site

In 2019 the number of licensed fishermen was 681, an increase of 8.4% when compared to 2018. All fishermen are licensed in polyvalent fisheries, the majority (460) work in the coastal polyvalent fisheries while the other work in the local polyvalent fisheries (MM, 2020). Fishing accounts for only 0.64% of employment and 0.71% of the Autonomous region of Madeira GDP. However, it is still of local importance in small towns, such as Câmara de Lobos and Caniçal.

1.2 Fisheries statistics

Fishing in the Autonomous region of Madeira is based on two main activities: fishing for tuna (including bigeye tuna, skipjack tuna, albacore tuna and Atlantic bluefin tuna) and fishing for black scabbardfish and intermediate scabbardfish. The most caught and valued medium to small pelagic species is the blue jack mackerel. Total catches landed in the fishing harbours of the Autonomous region of Madeira in the year of 2019 was 8,101 tonnes (Table 2), which is an increase of 6.3% compared to the previous year, and the highest value since 2005 (MM, 2020). The first sale value has also increased since 2019, up to 17.8 % while the total amount was EUR 22.5 million, the highest value ever. These results are mainly due to increases in landings of tunas (+9.6%) and black scabbardfish (+2.1%). Tunas were the most abundant species landed in 2019 (Figure 2) accounting for 5.1 thousand tonnes (64.0% of total landings). The second most landed species was the black scabbardfish, with a total landing value of 2.2 thousand tonnes (+2.1%).

Table 2: Total landing (tonnes) and value (EUR '000) by island and species group in 2019 (source: MM, 2020).

Species	Madeira Island (tonnes)	Madeira Island EUR'000	Porto Santo island (tonnes)	Porto Santo island EUR'000
Sea fish	8 020	22 126	4	7
Forkbeards; red hake; white hake	7	28	0	0
Megrim and flounder	0	0	0	0
Tuna and similar	5 128	13 118	3	5
Whiting	1	5	0	0
Axillary seabream	<0.5	<0.5	0	0
Common pandora	<0.5	<0.5	0	0
Blue jack mackerel	219	215	0	0
Chub mackerel	221	249	0	0
Wreckfish	1	14	0	0
Conger	2	4	0	0
Pargo breams	56	374	N/A	N/A
Black scabbardfish	2 247	7 451	0	0
Hakes	<0.5	<0.5	0	0
Skates	<0.5	<0.5	0	0
Red mullets	<0.5	1	0	0
Sardine	1	1	0	0

Species	Madeira Island (tonnes)	Madeira Island EUR'000	Porto Santo island (tonnes)	Porto Santo island EUR'000
Sargo breams	<0.5	2	0	0
Atlantic pomfret	1	1	0	0
Hounds	3	5	0	0
Bogue	1	1	0	0
Blackspot seabream	1	7	0	0
Salema	<0.5	<0.5	0	0
Groupers	5	39	-	-
Redfish	2	20	0	0
Alfonsinos	<0.5	3	0	0
John dory	<0.5	<0.5	0	0
Others	124	588	N/A	2
Crustaceans	<0.5	<0.5	0	0
Shrimps	<0.5	<0.5	0	0
Lobsters	<0.5	<0.5	0	0
Others	<0.5	<0.5	0	0
Molluscs	81	400	0	0
Common squids	1	3	0	0
Octopus	<0.5	1	0	0
Squids	1	5	0	0
Others	79	391	0	0
Total	**8 101**	**22 526**	**4**	**7**

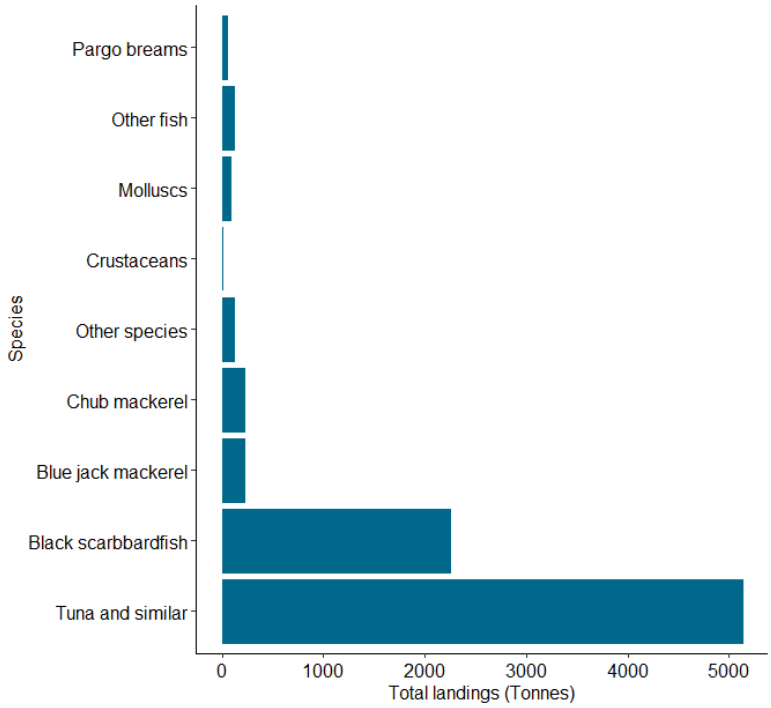

Figure 2: Total Landings (tonnes) in Madeira OR in 2019 (source: INE, 2021).

Total imports and exports (in euros) of fish and fishery products since 2011 are presented in Figure 3. In Portugal Mainland, the per capita supply is above the per capita supply of the world. While it seems to be slightly increasing worldwide, in Portugal it seems to be stable since it is already high (Figure 4). Figure 5 shows how this per capita supply of fish and fishery products is composed (by species group).

Within the Autonomous Region of Madeira the industries to fillet tuna and black scabbardfish are those that are currently of greatest economic importance. This industry employs approximately 140 people, with a EUR 25 million turnover, and production of 3 000 tonnes. This industry plays a major role in the marketing of the main species caught, while also offering higher and more stable incomes to boat owners and fishermen in the region. Tuna canning operations in Madeira ceased in 2004, so all tuna is transferred to the Azores or mainland Portugal for canning. Canned limpets are produced on a small scale. Black scabbardfish is filleted for the European market, but also for Venezuela and Angola. A large proportion of the activity is also dedicated to filleting frozen tuna from Spain, the precooked fillets being sent to Spain and, to a lesser extent, Portugal, for canning (EU, 2017).

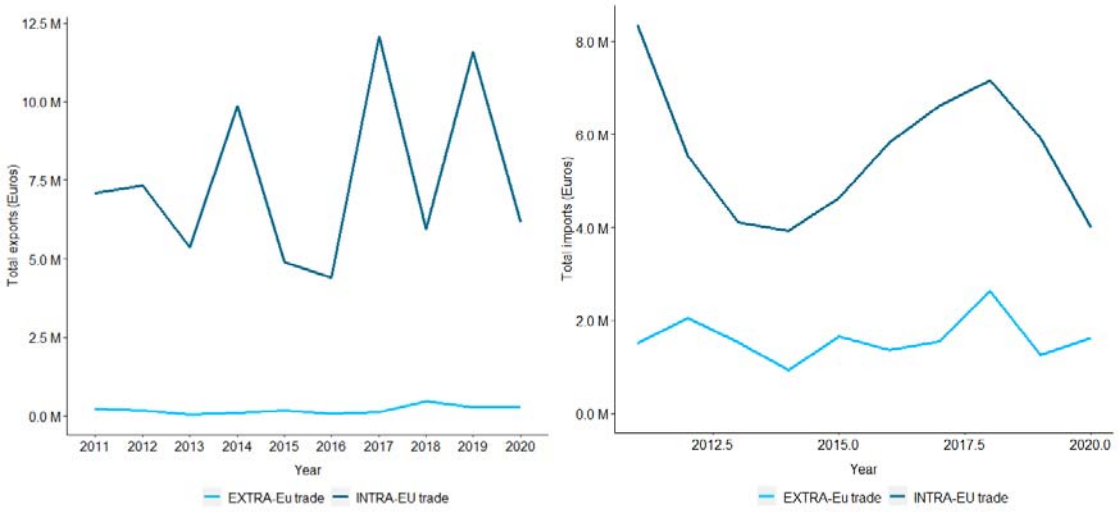

Figure 3: Total imports[2] (left panel) and exports[3] (right panel) of fish and fishery products (source: INE 2021). Definitive data from 2011 to 2019 and preliminary data 2020.

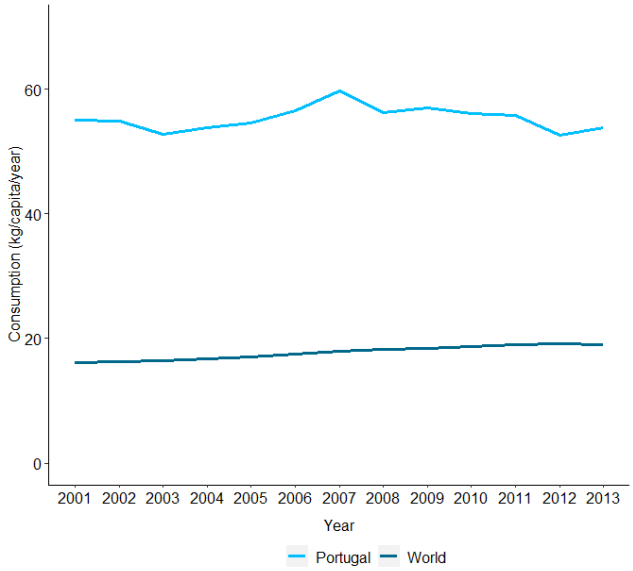

Figure 4: Per capita supply of fishing and fishery products for Portugal and World) (source: FAOSTAT).

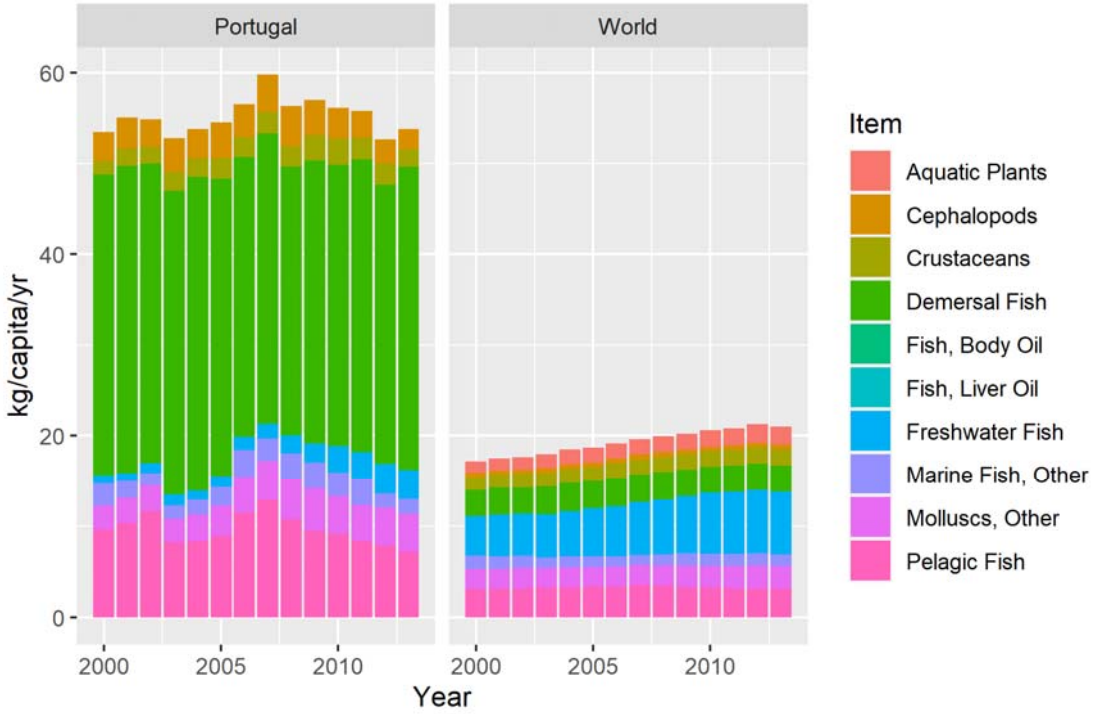

Figure 5: Composition of per capita fish supply for Portugal and the World (source: FAOSTAT).

1.3 Regional fisheries management

Fisheries are currently managed under the European Union (EU) Common Fisheries Policy (CFP). Most of the Madeira EEZ is located within the Food and Agriculture Organization (FAO) Statistical Area 34, with the exception of a small northernmost part, which lies within Area 27 (Figure 1). There are different Regional Fishery Bodies, as well as intergovernmental entities that also mediate fisheries in the area: the International Committee for Conservation of Atlantic Tuna (ICCAT) and the Fisheries Committee for the Central East Atlantic (CECAF).

For the black scabbardfish, the geographical areas where the fishing fleet operates are the CECAF areas 34.1.2 and 34.2.0. The large pelagic species stocks are evaluated within ICCAT, and comply with the stocks and areas defined by this organization. Other resources, with regional importance are all considered within the CECAF area 34.1.2. Locally explored species are included in this group such as the medium and small pelagics and limpets.

2 Fish stocks and other marine organisms and associated fishing activities

2.1 Commercial fish stocks

A number of different species are commercially important in Madeira OR: large pelagics, small pelagics, demersal fish species and several species of molluscs. The most landed species are tunas and black scabbardfish. The majority of landings are fished by lines and hooks followed by the purse seine fishery and hand collecting of molluscs. Table 3 shows the most important species (in value) in the period of 2008-2018.

Table 3: Species that constitute 95% of total Madeira landings in value ranking for the period 2008-2018 (source: MM, 2020).

Common name	Scientific name	FAO code	Ranking in value
Black scabberfish	*Aphanopus carbo*	BSF	1
Bigeye tuna	*Thunnus obesus*	BET	2
Skipkack tuna	*Katsuwonus pelamis*	SKJ	3
Limpets	*Patella aspera* and *Patella candei*	LPZ	4
Blue jack mackerel	*Trachurus picturatus*	JAA	5
Albacore	*Thunnus alalunga*	ALB	6
Atlantic chub mackerel	*Scomber colias*	MAS	7

According to Campos et al. (2018), many vessels based on Madeira archipelago also develop a substantial part of their activity at the fishing grounds of the Madeira-Tore complex. These fleets comprise vessels operating drifting longlines and pole and line bait boats fishing around the Lion and Seine seamounts, targeting respectively the black scabbardfish and several tuna species. The Madeira registered fleet is also present in a smaller scale around Lion and Unicorn seamounts, also targeting the black scabbardfish. In the last decade, the latter fishery has expanded into the Great Meteor area (Delgado, personal communication 2020). Despite the relative proximity of these seamounts to the landing ports, these vessels carry out fishing trips with average duration of two weeks.

2.1.1 Small pelagic

Blue jack mackerel and Atlantic chub mackerel are the main species fished by 3 purse seiners (18-24 m) within 1-2 nautical miles (nm) from the Madeira OR coast (MM, 2020). These purse seiners also catch European pilchard and Madeiran sardinella in much smaller quantities.

2.1.2 Large pelagic

In the Madeira Islands the most important large pelagic species are caught within the pole and line fleet using live bait. Baitfish is normally captured by the tuna vessels themselves using small purse seines or lift nets, and consist of small pelagic fishes such as blue jack mackerels. However, there are no consistent and readily available baitfish catch data for the Madeiran pole and line fleet (Shon et al., 2015). The predominantly tuna species caught are bigeye tuna and skipjack tuna, but in certain years there is also a considerable amount of catches of albacore tuna (MM, 2020). The fishery is highly seasonal and restricted to the period when the tuna migrate through the region. Lastly, one large pelagic

species for which there is interest in assessing the status of the stock and its metier is the swordfish.

2.1.3 Demersal/ Deep-sea

The deep sea fishery targeting the black scabbardfish (80% of the catch) and intermediate scabbardfish (20% of the catch) off the Madeira archipelago is one of the main fishing activities in Madeira OR (Delgado et al., 2018). Drifting deep-water longline is utilised within the archipelago, and is very specialized with a small amount of bycatch and discards (Morato et al., 2012; Delgado et al., 2018; MM, 2020). The fishery is mostly developed inside the Madeira EEZ, included in the CECAF area, all year round. Sporadically, fishing sets are also set outside the Madeira EEZ by larger vessels (vessels with superior autonomy).

There is a group of fishing vessels that direct their fishing activity to a wide diversity of species, locally designated as 'peixe-fino'. Among the various fish landed are demersal species such as bogue, red porgy, forkbeard, wreckfish, blacktail comber, white seabream, and barracuda. Some of the species are endemic to Macaronesia and are classified by the IUCN as vulnerable, e.g. barred hogfish and island grouper. This fleet constitute one unique segment, using handlines and anchored bottom longlines to catch species. Despite the fact that these demersal fish species constitute a very small proportion (in weight) of total commercial landings, they contribute a significant economic value to the archipelago. This fishery operates year round, mostly by small vessels (<10 m) in the insular shelf (Shon et al., 2015, Morato et al., 2012). Importantly, the most commercially relevant species within this fishing activity (common dentex, pink dentex) do not have biological sampling. Other fish species mentioned caught by this fishery, for which no biological data is collated are the amberjack species and parrotfish.

2.1.4 Molluscs

Consumption of coastal invertebrates is part of the local cultural heritage and has an important social aspect. Among the molluscs, both the Azorean limpet and sun limpet are hand collected in the intertidal zone with the use of equipment named 'lapeira', while both species are also caught using free-diving both as recreational and professional activity (MM, 2020). The fleet segment targeting gastropods (limpets, but also topshells) includes a small number of units (6 to 9) with small dimensions (<10m) that show a degree of variability in the numbers of days fishing (379 days in 2014, 970 in 2015, and 481 days in 2018). Small quantities of squid and octopus are also caught within the Madeira OR, which are significant due to their high price (MM, 2020).

Limpets and topshells have an important economic value within the Madeira OR, being subject to high levels of exploitation and representing one of the most profitable economic activities in small-scale fisheries (Sousa, 2019). Currently, these species are exploited near their maximum sustainable yield (MSY), and monitoring and enforcement should be accomplished to avoid future overexploitation (Sousa, 2019). As a consequence of the monitoring and evaluation of both exploited limpet species, several management measures were implemented as conservation measures and have prompted a positive effect. Nowadays there is a seasonal ban on collecting limpets in the OR between December and March (Sousa, 2019; MM, 2020). In comparison, the harvesting of topshells is not regulated and with the current level of exploitation there have been changes in the size structure, abundance and reproductive potential of the exploited populations (Sousa, 2019). Conservation measures such as catch limits, minimum landing size and seasonal ban are expected to be introduced in the near future.

2.1.5 Crustacean

Among the crustaceans, there is a small catch volume of northern prawns. From the questionnaires there was an expression of interest in developing a fishery targeting crustaceans, namely the Madeiran deep-water shrimp and the deep-water red crab.

According to Pajuelo et al. (2018), the shrimp species of the *Plesionika* genus have been recently fished with highly selective semi-floating shrimp traps operating between 100 and 500 m depth in the Madeira islands. The development of this fishery has not been monitored and information on its impact on target and non-target species (in particular sharks) has not been available. Atlantic chub mackerel is used as bait in the traps. In their study, it was found that catches are dominated by pandalid shrimps (99.5%), mainly target species *P. edwardsii (*75.8%), followed by the fish family Congridae (0.1%). This fishery seems to be highly selective for a low number of target species of pandalid shrimps with bycatch (in numbers) accounting for 0.5% of catches. Such bycatch includes a very small bycatch of smooth lantern shark and longnose velvet dogfish. Other species are not landed due to the small size of individuals or low numbers of individuals caught (self-consumption).

2.2 Fleet structure

The fleet consists of approximately 90 active boats, the majority being < 10 m in length (Table 4). The use of several gears is allowed, which correspond to approximately 450 licences for different gears, the majority being for lines and hooks (Table 5). There is a reduction in number of vessels but the number of licenses has increased.

Table 4: Number of vessels (No.) and number of fishing days (Days) per fishing gear and vessel size in the period of 2012-2018 (source: MM, 2020).

Fishing gear		Segment	2012		2013		2014		2015		2016		2017		2018	
			No.	Days	No.	Days	No.	Days	No.	Days	No.	Days	No.	Days	No.	Days
Lines and hooks	LLD	<10 m	5	273	4	272	8	677	8	666	6	559	7	702	8	557
		12< m <18	15	2 339	15	2 332	15	2 549	15	2 571	14	2 374	14	2 423	13	2,149
	LLS	<10 m	34	1 321	35	998	25	1 189	38	1 438	31	1 324	25	1 680	35	2,194
	LHP	<10 m	19	811	15	671	17	738	5	258	19	1 284	18	1 118	10	816
		12< m <18	5	542	4	394	4	278	4	314	4	568	5	445	5	621
		24< m <40	7	843	7	744	7	637	8	589	9	807	7	799	7	898
Purse seine	PS	18< m <24	3	702	3	558	3	476	3	539	3	576	3	472	3	530
Hand collecting	HC	<10 m	7	795	6	582	6	379	9	970	6	569	8	698	6	481
Total			**95**	**7 626**	**89**	**6 551**	**85**	**6 923**	**90**	**7 345**	**92**	**8 061**	**87**	**8 337**	**87**	**8 246**

Table 5: Number of fishing licenses issued by type of gear (2019) (source: MM, 2020).

Gear	No. of licenses
Lines and Hooks	376
Traps	24
Purse seines	31
Others	22
Total	**453**

Within Madeira fishing capacity has remained stable across the last few years, and this may be associated with a number of reasons. The purse seine fleet has been reduced from 5 to 3 vessels for management reasons (i.e. to reduce capacity) and has now been stable for several years. For other fleets there is likely a lack of fishing opportunities and increasing difficulty in attracting new fishers into the fishery.

2.2.1 Domestic fisheries

There are several métiers identified in the Madeira Islands:

LLD DWS 0 0 0 The métier that comprises the very specialized Madeira fishery of the black scabbardfish, exclusively performed with drifting longlines usually set well above the bottom, between 800 – 1 300 m in depth. The fishing gear used in this way does not contact the sea floor, causing no damage to its ecosystems (Delgado et al., 2018). Catches of this metier are strongly based on the targeted species of black scabbardfish, comprising 85–98% of total catch. The fishery operates year round, occurring predominantly inside the Madeira EEZ and adjacent international waters, but also under a fishing agreement in waters north of the Canary Islands (CECAF area 34.1.2). Sporadically fishing sets are made in the vicinity of the Madeira EEZ by the larger vessels (vessels with superior autonomy). Fishing vessels within this metier are of relatively small dimensions, with the majority between 12 and 18 m in length (68%), while the remaining are < 10 m. In general, between 4,000 and 5,000 hooks are used per boat per day of fishing, remaining in the water for between 10 and 12 hours. As fishing trips vary between 4 and 8 days, this results in between 3 and 6 days of fishing occurring concurrently (EU, 2017).

LHP_LPF 0 0 0 This metier comprises the Madeira fishery of large pelagic fishes, encompassing mostly bigeye tuna and skipjack tuna. Albacore tuna is also fished in variable amounts, while other species such as bluefin tuna and yellowfin tuna are poorly represented in the region (Gouveia et al., 2017). The fishery is undertaken by vessels using pole and line with live bait and is mostly developed inside the Madeira EEZ, included in the CECAF 34.1.2. area. This fishery operates seasonally, mostly during the second and third quarters of the year. The fishing grounds are off the south coast of Madeira, the Desertas Islands and Porto Santo. However, the Madeira fleet may travel to the Azores, the Savage Islands or the Seine Bank (EU, 2017).

LHM LPF 0 0 0 This métier comprises a small number of vessels, under 10 m, using hand lines, mostly during the tuna season (second and third quarter of the year), fishing several species of tuna in the coastal zone of Madeira and Porto Santo.

PS SPF 16 0 0 This metier comprises the fishery of small coastal pelagic fishes operating mainly off the south coast of Madeira Island. Landings of this fishery are mostly composed

of blue jack mackerel, Atlantic chub mackerel, and small amounts of sardine (Tejerina et al., 2019). Bycatch species are the bogue, the curled picarel, the Madeiran sardinella, the longspine snipefish, and the boarfish. This assemblage of small pelagic fishes is colloquially known in the region as 'ruama,', and traditionally constitutes an inexpensive food resource for local populations. Therefore, these species are of economic importance in the local fisheries sector, but are also used as live bait for the tuna fishery and, to a lesser extent, the black scabbardfish fishery when squid is not available (Tejerina et al., 2019). This fishery uses purse seine with light attraction. Nets have a legal mesh size of 16 mm. This metier, from 2009 onwards has comprised of 3 vessels (all 18 - 24 m length) operating year round. An adjustment of the fishing effort to the resources available was made in 2010 (SRARN/DRP 2010); prior to this there were five active fishing vessels in this segment. These three licensed boats use nets with a maximum length of 255 m, a height of 80 m and a mesh size of 18 mm. The boats had an average crew of 11 fishers, aged between 30 and 68 years old. Daily trips are made with an average duration of 10.47 hours (Tejerina et al., 2019). From the species caught by this métier only blue jack mackerel has a TAC and landing obligation.

LLS FIF 0 0 0 This metier comprises a multi-specific fishery, developed with bottom longlines, targeting a large number of demersal species with high commercial value (peixe-fino). This fishery is operated year round, predominantly using small vessels (10 m in length) in the insular shelf. Small quantities are caught but, with significant economic value (see Table 2 for an aggregated value of the catch).

LHM FIF 0 0 0 This métier comprises a large number of small vessels, under 10 m, using hand lines, all year round, fishing demersal fish species in the insular shelf.

MISC MOL 0 0 0 This artisanal harvesting is the principal occupation of a low number of small vessels (<10 m), with low tonnage and capacity, in coastal areas (predominantly on the north coast of Madeira and around the Desertas Islands). Species are caught in the intertidal zone by free divers with hand devices (lapeiras), specifically targeting two species of limpets (*P. aspera*, *P. candei*). There is specific local regulation of this fishery, with capture of specimens under 40 mm is not allowed. In addition, there is a daily limit to the catches of each vessel and a closure between 1st December to 28th February. Management actions resulted in a decrease of 50% of the vessels operating in the harvesting of limpets and corresponding slight recovery in stocks. The economic impact of limpets has gradually increased, representing (in 2017) 96% of the economic value landed for molluscs and 2% of the total landings in this region. Topshells are also exploited by this métier, with *P. sauciatus* the only species exploited in Madeira, Porto Santo, and Desertas. The topshell (*P. atratus selvagensis)* is no longer commercially exploited since its distribution is restricted to the MPA of the Selvagens where harvesting is not allowed (Sousa et al., 2019).

2.2.1.1 Industrial fishery

No industrial fishing activity conducted by foreign and Portuguese vessels takes place in the waters of Madeira.

2.2.1.2 Sports/recreational fishery

Recreational fishing in Madeira is a leisure activity and contributes to the non-commercial portion of the small-scale marine fisheries performed by both locals and tourists. This activity is subject to mandatory licensing (provided by Direcção Regional das Pescas - DRP) and comprises three modalities: shore angling, boat fishing (e.g. big game fishing)

and spearfishing (Table 6). The legal framework for targeting marine, plant and animal species, for recreational purposes within in ocean waters, maritime inland waters or non-maritime inland waters, which is under the jurisdiction of the maritime authority, is defined in Decreto-Lei No. 246/2000, of 29 September and was amended by Decreto-Lei 112/2005 of 8 July e o Decreto-Lei 56/2007 of 13 March.

Spearfishing in the Autonomous Region of Madeira is regulated by the Decreto Legislativo Regional no. 11/95/M, of 21 June, defining the need to obtain a licence. In addition, an authorisation needs to be issued by the maritime authority, while technical advice is provided by the Institute for Forests and Nature Conservation (Instituto de Florestas e Conservação da Natureza) if it concerns classified areas under its jurisdiction. Other types of recreational fishing in marine waters of the Autonomous Region of Madeira are regulated by the Decreto Legislativo Regional no. 19/2016/M, of 20 April. The Portaria n.º 484/2016 de 14 de Novembro defines the allowed gears, the constraints and the licensing terms for the exercise of recreational fishing, in marine waters of the ARM. In the Autonomous Region of Madeira, the Secretaria Regional de Mar e Pescas (SRMar - Regional Secretariat of the Sea and Fisheries) - Regional Directorate of Fisheries (DRP) was only empowered to issue licenses 2016 onwards (MM, 2020).

Specific policies to control possible negative effects of spearfishing have been in place in Madeira since 1995 (Regional Legislative Decree 11/95/M of 21 June 1995), but previous national legislation specific to this activity already existed in Portugal since 1963 (Decree 45116 of 6 July 1963). A specific regulation for recreational fishing in the region was introduced at the end of 2016 (Decree 484/2016) and from that moment the Regional Fisheries Directorate replaced the Marine Captaincy as the competent authority to issue licenses. Some of the most relevant points were the requirement of license acquisition (even for those who already have a license issued in mainland Portugal) and the ban of using of artificial respiration. Additional measures to conserve marine ecosystems were also implemented, such as minimum conservation reference sizes, banning of the capture of vulnerable species, limitations on the number of daily catches (the bag limit is of 10 specimens per fisher per day, and no more than five of the same species), and prohibition of the practise of spearfishing in MPAs. In addition, considering that some spearfishers complement their catches by harvesting invertebrates, limits to the capture of these were also included in this legislation (Martínez-Escauriaza et al., 2020).

The number of licenses issued for spearfishing has decreased since the most recent regulations (Decree 484/2016) came into effect (Martínez-Escauriaza et al., 2020a). Licenses are issued mainly in the summer months (July and August), are requested by residents and tourists, but it has been estimated that at least 5.1% of people who practise spearfishing do so without a license (Martínez-Escauriaza et al., 2020a). In their study, Martínez-Escauriaza et al. (2020a) found that spearfishers go fishing all year round (70%), reaching an average of 70 fishing days per year. The average time of a fishing event is of 3.9 hours. People who practise spearfishing also employ other recreational fishing methods (shore angling or boat angling). They estimated that the total annual catch obtained by spearfishing in 2017 was of 517.7 tonne. In their analysis of catch composition they found 52 different taxa (40 fishes, 12 invertebrates). Species caught by spearfishing are mainly teleost fishes, but in many cases the catch is complemented with invertebrates. In fact, it is interesting to note that limpets and octopuses are among the species most often caught by these fishers. Parrotfish was the most frequently caught species, followed by limpets (*Patella* spp.). The next most caught species were the white seabream and the common

octopus. Some other frequent catches are amberjacks and blacktail comber. Fish caught are mainly for personal and family consumption, but some spearfishers admit to occasionally selling the catch. This practice goes outside the definition of recreational fishery, but is widely recognized as common practice in spearfishing (Ramdeen et al., 2013).

Table 6: Number of recreational fishing licenses issued by type of activity in the year of 2017 (Source: MM, 2020).

Activity	No. of licenses
Shore angling	5,212
Boat fishing	861
Spearfishing	2,092
Total	**8,165**

Recreational fishermen in Madeira are mostly male, they fish all year round, with the main fishing season being the summer (from July to September), which can be explained by the more favourable weather conditions and the preferential holiday season in the Region. This activity is associated with other leisure activities that take place in the same period, generally not far from the place of residence (MM, 2020).

According to Martínez-Escauriaza et al., (2020b) shore angling is practised throughout the year (with an increase in summer), mostly at weekends and during day time. The majority of anglers are unemployed (60%), have low incomes, and spend on average EUR254 per person per year on this activity, adding up to a total of EUR1.16 million per year. Surface and bottom fishing are the most popular methods. Artificial baits are used by anglers, mainly if they practice spinning or for targeting squid. However, natural baits are popular, including portions of small animals such as polychaetes, molluscs (mostly squid or snails), decapods or small fishes, such as sardine and blue jack mackerel. Many anglers also use previously caught bait (e.g. snails, crabs or small fishes) or bread. In their study, Martínez-Escauriaza et al (2020b) estimated an average number of fishing days per year per fisher of 65.1 ± 62.0 and an average catch per unit of effort of 0.35 ± 0.26 kg/angler/hour. The estimated total annual catch was 520.7 tonnes. Martínez-Escauriaza et al (2020b) identified forty-three teleost species, 2 elasmobranchs and 6 invertebrates in the catches, and recommended that the impact on the most captured species, such as the white seabream and the parrotfish should be analysed, because high fishing pressure could affect populations and ecosystems. Martínez-Escauriaza et al (2020b) state that all fishers used the catches for consumption, with approximately half releasing only small fish and fish without gastronomic value. In their study, a small group of anglers (3.5%) admitted to selling their catches without declaring it.

The big game fishing fleet has increased in the last decade, possibly due to the increase in tourism. A pilot study conducted under the 2017-2019 EU-MAP and the extension to 2020-2021 registered 31 vessels, which represents an increase of 106 % compared with the number of vessels registered in 2003. Blue marlin is the targeted and most frequently captured species, although other large pelagic fishes, such as the Atlantic white marlin are also caught. Bycatch species include wahoo, dolphinfish and various tuna species (bigeye tuna, albacore, and skipjack). It was estimated that an average weight of blue marlin of 295.5 kg is caught. In general, anglers follow the catch and release technique. It is

believed that the use of this technique and the limited number of other species captured limit the impact that this type of fishing can have on these resources. The economic impact of the big game fishing activity in Madeira is estimated around EUR 2 million per year, an amount that should be considered when analyzing the impact of this activity in the regional GDP and its importance to the tourism sector.

2.2.2 Foreign fisheries

Vessels from the ARM catch the black scabbardfish in the waters of Canaries under a bilateral agreement. The exchange of fishing opportunities is established on a defined list of vessels never exceeding a simultaneous operation of a maximum of 10 vessels for each of the Parties.

Campos et al. (2018) report that vessel tracks from AIS-Sat (AIS-satellite data) evidence the presence of fishing vessels belonging to other EU fleets, as well as foreign vessels, operating near the seamounts in Madeira-Tore.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

In general, fishing gears that operated in Madeira are very selective and discards are considered almost null. For example, the black scabbardfish fishery is described as a highly selective fishery with almost exclusively bycatch of deep-sea sharks, mainly the species Leafscale gulper shark.

However, the amount of discards of the Madeiran purse-seine fleet has not been quantified accurately and it is necessary to characterise its species composition. Furthermore, some of the fishes are subject to slipping (i.e. the release of unwanted catches from purse seines, while the catch is still in the water). This procedure can lead to variable survival rates of the released fish. A fisheries observation programme was carried out between 2016-2017 to characterise the purse-seine fishery for small pelagic fishes in the Madeira EEZ, and to quantify the composition of the catches, landings, dead discards and slipping in this fishery, in order to provide essential information for the assessment of these resources. Reasons for discarding include fishes with a body size below the minimum landing size (Atlantic chub mackerel and to a less extent blue jack mackerel), competition between vessels, and the small economic value achieved at first sale (i.e. for sardine). The fact that only blue jack mackerel has a total allowed catch (TAC) and landing obligation may constitute one of the reasons for the higher percentage of rejection of other species (Tejerina et al., 2019).

In the recent study of Vasconcelos et al. (2018) a decreasing trend in length composition of blue jack mackerel; was detected, which indicates that the stock might be overexploited. In addition, a high proportion of Atlantic chub mackerel and sardine is being discarded at sea (Tejerina *et al.,* 2019). Hence it is possible that the exploitation pattern of these species might not be sustainable at current levels and suggests a need for the introduction of specific measures to promote more effective utilisation of the resources from the purse seine fishery (Tejerina *et al.,* 2019). Measures that could improve the sustainability of the small-pelagic fishery include the implementation of a closed season during the spawning period of blue jack mackerel. This also applies to Atlantic chub mackerel, which also spawns in the first trimester of the year (Vasconcelos *et al.* 2012).

2.3.2 Endangered, threatened and protected species

Fishers from the fishers association COOPESCAMADEIRA are concerned with the current European Commission fishing ban on deep-sea shark fishing. In particular, the kitefin shark continues to be a bycatch product of the black scabbard fishing. The kitefin shark is important to the regional economy, and nowadays they cannot sell it and have to throw it overboard. They feel they are losing a resource that served as a complement to about 200 families but also that this way data on this species is lost.

In general, accidental catches of marine birds and mammals is not identified as a major concern in the Macaronesia area (e.g. Freitas et al., 2013). However, this may be a consequence of the lack of on-board observation programmes.

Monitoring of all fishing activities is necessary (e.g. fisheries observation programmes) to determine if accidental catches of marine birds and mammals are a threat to the populations found in the Madeira OR. The same applies to endangered species of reptiles such as marine turtles.

2.4 Summary of fisheries

Following the description of resource and fleet structure above, it's important to create a link between each. The main species captured in the Madeira Islands by métier and fishing gear group is presented in Table 7.

Table 7: Description of fisheries in Madeira OR.

Pole and line (LHP_LPF)	**Drifting longliners** (LLD_DWS)	**Artisanal handline** (LHM_LPF)	**Artisanal handline** (LHM_FIF)	**Artisanal bottom longline** (LLS_FIF)	**Artisanal hand harvesting** (MISC_MOL)	**Purse seiners** (PS_SPF)
Domestic commercial fisheries						
Thunnus obesus, Katsuwonus pelamis, Thunnus alalunga Vessels 12 < m < 18; 24 < m < 40;	*Aphanopus carbo, Aphanopus intermedius* Vessels < 10 m, 12 < m < 18	*Thunnus obesus, Katsuwonus pelamis, Thunnus alalunga* Vessels < 10 m	*Boops boops, Pagrus pagrus, Phycis phycis, Polyprion americanus, Serranus atricauda, Pagellus atricauda, Sphyraena sp. and Diplodus sp., Bodianus scrofa, Mycteroperca fusca* Vessels < 10 m	*Boops boops, Pagrus pagrus, Phycis phycis, Polyprion americanus, Serranus atricauda, Pagellus atricauda, Sphyraena sp. and Diplodus sp., Bodianus scrofa, Mycteroperca fusca.* Vessels < 10 m	*Patella aspera, Patella candei, Phorcus sauciatus* Vessels < 10 m	*Trachurus picturatus, Scomber colias, Sardina pilchardus; Boops boops, Centracanthus cirrus, Sardinella maderensis, Macroramphosus scolopax, Capros aper.* Vessels between 18 < m < 24
Domestic sport / recreational fisheries						
Big game fishing	*Makaira nigricans, Kajikia albida , Acanthocybium solandri, Coryphaena hippurus and C. equiselis, Thunnus obesus, Thunnus alalunga, Katsuwonus pelamis.*					
Shore fishing	43 teleost species, 2 elasmobranchs and 6 invertebrates. *Diplodus sargus, Sparisoma cretense, Salpa salpa, Pagrus pagrus, Boops boops, Chelon spp., Trachinotus ovatus, several Sparidae, etc.*					
Spearfishing	52 different taxa (40 fishes and 12 invertebrates) mainly teleost fishes but in many cases the catch is complemented with invertebrates. *Sparisoma cretense, Patella spp., Diplodus sargus, Octopus vulgaris, amberjacks (Seriola spp.), Serranus atricauda*					
International fisheries (Drifting longliners)						
Vessel type 1	*Aphanopus carbo, Aphanopus intermedius*					

3 Institutional structures

3.1 Data collection

The National body responsible for the implementation and coordination of DCF work plan is Direcção-Geral dos Recursos Naturais, Segurança e Serviços Marítimos (DGRM) (Figure 6). Several entities participate in the DCF work plan and in Madeira the entity that has the responsibility to implement the DCF in the area is Direção Regional do Mar (DRM). DRM is a Directorate within Secretaria Regional de Mar e Pescas (SRMar). DRM is also responsible for data collection and analysis. The main responsibility of this institution is to provide scientific advice for the management of the fisheries sector. The existing infrastructure is adequate, although the number of staff (researchers and technicians) is considered to be below what is desired. The structure of the DRM ensures that activities are implemented on time, that data is provided to the national coordinator, biological data is collected for on stocks landed in Madeira OR.

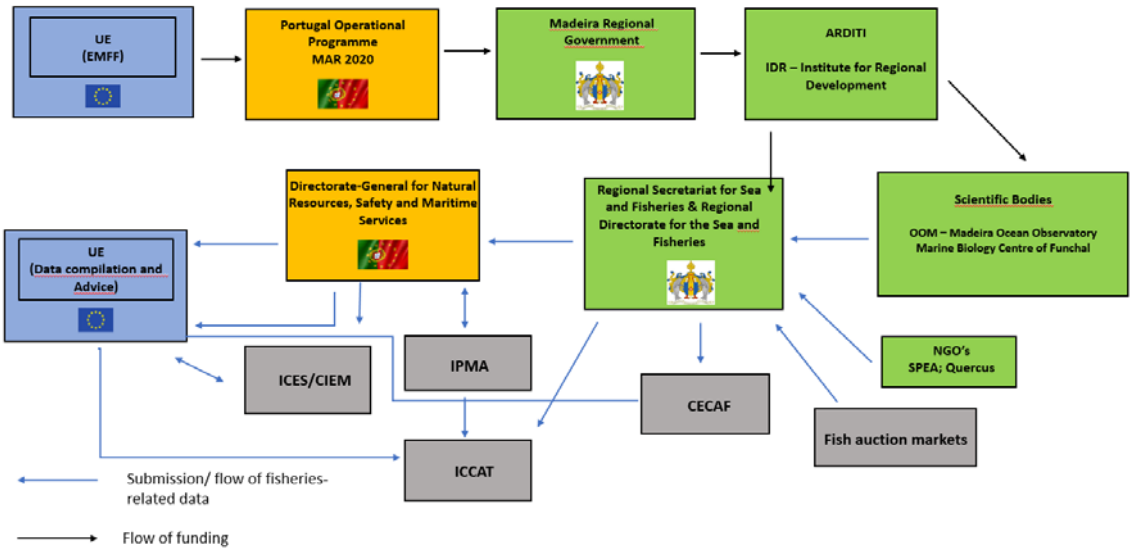

Figure 6: Institutional structures within Madeira

In previous years the responsibility for the implementation of DCF was attributed to the Direcção Regional das Pescas (DRP). Nowadays DRP is responsible for control and surveillance of the fisheries in this OR. The DRP/DSDAMP is responsible for the licensing of recreational and commercial fishing, licensing of fish auctions and the fish processing industry, as well as the evaluation of projects in the scope of the modernization of the professional fishing fleet of the Madeira OR. They are also responsible for fishing support infrastructure, and also for support in the installation, expansion and modernization of fish farms.

The DRP/DSIC has the mission, together with other entities, to ensure that fishing activities in the waters of the ARM are in accordance with the rules of the CFP. To this end, it has a body of qualified fisheries inspectors and financing from EMFF projects under the priority axis 3 - Support for control and inspection relating to the CFP (see Section 4).

Regarding landings in all national ports, there are cross-checks by the DRP/DSIC of all the information from VMS, logbooks and sales notes in order to filter wrong data (e.g. trip

duration, location of fishing operation), complying with the cross-checks foreseen under the control legislation. The cross-check between landed species (name and weight) and the ones declared in the logbooks is performed on a daily base as outlined in the National Annual Report (DGRM, 2019). DRP undertake all inspection and control services, provide information collected by the satellite VMS as well as the fishing activity registration data to the DRM services responsible for data processing and stock assessment.

Institute for Forests and Nature Conservation is responsible for the management of marine protected areas. Limitations within this organisation are a lack of personnel, infrastructure and funding.

All vessels landing fresh fish are obliged to sell on first sale. Therefore, data regarding all vessels landing, including small scale fisheries, are collected. The sources of information on landings of fresh or refrigerated fish in Madeira ports is the undertaken by the Regional Directorate (DRM). DRM electronically registers all the data from first sale, and then sends the information to the national administration, according to the rules laid out in the Control Regulation. Regarding fish processed on board, the sources for landing data are logbooks and landing declarations. Landings' live weight by species is computed using processed-live weight conversion factors (DGRM, 2019).

Monthly length sampling of fish landed from a subset of the Madeiran active vessels which operate in CECAF 34.1.2. and CECAF 34.2.0., (i.e. within species) are made. The subset is composed of several fleet segments selected based on species landings. The list of vessels for each fleet segment is updated annually based on a combination of gear licenses and the main species landed in the previous year. Stock-specific biological analysis (i.e. reproduction, growth etc) for limited species is also completed.

The sampling design to survey landings on active vessels is stratified, with 'trip' (i.e. number of trips) as the Primary Sampling Unit (PSU). The Madeiran fleet is further stratified by fleet segment/métier and month. Annual sampling effort is fixed by the DCF National Sampling Plan that sets the number of trips expected to be sampled in each fleet (≈ métier). Data is archived within the DRM local excel database that contains general trip information (vessel information, date, location, landed weight by species), along with sample information by species, namely weight, number of specimens and length composition. Lastly, since the fishing fleet is small within the Madeira OR, economic and social data (e.g. data on gender, age) collection is done by census and data is archived in specific databases.

Data collected under the DCF within Madeira OR are available to relevant stakeholders and scientific institutions upon request. For example, every two months COOPESCAMADEIRA, within the scope of the controls carried out by DGRM, requests from the DRP the production data of the species with the highest commercial volume, namely bigeye tuna, black scabbardfish, albacore, skipjack mackerel and horse mackerel.

There are no common platforms in terms of data sharing between institutions. In detail, there are no common databases, or any databases accessible from outside specific institutions. Even within the same institution relevant databases may not be accessible to everyone. Developing a common platform to hold all data would allow for better coordination, fund and data management.

3.2 Scientific advice

DRM is the most relevant body for the provision of data and scientific advice in Madeira. Data and scientific advice form the basis for management decisions in the OR fisheries resources at Portugal and at the EU level. There are two main international fisheries bodies for which the provision of scientific data and advice are essential and mandatory under the national data program: ICCAT for tuna and tuna-like species and CECAF for small pelagic and demersal species. SCRS in ICCAT assessments constitute the scientific basis for the allocation of TACs and quotas that are annually allocated to the fisheries that capture tunas in the area. The black scabbardfish is currently being assessed by STECF which advises the TAC for the CECAF area. However, available information is also dealt with by the ICES Working Group on the Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP). WGDEEP does not assess fisheries in Madeira (Eastern Central Atlantic area, CECAF); the incorporation of CECAF data to the Northeast Atlantic could provide a global perception of the dynamics of the stock.

In the context of the scientific process of ICCAT and CECAF, national scientists participate regularly in relevant assessment working groups, and in the scientific committees of both bodies. Data on Madeira's fisheries is also relevant for the work of STECF, in particular for working groups meetings related to the DCF and ORs.

3.3 Research institutions

With regard to the development of maritime space research, the creation of the Madeira Ocean Observatory (OOM) in 2014, made it possible to aggregate all the bodies and institutions that carry out research activities in the marine area. The OOM operation is co-financed by the Operational Program of the Autonomous Region of Madeira (Madeira 14-20), under the Portugal 2020 strategy, through the European Regional Development Fund and the EU's Cohesion Policy.

The following entities are involved in marine scientific research in the region: ARDITI - Regional Agency for Research and Technology Development and Innovation; CIIMAR; Funchal Marine Biology Station; MARE - Center for Marine and Environmental Sciences; Madeira Whale Museum; Funchal Natural History Museum and SPEA - Portuguese Society for the Study of Birds

Scientific research is carried out using mainly European projects or under the implementation of particular activities. In most cases, it is carried out in partnership with other national or European entities, with special emphasis on partnerships with the Canary archipelago.

Beyond the official channels of data collection, other entities such as universities collect data for marine and fisheries research. These are not part of regular sampling programs, with the main mandate for such data collection being the needs of research projects. This type of data collection is usually not structured by the nature of the fisheries and does not predominantly result in management measures. Outputs are presented in the form of scientific articles, thesis (master, PhD, etc.) or project reports. Those responsible for data collection in the OR can access these data, consider it easily available and a potential opportunity to enhance understanding of the fisheries within Madeira OR. Local authorities have little dependence on additional data collection but consider it credible and useful information.

3.4 Monitoring, control and surveillance

The DRP oversee maritime activities using VMS, inspections on vessels and landings with the collaboration of the GNR (Portuguese National Guard) and maritime police. A new system is expected to be in place (SIVCC) under the responsibility of the GNR to improve and reinforce monitoring of the regional coast, and deal with issues related to recreational and professional fishing and marine pollution.

Control is the responsibility of the Inspection and Control Service (DSIC) of the DRP. DRP/DSIC is responsible for the issuing of notices and the instruction of processes for infractions of the legal norms for the exercise of fishing activities. Then it proposes to DRM/DGRM fines and other penalties as applicable under the legislation in force in each case.

4 Funding and funding structures for data collection

The European Maritime and Fisheries Fund (EMFF) and the EU's Cohesion Policy funds (ERDF), managed by the regional authorities, are the key instruments to ensure the continuity of financial resources in the Madeira OR. On the Cohesion Fund, the Azores and Madeira are the only two outermost regions belonging to a Member State eligible for Cohesion Fund support.

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member State funding

Two national programmes, MARE (2007-2013) and more recently the PROMAR (2014-2020) have been made under the European Maritime and Fisheries Fund (EMFF). The current operational programme aims at achieving key national development priorities along the support for the reform of the EU's Common Fisheries Policy and the implementation of the EU's Integrated Maritime Policy in Portugal. The programme main objectives include enhancing the competitiveness and viability of the fisheries and aquaculture business in Portugal, strengthening technological development, innovation and transfer of knowledge to fishery and aquaculture businesses, and improving the common markets organisation. The programme addresses the following EMFF priorities:

- Priority 1 - promoting environmentally sustainable, resource–efficient, innovative, competitive and knowledge–based fisheries
- Priority 2 - fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture
- Priority 3 - fostering the implementation of the CFP
- Priority 4 - increasing employment and territorial cohesion (CLLD)
- Priority 5 - fostering marketing and processing (compensation plans are included in this priority), this priority includes CPAC
- Priority 6 - fostering the implementation of the integrated maritime policy (IMP)
- "Priority 7" - technical assistance to reinforce implementation and ensure efficient administration of the EU funding

The Portuguese programme funding for each of the EMFF priorities is: Union Priority 1 (UP1): EUR 103.6 million (26.4% of the total EMFF allocation); Union Priority 2 (UP2): EUR 59.0 million (15.0% of the EMFF allocation); Union Priority 3 (UP3): EUR 55.5 million (14.1% of the EMFF allocation); Union Priority 4 (UP4): EUR 35.0 million (8.9% of the EMFF allocation); Union Priority 5 (UP5): EUR 111.2 million (28.3% of the EMFF allocation); Union Priority 6 (UP6): EUR 5.3 million (1.4% of the EMFF allocation) and EUR 22.8 million (5.8% of the EMFF allocation) allocated to technical assistance.

The total budget is EUR 507 807 536 with a total EU contribution of EUR 392 485 464 and the Member state contribution is EUR 115 322 072.

4.1.2 OR funding

Two application programs (MARE and PROMAR) have been made under the EMFF. Their purpose is to collect and process catch and biological data, undertake biological sampling, and collect socioeconomic data collection in order to improve fisheries data collection and management. The level of EMFF commitment reaches 86%, the most significant measures are related to port investments, protection and restoration of marine biodiversity and compensation of additional costs for fishery and aquaculture products.

The difficulties faced in Madeira regarding EMFF implementation is linked to the management of the EMFF, the low administrative capacity in Madeira (as most of potential beneficiaries are small businesses) and the lack of adaptation of EMFF measures to the local context (EU, 2019).

There are several institutions involved in the management of EMMF funding in Portugal mainland and Madeira (which leads to a high administrative burden). The managing, certifying, paying and audit authorities are national-based and the regional local application, quality control, administrative validation of investments and measures using EMMF funding is performed by regional intermediate bodies. Table 8 depicts the national and Madeira OR institution involved in the EMMF funding management.

Table 8: List of organisations involved in the EMMF management in Portugal and Madeira OR. (source: adapted from EU, 2019 following an order from the Minister of the Sea (08/11/2019). As of August 2021, 86% of this amount has been committed, amounting to EUR 23 004 million. Under Priority 3 - Fostering the Implementation of the Common Fisheries Policy, namely through Measure 2 - Data Collection in the Framework of the Common Fisheries Policy EUR 597 764 were allocated to Madeira, of which 95% has already been committed (EUR 565 153).

Table 9: Overview of the state of play of EMMF implementation in Portuguese ORs (Madeira and Azores) per EMMF priority (EUR '000) (source: EU, 2019).

Priority	Art. of Reg. EU nº508/2014	EMFF budget for AZO[74]	EMFF budget for MAD	Total EMFF budget for OR	% of EMFF OR / EMFF PT	N° oper--ations committed	EMFF support committed	EMFF eligible paid	Commitment rate	Payment rate
P1	38	6 090	1 550	7 640	32%	12	144	30	2%	0%
	31	200	50	250	13%	0	0	0	0%	0%
	29	1 430	60	1 490	11%	0	0	0	0%	0%
	40	2 160	750	2 910	15%	2	698	489	24%	17%
	43	19 198	3 862	23 060	77%	12	12 162	1 571	53%	7%
	50	100	10	110	11%	0	0	0	0%	0%
	33	800	400	1 200	15%	0	0	0	0%	0%
	30	400	50	450	45%	0	0	0	0%	0%
	34	480	360	840	14%	0	0	0	0%	0%
	TOTAL P1	**30 858**	**7 092**	**37 950**	**37%**	**26**	**13 005**	**2 090**	**34%**	**6%**
P2	47 48 49	1 860	1 900	3 760	8%	10	2 373	414	63%	11%
	51	80	50	130	3%	0	0	0	0%	0%
	53	70	38	108	3%	0	0	0	0%	0%
	55	10	0	10	1%	0	0	0	0%	0%
	56	10	0	10	1%	0	0	0	0%	0%
	57	300	200	500	17%	0	0	0	0%	0%
	50	100	10	110	11%	0	0	0	0%	0%
	TOTAL P2	**2 430**	**2 197**	**4 627**	**8%**	**10**	**2 373**	**414**	**51%**	**9%**
P3	76	/	0	0	0%	3	2 222	1 922	/	/
	77	3 361	1 920	5 281	22%	4	1 400	704	27%	13%
	TOTAL P3	**3 361**	**1 920**	**5 281**	**10%**	**7**	**3 621**	**2 626**	**69%**	**50%**
P4	62	42	0	42	12%	0	0	0	0%	0%
	62	/	0	0	0%	0	0	0	/	/
	63	638	0	638	2%	0	0	0	0%	0%
	64	20	0	20	10%	0	0	0	0%	0%
	TOTAL P4	**700**	**0**	**700**	**2%**	**0**	**0**	**0**	**0%**	**0%**
P5	66	250	150	400	4%	0	0	0	0%	0%
	68.b	1 190	100	1 290	18%	3	140	0	11%	0%
	69	4 600	1 500	6 100	13%	3	672	0	11%	0%
	70	30 657	14 481	45 138	100%	1505	27 908	21 974	62%	49%
	67	62	523	585	19%	0	0	0	0%	0%
	TOTAL P5	**36 758**	**16 754**	**53 513**	**48%**	**1 511**	**28 720**	**21 974**	**54%**	**41%**
P6	76	/	0	0	/	0	0	0	/	/
	77	/	0	0	/	0	0	0	/	/
	TOTAL P6	**/**	**0**	**0**	/	0	0	0	**/**	**/**
P7 (AT)	78	1 409	300	1 709	7%	1	67	0	4%	0%
	TOTAL P7	**1 409**	**300**	**1 709**	**7%**	**1**	**67**	**0**	**4%**	**0%**
TOTAL		**75 516**	**28 264**	**103 779**	**26%**	**1 555**	**47 786**	**27 104**	**46%**	**26%**
TOTAL without CPAC		**44 859**	**13 783**	**58 642**	**17%**	**50**	**19 878**	**5 130**	**34%**	**9%**

4.2 Other sources of funding

Table 10 depicts projects within the scope of the community funds (outside EMFF) with application to marine fisheries data/science for the period between 2007 and 2015.

Madeira also received funding through PROMAR (Portugal's programme for the EFF 2007-2013), PIC MAC 2007-2013 and PIC MAC 2014-2020 (cooperation programme INTERREG between Portugal and Spain - Madeira-Azores-Canaries - MAC) for ERDF). For example, ARDITI, a recently-established private non-profit agency that has as founding shareholders the Regional Government and University of Madeira, as well as a number of companies based in the region with particular interest in RTD activities, is co-funded by ERDF.

Various European support programs (e.g. LIFE and INTERREG) that encourage the development of scientific projects have contributed to funding within Madeira (as well as the Azores and Canaries but also extending its area of intervention to third countries such as Cape Verde, Mauritania and Senegal). This type of program not only allows these

regions to be seen as a whole, but also allows for the exchange of ideas and above all the development of partnerships between the various entities and research organizations in Macaronesia.

Institute for Forests and Nature Conservation has applied for funding to the Blue Fund (EUR 150 000 application approved, but no financial allocation) and to Life4 Best (EUR 40 000). Funding was requested for the collection of information on coastal habitats, which can provide information to assist coastal fisheries management.

4.3 OR funding for data collection

The next table shows the main projects funded by the EMFF, the ERDF and other funding sources (Table 11).

Table 10: Projects (2007-2015) with application to marine fisheries data/science. Funding institution, total project budget and contribution from national/regional funding (EUR) (Source: IP - RAM)

Programme	Year	Name of project	Institution	Total ERDF (EUR mil.)	Total budget (EUR)	National/regional budget (EUR)
INTERVIR + (QREN)	2011	Pélagos	Secretaria Regional do Ambiente e Recursos Naturais (SRA) - Centro de Maricultura da Calheta	320.5	77 216	65 633
	2014	Cluster do Mar	ACIF-CCIM		109 105	92 739
MADEIRA 14-20	2015	Observatório Oceânico da Madeira - OOM	ARDITI	274	2 316 410	1 968 948
INTERREG-MAC 2007-2013	2009	MACSIMAR	APRAM - Administração dos Portos da Região Autónoma da Madeira SA	12.5	26 743	22 731
		MARES	Madeira Tecnopolo		82 756	70 342
		BANGEN	Câmara Municipal do Funchal (CMF) / Museu Municipal do Funchal (História Natural) (MMF) / Estação de Biologia Marinha do Funchal (EBMF)		18 362	15 607
			Universidade da Madeira		33 646	28 599
			Secretaria Regional do Ambiente e Recursos Naturais (SRA) / Direção Regional de Pescas (DRP) / Direção de Serviços de Investigação das Pescas (DSIP)		11 255	9 567
		GESMAR	Camara municipal de Funchal (CMF)/Museu Municipal de Funchal (História Natural) (MMF)/Estación de Biologia Marina de Funchal (EBMF)		64 898	55 163
			Universidade da Madeira		65 335	55 535

Programme	Year	Name of project	Institution	Total ERDF (EUR mil.)	Total budget (EUR)	National/regional budget (EUR)
		MARPROF	Câmara Municipal do Funchal / Museu Municipal do Funchal / Estação de Biologia Marinha do Funchal		53 190	45 212
			Secretaria Regional do Ambiente e Recursos Naturais / Direção Regional de Pescas / Direção de Serviços de Investigação das Pescas		90 903	77 268
		LITOMAC	Secretaria Regional do Ambiente e dos Recursos Naturais		93 460	79 441
	2010	MARPROF-CV	Secretaria Regional do Ambiente e Recursos Naturais / Direção Regional de Pescas / Direção de Serviços de Investigação das Pescas		34 022	28 919
			Câmara Municipal do Funchal / Museu Municipal do Funchal / Estação de Biologia Marinha do Funchal		20 465	17 395
	2013	ALGABIOMAC	Associação Investigação Científica do Atlântico		93 430	79 415
		BIOVAL	Câmara Municipal do Funchal / Museu Municipal do Funchal / Estação de Biologia Marinha do Funchal		26 255	22 137
			Universidade da Madeira		23 000	19 550

Table 11: Some projects funded by EMFF ERDF (Interreg's MAC program) and other funding sources.

Project title	Objective	Funding source	Value (EUR)	Beneficiary	Years
MACAROFOOD MAC / 2.3d / 015	To create a public-private partnership that develops synergies between marine and social sciences and gastronomy promoting tourism and local marine product. This strategy will improve the competitiveness of SMEs favouring internationalization and innovation in the value chain.	Interreg's MAC program	624 801	ULPGC and others	2014-2020
MARIS-COMAC MAC / 2.3d / 096	Development of technical conditions and scientific bases for the sustainable exploitation of fishing resources in the coastal and deep waters of Madeira, Canary Islands and Cape Verde and their commercialization and transfer of knowledge and technology to the fishing industry.	Interreg's MAC program	465 604	Municipality Chamber of Funchal and others	2014-2020
MARPROF-CV MAC / 3 / C124	MARPROF-CV continue to explore new perspectives in the field of sustainable development and the appreciation of Cape Verde's deep sea resources,	Interreg's MAC program	671 842	Canaries Government and others	2007-2013
ORFISH MARE/2015/06	Objectives: developing and optimizing fishing techniques to alleviate fishing pressure on coastal fish resources; raising awareness of the opportunities to develop innovative low-impact fishing techniques for small-scale fisheries; and creating sustainable fishing opportunities that will help employment in the fishing industry.	EU	750 000	Government of Guadalupe and others in PT, SP and FR	2017-2018
ABACO	To evaluate the ecological indicators of the Macaronesia coastal area. Cape Verdean technicians will be trained by EU scientists allowing to achieve project's objectives. Regions covered: Azores, Madeira, Canaries, and Cape Verde (cooperation). In the EU'S	EU-Interreg	318 616 (IEO)	IEO, ITC, and others	2019-2021

Project title	Objective	Funding source	Value (EUR)	Beneficiary	Years
	ORs, some actions will be carried out on specific islands, while others involve monitoring activity.				
BIOMETORE	Acquire physical, chemical and biological data, in selected areas from the submarine mounts from the complexes Great Meteor and Madeira-Tore with the goal to acquire knowledge about the biodiversity, the species from the pelagic and benthonic ecosystems, and also about the human pressures in these areas.	Finance Mechanism of the European Economic Space 2009-2014 from EEA Grants	2 652 131	IPMA and others	2015-2016

5 Current state of data collection and other reporting obligations

The current sampling obligations under the DCF are:

- At-market sampling (ICCAT, CECAF Divisions 34.1.2 and CECAF 34.2.0) to obtain length distributions of fish landed at auctions by Madeiran vessels operating in CECAF 34.1.2. and CECAF 34.2.0 Divisions of all métiers.
- At-sea sampling (ICCAT, CECAF Divisions 34.1.2 and 34.2.0).

Currently, and for the past 5 years, the on-board observer program has not been operational and for various administrative reasons has not been implemented (DCF annual report 2019). The systematic failure to implement an on-board observer program has been a recurrent source of deviations from some objectives of the Madeira OR in the framework of the DCF. Despite efforts made by the DRM over the last few years, this has been largely limited by the lack of local companies that are truly aimed to provide this type of service, with limited access to scientific observers trained to do this type of work. Recently it was announced that the program "OBSERVA-PESC" (on-board observers program) would move forward in 2021 for the fishing fleet that operates in the Autonomous Region of Madeira (Portal do Mar).

Research surveys at sea are not carried out in Madeira, the main reason being that there is no research vessel in this region. In the last decade the only research survey carried out was within the BIOMETORE project. The main goal of this project was to collect information on the northeast Atlantic seamounts, which included the Madeira-Tore seamount chain (in 2016). The general objective of the project was to increase the scientific knowledge on the biodiversity and oceanographic characteristics of these regions. The project was funded by EEA-Grants.

There is no SMEFF and SFPA data collection in the Madeira OR.

At-marketing sampling is undertaken by DRP staff. Such sampling encompasses collecting data on the length and weight of fish specimens landed daily at the auction, information on capture areas and fishing effort per trip (provided by fishing logbooks) and is then integrated in the National Programme for Fisheries Data Collection for tuna and black scabbardfish.

Gaps in data requirements for Madeira are in oceanography, topography and mapping of habitats and abundance of marine species (fishery independent data), including species that are exploited by fisheries. The EU-MAP from 2022[1] list of DCF species will not change current data collection processes within Madeira OR; the competent authorities don't see the need to include additional species or data collection needs in the national work plan.

[1] The EU multiannual programme for data collection establishes the data requirements to be collected, the list of mandatory surveys in each sea basin and the thresholds to collect data. In line with the DCF Regulation, it is composed of two legal acts: Commission Delegated Decision (EU) 2021/1167 of 27 April 2021 establishing the multiannual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors from 2022 C/2021/2797 (OJ L 253, 16.7.2021, p. 51–90) and Commission Implementing Decision (EU) 2021/1168 of 27 April 2021 establishing the list of mandatory research surveys at sea and thresholds as part of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors from 2022 C/2021/2801 (OJ L 253, 16.7.2021, p. 92–99).

The DRP/DSIC follows and validates catch certificates under Council Regulation (EC) 1005/2008[2], which aims to control IUU activity. Until August 2021, there are no records of this activity in Madeira waters or that IUU fishing products have entered the market in Madeira.

6 Fisheries management and conservation measures

6.1 Management and conservation measures

6.1.1 National

Some of the management and conservation measures implemented within Madeira OR have already been discussed within Section 2. The management objectives applicable in the Madeira OR are mostly aimed at regulating fishing effort and ensuring the application of quotas. Such quotas in the case of large migratory species are predominantly defined by the ICCAT, while those for black scabbardfish are defined by the EU (e.g. Council Regulation (EU) 2021/91[3] of 28 January 2021). The tuna fisheries and black scabbardfish fisheries are managed by setting TAC's and quotas as well as fishing effort limitations and minimum landing sizes. Resource management/conservation measures are applied according to advice on the state of exploitation of resources resulting from stock assessments (ICCAT) or advice from regional management studies.

The remaining landings of regional importance are evaluated by regular catch assessments. Included in this group are stocks exploited by the local fleet, namely small pelagics (mainly blue jack mackerel and Atlantic chub mackerel) and limpets (*Patella aspera* and *Patella candei*). In development is also a numerical evaluation and proposed management measures for topshells (Sousa et al., 2018).

European regulations, by defining rules for fleet effort (number of vessels), minimum catch sizes, prohibiting the use of certain gears or banning certain species, promote sustainable management of demersal and pelagic species in Madeira waters. However, in some cases, these EU regulations have been adapted for the region through regional legislative decrees, which, following the norms imposed by the EU, adapt the management of the activity to regional specificities, namely at the environmental and socio-economic levels. For example, in the Madeiran regional pelagic fishery, there is *a de minimis* exemption for certain cases detailed in Commission Delegated Regulation No. 1394/2014[4] of 20 October 2014 which establishes a discard plan for certain pelagic fisheries in the southwestern waters. In 2017, this exemption comprised 4% of the catches of horse mackerel caught in the Madeira area. There is also a 'survivability exemption' in the regulation which states that catches within the artisanal purse-seine fisheries of anchovy, horse mackerel and blue jack mackerel, and mackerel must be released.

It should be noted that there are a large number of demersal fish species that are not assessed and regulated. Although these species are of high economic value, they represent a small fraction (in total weight) within the commercial fishing of Madeira.

[2] Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999
(OJ L 286, 29.10.2008, p. 1–32).
[3] Council Regulation (EU) 2021/91 of 28 January 2021 fixing, for the years 2021 and 2022, the fishing opportunities for Union fishing vessels for certain deep-sea fish stocks (OJ L 31, 29.1.2021, p. 20–30).
[4] Commission Delegated Regulation (EU) No 1394/2014 of 20 October 2014 establishing a discard plan for certain pelagic fisheries in south-western waters (OJ L 370, 30.12.2014, p. 31–34).

Unlike other OR (e.g. Azores) and following personal enquiries there is no public available list of management measures at a regional level.

6.1.2 International

Management of large migratory pelagic species is carried out by ICCAT, with stocks and respective assessment areas defined by this organization. In the case of populations with a wide distribution (where the distribution of the species cuts across several countries or regions) ICCAT indicates that these should be considered in each region for which they occur, i.e. the result of the stock assessment is attributed to all relevant countries and/or regions. For example, in 2020 the EU received, in addition to the allocated quota of 19 360 tonnes, an extra allocation of 100 tonnes exclusively for artisanal vessels within Greece (Ionian Islands, 4.5 tonnes), Spain (Canary Islands, 87.3 tonnes) and Portugal (Azores and Madeira, together 8.2 tonnes).

There is a bilateral agreement (Decree-Law No. 8/2013) between Madeira and Canaries regional governments which establishes an equal exchange of fishing opportunities in the island waters for vessels (based in ports of Madeira and the Canary Islands) fishing for pole-and-line tuna and black scabbardfish. The exchange of fishing opportunities is established on a defined list of vessels never exceeding a simultaneous operation of a maximum of 10 vessels for each of the Parties.

In the case of black scabbardfish, the geographical area of operation of the Madeira swordfish fleet is the FAO European waters of the Eastern Central Atlantic: CECAF areas 34.1.2 and 34.2.0. CECAF is an advisory body providing science-based advice but management recommendations are not legally binding. However, the EU is responsible for determining the TAC for the Madeira CECAF area. In 2018, the Council decided that the TAC for black scabbardfish in area 34.1.2 was to be determined by Portugal, as long as it was consistent with the principles and rules of the CFP, in particular the principle of sustainable exploitation of the stock (Council Regulation (EU) 2021/91 of 28 January 2021).

For demersal and small pelagic stocks, CECAF does not establish management and conservation measures in regional waters. Fisheries regional data is provided by the National State Administration to CECAF on the pelagic Atlantic chub mackerel, horse mackerel, demersal parrotfish and limpet species.

6.1.3 Marine Protected Areas

Madeira contributes to the marine protection of Macaronesia, by having six marine protected areas, where all types of fishing, even live bait fishing, are prohibited:

- Ilhas Desertas Nature Reserve - These islands constitute the last refuge of the monk seal and the presence of these mammals led the Regional Government to create the protected area in 1990. There is a total ban of spearfishing in this reserve and no boats are allowed to sail through the southern part of the reserve.
- Garajau Parcial Nature Reserve - Created in 1986, it is a marine park that includes a strip running from the high tide line and into the sea to a depth of 50 m. Amongst the fauna of this park are larger fish such as the dusky grouper and also a variety of other coastal species. Any fishing activity is forbidden inside the park. Navigation is also highly controlled. Only small boats are allowed to approach the beaches.

- Ponta of S. Lourenço Nature Reserve - Set up in 1982. It has a particular fauna and flora, practicality confined to this area.
- Rocha do Navio Nature Reserve - Created in 1997. There is open access by boat, but underwater fishing and the use of fishing nets are forbidden. Exclusively marine, this Reserve is integrated in the Natura 2000 Network.
- Porto Santo Network of Protected Marine Areas - Comprises the areas of the six islets around the island of Porto Santo which all are a Special Conservation Area, part of the Natura 2000 network.
- Ilhas Selvagens Nature Reserve – located at 250km south of Madeira archipelago include two groups of small islands and was created in 1971 and is one of the oldest in Portugal. Because of the favourable nesting conditions for seabirds, these islands are also known as bird sanctuaries. Any fishing activity is forbidden and navigation is highly restricted.

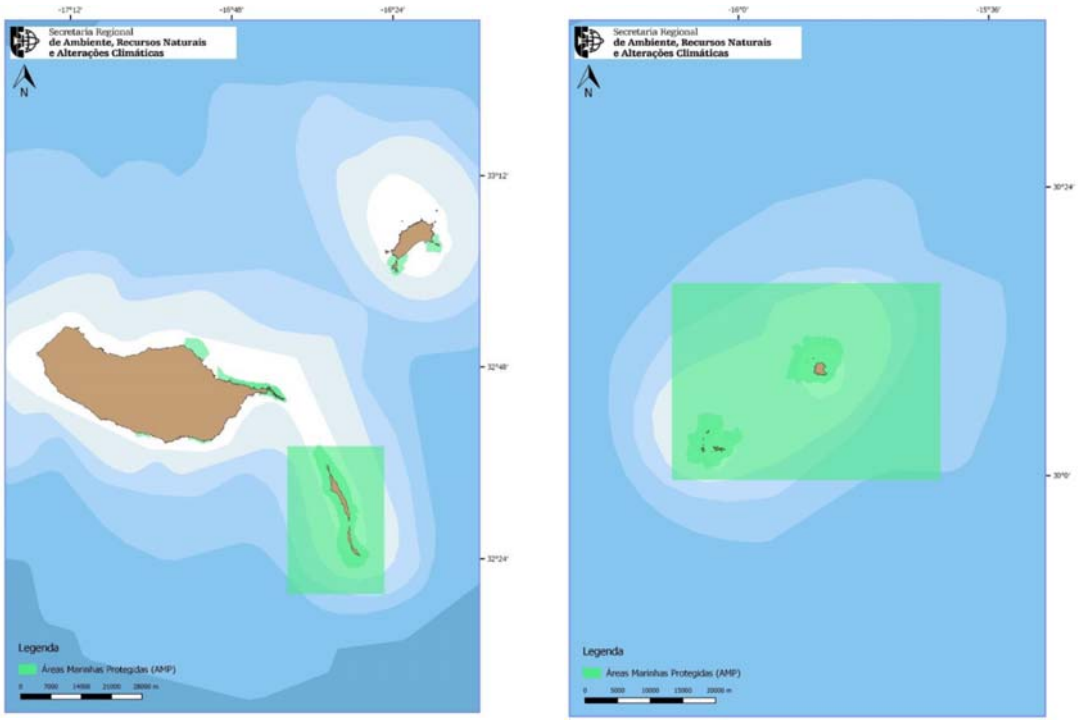

Figure 7: Green areas depict the MPAs around the Madeira archipelago (left panel) and the Ilhas Selvagens Nature Reserve (right panel) (Adapted from MM, 2020).

Madeira also has classified areas under the Natura 2000 network, both under the Habitat Directive (11 Special Areas of Conservations and 8 Sites of Community Importance) and under the Birds Directive (5 Special Protection Areas).

6.2 Background to scientific advice and data requirements

6.2.1 National

There are several scientific studies that form the basis for local regional management measures and are candidates for newly proposed data collection requirements under the DCF:

- The definition of a closed season for the purse seine fleet that catches mainly blue jack mackerel and Atlantic chub mackerel in the first quarter of the year (Vasconcelos *et al* 2018).
- Assessment of the regional population structure of the blue jack mackerel (Vasconcelos, 2017).
- The definition of a closed season for the black scabbardfish fishery (Delgado *et al* 2018).
- A fisheries observation programme carried out from October 2016 to December 2017 to quantify discards and slipping in the purse seine fleet, which is the basis for the de *minimis* exemption mentioned in section 6.1.1 and also the need for the introduction of specific regional measures to promote more effective utilisation of the pelagic resources by the purse seiners (Tejerina *et al*., 2019);
- First approach to implement stock evaluation of Atlantic chub mackerel (Vasconcelos *et al.*, 2012).
- The scientific approach and further knowledge that forms the basis for defining future minimum landing sizes on the main mollusc species in the region (Sousa *et al.* 2017; Henriques *et al* 2011; Sousa *et al* 2019)
- Topshell harvest is not regulated with the exception of harvest ban on MPAs. First evaluation for the *P. sauciatus* and urgent conservation measures to be applied, such as a landing obligations and first sale at auction, the establishment of a minimum catch size, the establishment of a maximum catch of 2 kg per day for non-commercial use and 20 kg per day for commercial use and a closed season (February–May), are warranted to preserve stocks of this species in the medium to long term (Sousa *et al.* 2018; Sousa *et al* 2019).
- Several reports (published by the Regional Directorate of Fisheries) show the need to protect a range of stocks, introducing seasonal bans to protect the reproduction, additional minimum landing sizes (Regional Directorate of Fisheries – Madeira).
- Implementation of a pilot study for monitoring the discards of the commercial fishing fleet of Madeira OR. (Technical Report. Funchal, Madeira: DRP & SRARN/DRP. Plano de ajustamento de esforço de pesca de pequenos pelágicos na Região Autónoma da Madeira. Funchal, Madeira: Secretaria Regional do Ambiente e dos Recursos Naturais/Direcção Regional das Pescas (SRARD/DRP)).
- Collaboration with spearfishers to collect information on their fishing trips is recommended. The use of record sheets, logbooks, or mobile applications, which are being used in other regions with interesting results could provide a valuable source of information. Evaluate annual catches of this activity to assess the impact on coastal species. Spearfishing should be taken into account in fisheries management, and adequate monitoring of this activity should be carried out in order to assess the evolution of exploited marine resources over time. Martínez-Escauriaza *et al* 2020).

Table 12 shows the main species in the OR that have data collection through the DCF and/or regional studies identified above and if the information is used for any type of

assessment or numerical evaluation of the species. It also has indication of the management area, RFMO area and ICCAT stock name.

6.2.2 International

ICES WGDEEP does not assess the black scabbard fisheries in Madeira. Nonetheless, it is understood that the incorporation of CECAF data could provide a global perception of the whole dynamics of the stock. Regional relative stock indices (length-based indicators) for the CECAF Madeira waters are estimated in this Working Group (personal communication, 2020)

The collection of biological data in Madeira OR follows the DCF sampling at market and at-sea (see section 5) but additional data/species are proposed for some species following the studies identified in the previous section, namely for topshells.

Table 12: Species scientific name, information available through the DCF (marked X), management area, RFMO/stock area, indication if the information is/was used for local regional evaluation (marked X) and from which institution this is applied.

Species	Data collection	Management Unit	RFMO area/stock	Regional evaluation (study index)	Management bodies
Black scabbardfish	X	Northeast Atlantic	CECAF 34.1.2.	X (iii)	Regional Government (catch limit)
Blue jack mackerel	X	Madeira waters	CECAF 34.1.2.	X (i, ii)	EU(catch limit)
Atlantic chub mackerel	X	Madeira waters	CECAF 34.1.2.	X (iv,v)	
Yellowfin tuna	X	Atlantic	ICCAT - YFT		ICCAT(catch limit)
Bigeye tuna	X	Atlantic	ICCAT - BET		ICCAT(catch limit)
Atlantic bluefin tuna	X	Northeast Atlantic and Mediterranean	ICCAT - BFT-E		ICCAT(catch limit)
Albacore tuna	X	North Atlantic (>5ºN)	ICCAT - ALB-N		ICCAT(catch limit)
Skipjack tuna	X	Atlantic	ICCAT - SKJ		ICCAT(catch limit)
Rough limpet	X	Madeira waters	CECAF 34.1.2.	X (vi)	
Sun limpet	X	Madeira waters	CECAF 34.1.2.	X (vi)	
Topshells	X (proposed)	Madeira waters	CECAF 34.1.2.	X (vii)	

7 Shortcomings or obstacles to fisheries management

Category	Shortcoming or obstacle	Description and evidence
Stocks	The majority of stock boundaries and/or stock connectivity are unknown in the region.	Large migratory species occur in the area; Black scabbard fish connectivity with other Macaronesia is unknown.
	Gaps in oceanography, topography and mapping of habitats.	BIOMETORE was an opportunity to collect data in this area but is the only case in recent years.
	Gaps in knowledge of resource status and awareness may lead to overfishing.	Even though several management measures (e.g. closed areas, TACs, and minimum landing sizes) have been implemented, indications of depletion or over-exploitation of some demersal fish populations highlight that the scientific and manage.
	Need for the introduction of specific measures in the purse seine fleet.	Results from a project specific fisheries observation programme (2016-2017) suggest a need for the introduction of specific measures in the purse seine fleet to promote more effective utilisation of the resources. Following DRM (pers. comm.), this fishery already presents some indicators that show the need to protect the respective stocks, one of the proposed measure is to introduce a seasonal ban to protect reproduction.
	ICCAT stock evaluation can be improved.	ICCAT stock evaluation seems sufficient for the main five tuna stocks BFT, BET, YFT, ALB and SKJ tunas. It can be improved with abundance indexes but, alike other scientific bodies such as ICES, these indexes are less available due to the strong dependency of tuna data on fisheries dependent data.
	Many of the species that sustain OR fisheries are not subject to comprehensive data. collection under regular programs.	What characterise fisheries in the Outermost Regions is the predominance of local fisheries of artisanal, subsistence or recreational nature. Many of the species that

Category	Shortcoming or obstacle	Description and evidence
		sustain those fisheries, e.g. small neritic tunas are not subject to comprehensive data collection under regular programs. (ICCAT personal communication).
Institutional structures	No simple way to obtain data.	There are no coordination tools/platforms in place to facilitate communication amongst scientists and managers. There is no data sharing among institutions. It is only made available when formally requested.
	Experts needed.	The currently existing infrastructures are found adequate although the staff (researchers and technicians) from several institution is still considered understaffed.
	Scarce coordination of managers and sector to organize the fishing activity.	Some examples of cooperation although occasional and should be improved.
	Jurisdiction overlap.	There is jurisdiction overlap across different RFMOs due to ICCAT oversees migratory resources in the Atlantic (ICCAT- Mauricio Ortiz).
Funding and funding structures	Shortcomings of the accessibility and utilisation of EMFF.	Shortcomings (delays, underutilization) of the EMFF, as in the case of the lack of financial support for support for fishermen in region between 2014 and 2016.
Data collection and other reporting obligations	No on-board observers programme.	Currently the on-board observer program is not operational and for various administrative reasons has not been implemented.
	No scientific survey.	The main gap comes from the scarce information from fishery independent data (surveys). There is a limited capacity of technical staff and there is no research vessel.
	Effort by métier.	Fishing effort by metier is not estimated. Auction market on-site

Category	Shortcoming or obstacle	Description and evidence
		questionnaires could be implemented.
	Recreational fisheries constitute a challenge for data collection.	There is not regular information on fishing mortality by recreational fisheries. Recreational activities are increasing and means to collect data seem insufficient to address these needs. For example, recreational data is collected in the framework of a pilot programme.
	Difficulties in monitoring the small-scale fleet.	Most of the OR vessels are small in size and this may lead to important limitations to the possibility of having on-board observers to collect scientific data.
	Add data collection requirements.	The collection of biological data in Madeira OR follows the DCF sampling methodology but additional data/species are proposed for some species following the studies previously identified in the previous section, namely for the topshells.
Management and conservation measures	Some species need to be regulated.	Conservation measures such as catch limits, minimum landing size and seasonal ban where proposed based on scientific studies and have to be introduced.
	Monitoring.	Monitoring is not enough to assure accomplishing with the management regulations.
	Micro management is needed.	European regulations don't always take into account the specific socio-economic and artisanal fishery characteristics of ORs like Madeira. One of these specific cases is the current zero TAC imposed on the capture of deep-sea sharks in the region, not taking into account the dependence of some regions such as Câmara de Lobos on this resource and the fact that these selaceans are an inevitable by-catch of the black scabbardfish fishery which, although

Category	Shortcoming or obstacle	Description and evidence
		highly selective, catches these species.
	Protection of endemic and vulnerable species.	Need to establish minimum catch sizes and a ban on catches for the endemic and vulnerable species barred hogfish and island grouper.
	TACs are not implemented for all species.	In Macaronesia TAC is only in use for BFT, BET and from 2020 for three billfish species. All these are ICCAT species. (STECF 2020; ICCAT). For horse mackerel species there is a precautionary TAC.
	Fishing without licenses.	In recreational fisheries fishing without licenses occurs either due to lack of knowledge that one should have a license, difficult to obtain a license, licenses are too expensive, etc.
	Inaccuracies in the fishing legislation.	Inaccuracies in the new fishing legislation of recreational fishing such as the daily bag limits established for the stock control and designed to reduce fishing mortality of highly exploited species, because no studies in Madeira were performed to correctly allocate sustainable fishing quotas to each species. Moreover, the minimum landing sizes of many species of interest are smaller than the length at maturity thus compromising the reproduction of these species.
	Big game fishing impact unknown.	There is a need to evaluate the impact of big game fishing in the resources and socio economy of the OR

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Portugal

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REGULAMENTO (UE) Nº. 1380/2013 DO PARLAMENTO EUROPEU E DO CONSELHO, de 11 de dezembro de 2013, relativo à política comum das pescas, que altera os Regulamentos (CE) nº.1954/2003 e (CE) nº. 1224/2009 do Conselho e revoga os Regulamentos (CE) nº.2371/2002 e (CE) nº. 639/2004 do Conselho e a Decisão 2004/585/CE do Conselho.

REGULAMENTO (UE) 2021/91 DO CONSELHO de 28 de janeiro de 2021(https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0091&from=PT)

Portaria n.º 484/2016 de 14 de novembro. Define as artes permitidas, os condicionalismos e os termos do licenciamento do exercício da pesca lúdica, nas águas marinhas da Região Autónoma da Madeira. (https://joram.madeira.gov.pt/joram/1serie/Ano%20de%202016/ISerie-199-2016-11-14sup.pdf)

Decreto-Lei No. 246/2000, de 29 de Setembro. Define o quadro legal do exercício da pesca marítima dirigida a espécies animais e vegetais com fins lúdicos. (https://dre.pt/home/-/dre/553876/details/maximized)

Decreto-Lei 112/2005 de 8 de Julho. Altera o Decreto-Lei n.º 246/2000, de 29 de Setembro, que define o quadro legal da pesca dirigida a espécies marinhas, vegetais e animais com fins lúdicos em águas oceânicas, em águas interiores marítimas ou em águas interiores não marítimas sob jurisdição da autoridade marítima. (https://dre.pt/pesquisa/-/search/235911/details/maximized)

Decreto Legislativo Regional no. 11/95/M, de 21 de Junho. Regula o exercício da caça submarina na Região Autónoma da Madeira (https://dre.pt/pesquisa/-/search/475480/details/maximized).

Decreto Legislativo Regional no. 19/2016/M, de 20 de Abril. Regula a pesca dirigida a espécies vegetais e animais, com fins lúdicos, nas águas marinhas da Região Autónoma da Madeira (https://dre.pt/home/-/dre/74216974/details/maximized?p_auth=Z63ZhNO8)

Decreto 45116/1963 de 6 de Julho. Promulga o Regulamento da Pesca Praticada por Amadores (Pesca Desportiva) - Revoga o Decreto n.º 41444. (https://dre.pt/web/guest/pesquisa/-/search/693214/details/maximized?filterEnd=1963-12-31&filterStart=1963-01-01&q=1963&print_preview=print-preview&fqs=1963&perPage=50)

Decreto-Lei 56/2007 de 13 Março. Altera o Decreto-Lei n.º 246/2000, de 29 de Setembro, que define o quadro legal do exercício da pesca marítima dirigida a espécies animais e vegetais com fins lúdicos. (https://dre.pt/pesquisa/-/search/518464/details/maximized)

Natura 2000 network in Madeira:

Decisão de execução (UE) 2019/20 da Comissão de 14 de dezembro de 2018 que adota a sétima atualização da lista dos sítios de importância comunitária da região biogeográfica macaronésica

Decisão de execução (UE) 2016/2330 da Comissão de 9 de dezembro de 2016 que adota a sexta atualização da lista dos sítios de importância comunitária da região biogeográfica macaronésica.

Resolução n.º 699/2016, de 17 de outubro, que aprova a inclusão do Sítio Cetáceos da Madeira na Lista de Sítios da Região Autónoma da Madeira

Resolução n.º 1226/2015, de 29 de dezembro de 2015 que Aprova a alteração dos limites dos Sítios Classificados da Rede Natura 2000 PTMAD0001 - Laurissilva da Madeira; PTMAD0003 - Ponta de São Lourenço; PTMAD0006 - Moledos - Madalena do Mar e PTMAD0007 - Pináculo, por forma a incluir uma área de 95 hectares, 1320 hectares, 17 hectares e 41 hectares, respetivamente.

Resolução n.º 1225/2015, de 29 de dezembro de 2015 - Determina a criação de 7 novos Sítios de Importância Comunitária da Rede Natura 2000, na Região.

Decreto Regulamentar Regional n.º 3/2014/M, de 3 de março de 2014 - Procede à classificação das Zonas de Proteção Especial (ZPE) da Região Autónoma da Madeira

Resolução n.º 1341/2009, de 3 de novembro - Procede à classificação de Sitio de Importância Comunitária (SIC) para Zona Especial de Conservação (ZEC) do SIC "Ilhéus do Porto Santo (PTPOR 0001)

Resolução do Conselho de Governo n.º 1291/2009, de 2 de outubro –Procede à classificação de Sitio de Importância Comunitária (SIC) para Zona Especial de Conservação (ZEC) de alguns Sítios de Interesse Comunitário.

Resolução n.º 874/2009, de 28 de julho - Procede à classificação de Sitio de Importância Comunitária (SIC) para Zona Especial de Conservação (ZEC) dos Sítios de Interesse Comunitário: Laurissilva da Madeira e Maciço Montanhoso Central.

Resolução n.º 751/2009, de 2 de julho - Procede à passagem de Sítio de Importância Comunitária (SIC) para Zona Especial de Conservação (ZEC)

8.3 Data sources

INE, 2021. www.ine.pt

FAOSTAT, 2021. http://www.fao.org/faostat/en/#data/CL

Canary Islands

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Canary Islands Profile Report

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Acronyms

Term	Description
AC	Autonomous Community
AZTI	Marine research institute in the Basque Country (Spain)
CECAF	Fishery Committee for the Eastern Central Atlantic (FAO)
CC-RUP	Consejo Consultivo de las Regiones Ultraperiféricas
CC-SUD	Consejo Consultivo para las Aguas Occidentales Australes
DCF	EU Data Collection Framework (Common Fisheries Policy)
DG MARE	Directorate-General for Maritime Affairs and Fisheries
EASME	Executive Agency for Small and Medium Sized Enterprises
EC	European Commission
EMFF	European Maritime and Fisheries Fund
EU	European Union
IEO-CSIC	Instituto Español de Oceanografía-Centro Superior de Investigaciones Científicas
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IMBs	Intermediate Management Bodies
JSC	Joint Scientific Committees
MCS	Monitoring, control and surveillance
MAPA	Ministerio de Agricultura, Pesca y Alimentación
MPA	Marine Protected Area
NGO	Non-governmental organisation
OR	Outermost Region
RIM	Red de Información y Muestreo
SGP	Secretaría General de Pesca
SMEFF	Sustainable management of external fishing fleets
SFPAs	Sustainable Fisheries Partnership Agreements
STECF	Scientific Technical and Economic Committee for Fisheries
SWOT	Strengths, Weaknesses, Opportunities, Threats
VMS	Vessel Monitoring Systems

List of Species

Common name	Scientific name
Albacore tuna	*Thunnus alalunga*
Alfonsino	*Beryx* spp.
Amberjack	*Seriola* spp.
Atlantic bluefin tuna	*Thunnus thynnus*
Atlantic bonito	*Sarda sarda*
Atlantic chub mackerel	*Scomber colias*
Barracuda	*Sphyraena* spp.
Bigeye tuna	*Thunnus obesus*
Black scabbardfish	*Aphanopus carbo*
Black seabream	*Spondyliosoma cantharus*
Blue shark	*Prionace glauca*
Bogue	Boops boops
Common cuttlefish	*Sepia officinalis*
Common hake	*Merluccius merluccius*
Common octopus	*Octopus vulgaris*
European pilchard	*Sardina pilchardus*
Flying squid	Fmaily Ommastrephidae
Frigate tuna	*Auxis* spp
Grouper	Family Serranidae
Horse mackerel	*Trachurus spp.*
Little tunny	*Euthynnus alletteratus*
Madeiran sardinella	*Sardinella maderensis*
Mediterranean Parrotfish	*Sparisoma cretense*
Moray eel	Family Muraenidae
Northern prawns	*Plesionika* spp.
Pencil squid	Family Loliginidae
Pink dentex	*Dentex gibbosus*
Red pandora	*Pagellus belloti*
Red porgy	*Pagrus pagrus*
Round sardinella	*Sardinella aurita*
Scorpionfish	Family Scorpaenidae
Seabream	Family Sparidae

Common name	Scientific name
Skipjack tuna	*Katsuwonus pelamis*
Striped red mullet	*Mullus surmuletus*
Swordfish	*Xiphias gladius*
Wahoo	*Acanthocybium solandri*
White seabream	*Diplodus sargus*
Yellowfin tuna	*Thunnus albacares*

Introduction

1.1 Geographic and economic characteristics

The Canary Islands archipelago belongs to Spain and is an autonomous community, with more than 2 million inhabitants. The archipelago consists of eight islands, divided into two provinces composed of Santa Cruz de Tenerife in the western islands and Las Palmas that cover the eastern islands. Combined, the archipelago has a total area of 7,943 km^2 and an Exclusive Economic Zone of 445,910 km^2 (Figure 1).

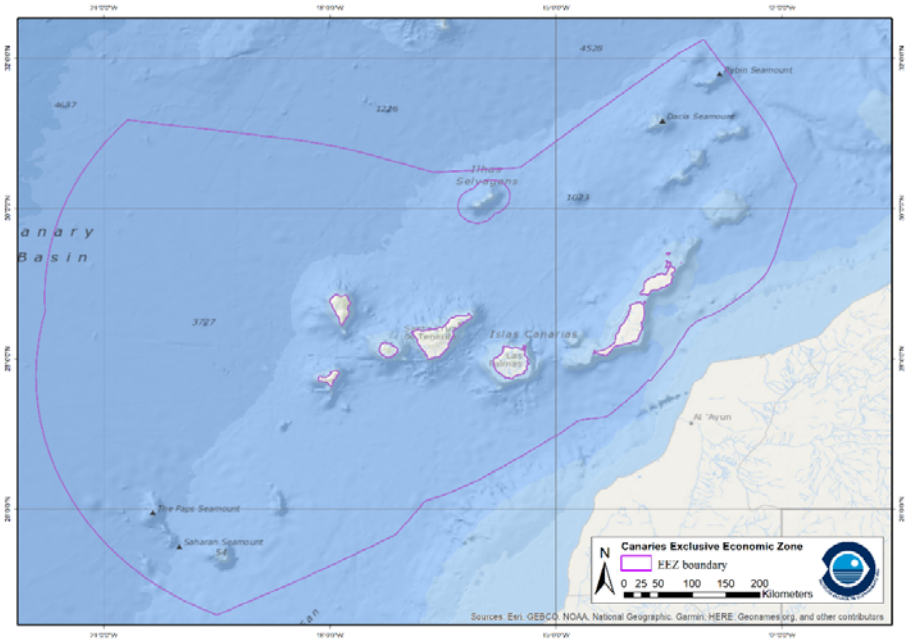

Figure 1: The Exclusive Economic Zone of the Canary Islands (source: IEO)

In total, there are 38 fishery landing sites scattered throughout the Canary Islands (**Error! Reference source not found.**).

Table 1: General indicators

Description	Unit	Source
Area of archipelago	7,943 km^2	Wikipedia
Population size	2.2 million	ISTAC
Exclusive Economic Zone (EEZ) area	445,910 km^2	VLIZ

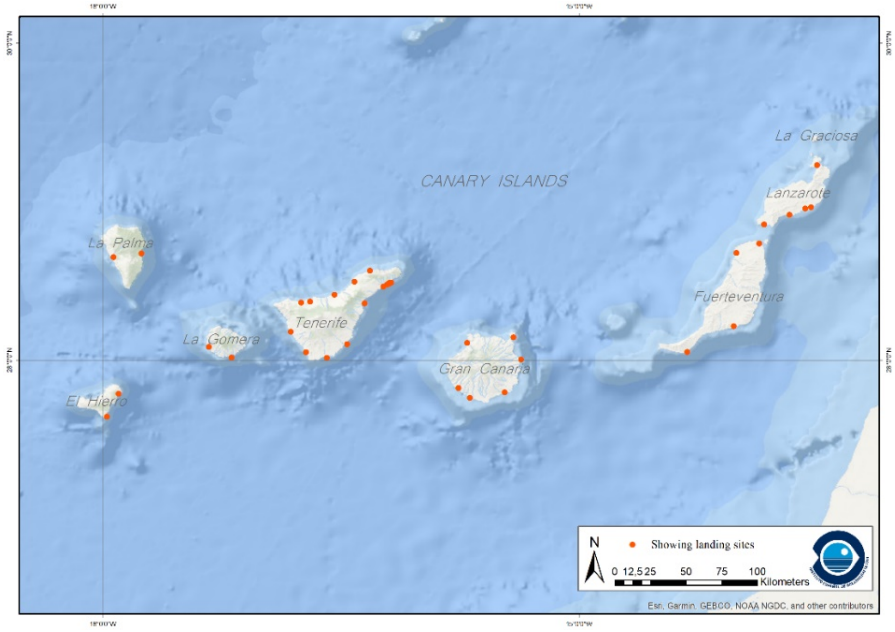

Figure 2: Map of the Canary Islands showing landing sites (orange marks) (source: IEO).

1.2 Fisheries statistics

The Instituto Español de Oceanografía (IEO) is responsible for data collection under the Data Collection Framework (DCF) within the Canary Islands, funded by the European Maritime and Fisheries Fund (EMFF) (Figure 7). The regional government is also allocated a budget for data collection outside the DCF, but still under priority 3 of the EMFF. There are other data needs for control purposes which are implemented by the regional government. In addition, there are a range of institutions (e.g. universities) in the region who participate in fisheries data collection (outside of the DCF) as part of their research activities. Funding for these activities can come from a variety of sources, particularly from the European Commission (EC) and the Interreg's cooperation programme 'Madeira-Açores-Canarias' (MAC[1]). Collection of data within these projects is not routine and only respond to the particular needs of these projects, which have been mostly focused on aquaculture and the marine ecosystem where fisheries has been only one element (see section 4).

The Canary Islands hold a large variety of pelagic and demersal fish species, predominantly subtropical and temperate with low abundances of tropical species. The 11 most commonly caught species are included in the multiannual Union programme (EU-MAP[2]) for the collection, management and use of data in the fisheries and aquaculture sectors, representing around 92% of the local landings. Three métiers (tuna, small pelagic fish and demersal species, respectively) are accordingly identified under the DCF and are monitored within the small scale fisheries (SSFs) across the Canary Islands.

The fisheries sector in the Canary Islands is characterised by the predominance of small scale fishing activities. The fishing fleet consists of a variable number of 600-700 fishing vessels. According to the Scientific Technical and Economic Committee for Fisheries

[1] https://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/spain/2014tc16rfcb007
[2] Commission Delegated Decision (EU) 2019/910 (OJ L 145, 4.6.2019, p. 27–84)

(STECF) annual report 2020 (STECF, 2020), this fleet numbered 590 active vessels in 2018, 2.4% less than in 2017. It employs a large array of traditional fishing technologies and mostly operate under "minor gear"[3] licences, which allow fishermen to use several gears in the same trip. Thus, the high polyvalence (mostly between pelagic (tuna) and demersal species) is one of the characteristics of the regional fleet.

According to official data, in 2019 landings in the Canary Islands amounted to 11 300 tonnes with a focus on a large diversity of pelagic (84%, including tuna) and demersal species (14%) (**Error! Reference source not found.**).

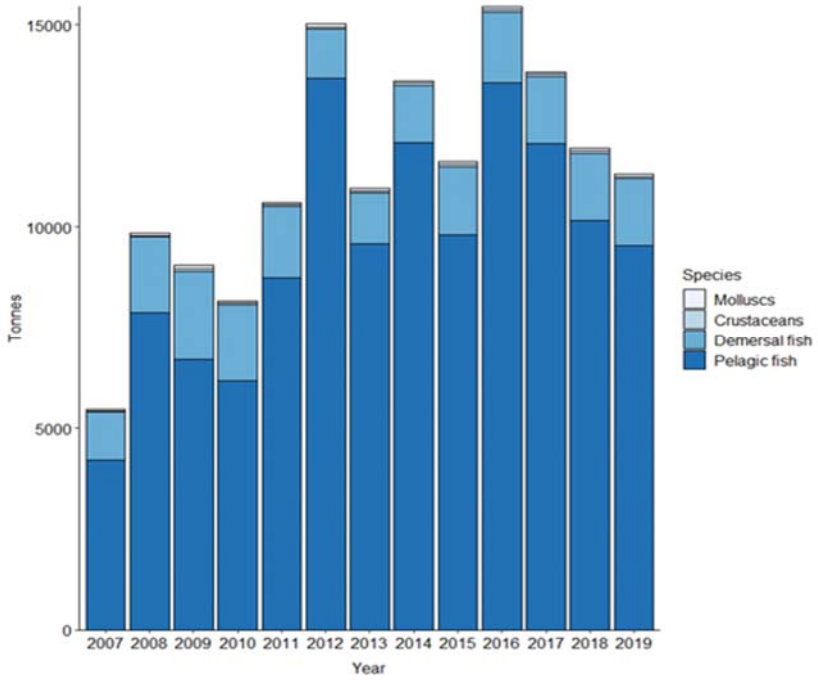

Figure 3: Total capture production of the Canary Islands fleet by species groups (data source: Canary Islands Government).

There are substantial landings of fish, mainly demersal, harvested by industrial vessels operating in African waters, that are landed in the Canary Islands to be processed and re-exported (i.e. not consumed in the archipelago, **Error! Reference source not found.**).

Per capita fish supply has been estimated at 20.5 kg in 2019 (calculated as the average between 2007-2019, **Error! Reference source not found.**). In turn, total employment in the Canary Islands in the first trimester of 2021 was estimated as 804 138 workers. Fisheries and aquaculture employ a total of 1 542 people in the first trimester of 2021, with the average number of workers being 1 620 (across 2010-2021, **Error! Reference source not found.**).

[3] Fishing modalities authorized under the "minor-gear" licences in the Canary Islands are traps, (fish traps, shrimp traps and drums for morays), lines (handlines, longlines, drifting longlines, trolling lines, handle jigging) and nets (surrounding nets, seine nets, lift nets, gillnets). The use of minor gears is polyvalent for vessels of less than 15 m length, being able to carry on board simultaneously and carry out the activity with several of these authorized gears. More information available at https://www.boe.es/boe/dias/2015/12/01/pdfs/BOE-A-2015-13003.pdf

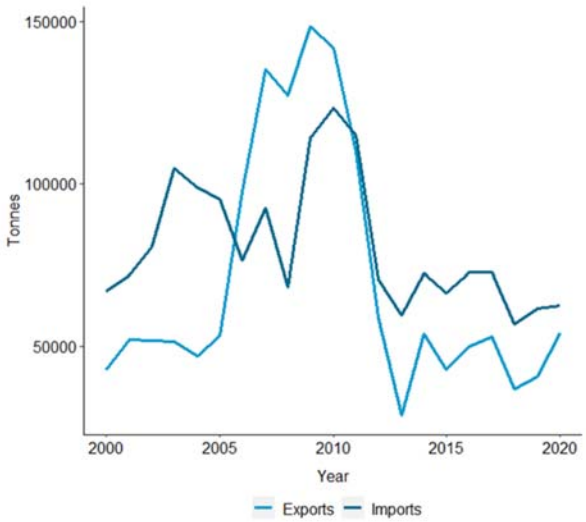

Figure 4: Total imports and exports of fish and fishery products in Canary Islands (data source: ISTAC).

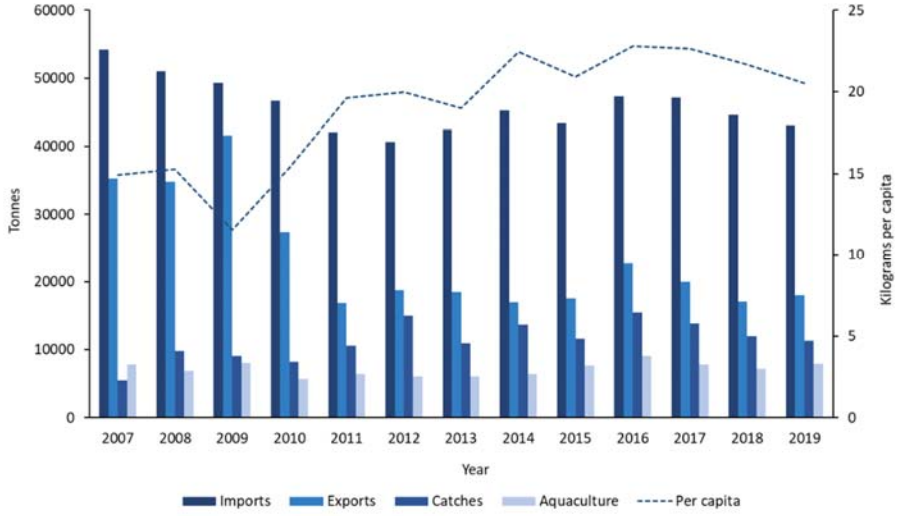

Figure 5: Estimated per capita supply[4] of fishing and fishery products in Canary Islands[5] (data source: ISTAC for exports and imports, Canary Islands Government for catches and aquaculture, ISTAC for population).

4 Estimated as the sum of catches, aquaculture and imports less exports (in kilograms) then divided by the total population of Canary Islands. The methodology applied is that proposed by FAO (Failer, 2007).

5 Statistics of exports and imports of frozen fish have not been included in this estimation of supply per capita since, in most cases, this fish is harvested in third countries waters by Spanish and other EU industrial fishing fleets waters and then processed in the port of La Luz and finally re-exported. Thus, this fish is in most cases not consumed in Canary Islands.

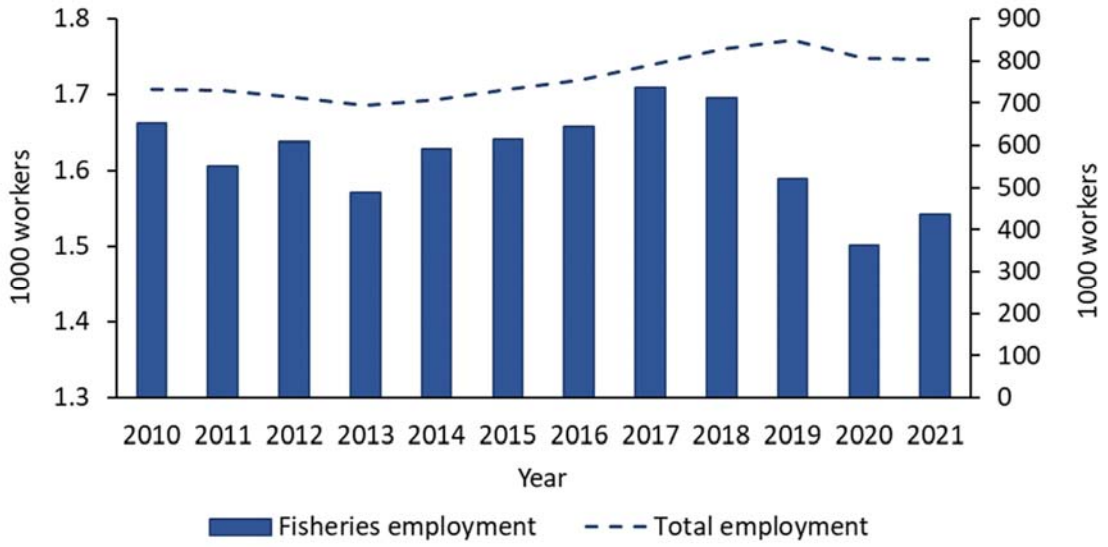

Figure 6: Total employment versus fisheries employment, including aquaculture, rate in Canary Islands. Data is provided for the first semester of each year (data source: ISTAC).

The institutional set up of fisheries in the Canary Islands has three levels of decision-making. The EU establishes management measures which are then applied in the external waters of the archipelago by the government of Spain. In turn, management of resources within Canary Islands waters is the competence of the regional Canary Islands government. Concerning fisheries data collection, the data collection (under the DCF) in Canary Islands waters is structured according to the Programma Nacional de Datos Básicos (PNDB[6]).

Data collection obligations for Canary Islands include length sampling (both at market and at sea), as well as biological sampling of some target species (e.g. small pelagic fish). The EU-MAP establishes the minimum obligation to collect data for those species with catches higher than 200 tonnes per year[7]. For the Canary Islands, these are parrotfish, sardine, mackerel, horse mackerel, sardinella, Atlantic bluefin tuna, albacore tuna, skipjack tuna, bigeye tuna, yellowfin tuna and swordfish (see section 2.1).

1.3 Regional fisheries management

The Canary Islands and all the other EU outermost regions have the first 100 nautical miles (nm) for exclusive use of their fishing fleets and for those which have traditionally operated in these waters[8]. While there is a limited foreign fishing, a group of Madeira-based vessels operate in the waters of the Canary Islands, harvesting the deep-water black scabbardfish. This fleet is able to fish with the permission of the Canary Islands authority, within the framework of a bilateral agreement between these two autonomous

[6] Further details of the national work plan can be viewed here: https://www.mapa.gob.es/es/pesca/temas/proteccion-recursos-pesqueros/programa-nacional-datos-basicos/participantes-pndb-espana/

[7] Under previous Annex Chapter II 'Thresholds' of Commission Implementing Decision EU 2019/909. Establishing the Multi-Annual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors and now under Annex Chapter II 'Thresholds for data collection' of Commission Implementing Decision EU 2021/1168.

8 https://ec.europa.eu/oceans-and-fisheries/fisheries/rules/fishing-fleet-capacities_en

regions. In turn, Canary Islands-based boats target tunas in the waters of Madeira (see section 0).

The EU (and therefore Spain) is a contracting party to International Commission for the Conservation of Atlantic Tunas (ICCAT), which is an Regional Fisheries Management Organisation (RFMO) and has the responsibility to establish management measures, such as total allowable catches (TACs), concerning tuna and tuna-like species. All Member States (MS) have responsibilities in terms of data collection and involvement in the scientific process of ICCAT. In addition, the Fishery Committee for the Eastern Central Atlantic (CECAF) is an international fisheries body without management responsibilities, but plays a key role for the provision of advice in scientific matters for general fishing resources taking place in the waters of central and eastern Atlantic (area 34, the Canary Islands belongs to 34.1.2). IEO staff based in the Canary Islands participate in the scientific process of these two bodies, and contribute with data and expertise. Scientists from IEO and universities also participate in the scientific process within the International Council for the Exploration of the Sea (ICES). For more information concerning these bodies see section 1.8.

Fish stocks and other marine organisms and associated fishing activities

1.4 Commercial fish stocks

Within the Canary Islands there is a large variety of marine resources: large and small pelagic, as well as demersal fish species. The 11 species (including tuna) listed in the EU-MAP represent 92% and 78% of the landings in tonnes and value, respectively. In terms of species sampled and reported in the national annual reports for DCF[9], the number of species is the same (i.e. all species are relevant for the DCF). According to the 2020 STECF Annual Economic Report (STECF, 2020), the volume of landings in 2018 was dominated by skipjack tuna (43%), bigeye tuna (24%) and Atlantic chub mackerel (12%). In terms of value, the most representative species are bigeye tuna (31%), skipjack tuna (19%), albacore tuna (11%) and Atlantic chub mackerel (9%). The value of tuna and tuna-like species amounted to more than EUR 15 million (STECF, 2020).

1.4.1 Small and medium pelagic

The most important small pelagic species in terms of landings are jack and horse mackerel, Atlantic chub mackerels, European pilchard and Madeiran and round sardinellas. All these species are relevant for DCF.

1.4.2 Large pelagic

The location of the Canary Islands and the oceanographic characteristics attract the majority of fished tuna species: temperate species (albacore, Atlantic bluefin) and the typically tropical species (bigeye, skipjack, and yellowfin). These highly migratory fish reach the Canary Islands from several areas of the Atlantic at different times of the year and are the main fishery resource of the Canary Islands. The remaining landings are predominantly comprised of wahoo and swordfish. Swordfish and blue shark are also fished by some Andalusian longline vessels that carry out temporary fishing campaigns in the CECAF area 34.1.2 surrounding the Canary Island waters every first two quarters of the year (usually from November to April).

1.4.3 Demersal

Landings of demersal species in the Canary Islands include a large number of species, but only a small number of these are landed in significant quantities. The most important landings are of parrotfish, pink dentex, alfonsinos species and red porgy. Other fish species (e.g. amberjack, moray eel) and invertebrates (e.g. northern prawns, cephalopods) are landed, and of high value in local markets. The total landings of demersal species amount to approximately 1,100 tonnes. At present, only parrotfish landings (some years exceeding more than 200 t) is relevant for DCF purposes as stock required to have data collected, although stock specific sampling at market is also conducted by IEO for other relevant species (e.g. porgy, dentex, grouper, alfonsino, amberjack and moray eel).

1.5 Fleet structure

The fleet consists predominantly of small scale artisanal boats. The total number of units varies, although usually ranges between 600-700 in recent years, with a mean value of

[9] National annual reports between 2004-2020 can be downloaded from European Commission website: https://datacollection.jrc.ec.europa.eu/ars/2020

656 in the period 2016-2018 (national work plan, 2019). Most vessels are less than 10 m in length operating under "minor-gear" licences and predominantly conducting daily trips (In total, there are 38 fishery landing sites scattered throughout the Canary Islands (**Error! Reference source not found.**).

Table 1). The use of several gears is allowed in the same trip (surrounding nets, seine nets, lift nets, gillnets traps, hand lines, longlines, trolling lines, etc.). There is a specific licence for the artisanal "tuna bait boats" (35 licences in 2021), but a significant number of boats show polyvalence and opportunistic activities, alternating between demersal and pelagic species.

Table 1: Technical characteristics of the mean vessel per length category in the Canary fleet (source: ORFISH Canarias 2016).

Length class	Number of vessels	Average length (m)	Average power (KW)	Average age (years)
< 6 m	156	5.2	6	52
6-8 m	301	7.0	17	43
8-10 m	103	8.5	26	35
10-12 m	38	10.4	49	41
12-15 m	42	13.3	73	27
15-18 m	12	16.0	94	25
18-24 m	10	20.4	136	23
24-40 m	35	30.7	454	21
> 40 m	13	48.1	943	16

Data source: ORFISH Report - Canarias 2016
(https://orfish.eu/data/activities/data/orfish_2016_CANARIAS.pdf)

The characteristics of vessels that fish tuna species are shown in the table below for the period 2015-2019. The total number of vessels fishing tuna (e.g. 235 in 2019) includes the baitboats and a variable number of vessels conducting opportunistic fishing activities, alternating between demersal and pelagic species.

Table 2: Number of vessels fishing tuna by fleet segment in the Canary Islands.

Year	< 10 GRT	10-19.9 GRT	20-49.9 GRT	50-99.9 GRT	>100 GRT	Number of vessels	GRT annual
2015	134	40	9	5	12	200	3 318.53
2016	179	43	11	6	11	250	3 516.68
2017	194	42	9	5	11	261	3 353.55
2018	176	39	6	5	11	237	3 177.39
2019	175	37	8	5	10	235	3 090.48

GRT: gross registered tonnes. Source: IEO, Tuna fisheries team 2021

There are many landing sites (which act as the first point of sale), within the entire archipelago. A total of 38 authorized first sale sites were operating in 2020 (**Error! Reference source not found.**). Of the islands, Tenerife has the highest landing values and number of landing sites.

1.5.1 Domestic fisheries

Three métiers are identified in the Canary Islands (Table 3):

Small pelagic - métier **PS_SPF_10_0_0**. This is an artisanal purse seine activity targeting small pelagics in the Canary Islands. These vessels perform daily trips, generally fishing at night with light to attract fish. This is a mixed fishery, where the fishing effort is directed to several target species. In the order of importance of their landings are the Atlantic chub mackerel, horse mackerel, European pilchard and round sardinella.

Large pelagic - métier **LHP_LPF_0_0_0 (MSP):** The artisanal live bait is the fishing mode for tuna. Once hooked, the tuna species are hauled on board using pulleys or a pole and line. Main target species comprise temperate species (albacore and Atlantic bluefin*)* and the typically tropical groups (bigeye, skipjack and yellowfin). Other relevant tuna-like species are wahoo and swordfish*.* The bait comprises small pelagic, mainly Atlantic chub mackerel, European pilchard and bogue. Larger vessels employ purse seine net and smaller boats use ringnets to catch the live bait. Vessels capturing skipjack typically use small sized chub mackerel individuals as bait, whereas those fishing the larger tunas use larger specimens of chub mackerel as live bait. There are different fishing strategies of this fleet, depending on the size of the vessels and the target species. For tropical tunas, "free school" fishing is the main fishery strategy especially on the smaller vessels. Using the vessel as a FAD on the medium-sized vessels, fishing in groups made by two or three vessels ("*pesca a manchas*"). The duration of the fishing trip is from one day to about ten or fifteen days for the largest vessels. They use ice to conserve the fish and land fresh fish normally. In this fleet, the number of crew members is variable and depends on the size of the vessels and the period of seasonal fishing. From two or three fishermen on smaller boats to around 25 people on the largest ones. The fishing ground is around and between islands for smaller vessels and offshore waters for largest vessels.

Demersal species - métier **MIS_DES_0_0_0**. This is a multi-species artisanal activity targeting mostly demersal species of fish, crustaceans and cephalopods. This fleet also performs daily trips and uses a large number of gear types such as traps, hooks and nets, the most important being: fish and shellfish traps, drum, horizontal longline, hand line, and trammel nets. The most landed species are parrotfish, porgy, morays, amberjacks, alfonsinos, and shrimp. Other species of interest are also marketed, although with less representation in the catches, such as seabream, groupers and cephalopods. As it is a multi-species fishery where most of the species caught are commercialized, any discards are usually of undersized individuals.

Industrial fishery

The port of Las Palmas is a base port for some industrial vessels operating in the waters of western Africa. No industrial fishing activity conducted by foreign or Spanish vessels takes place in the waters of the Canary Islands.

Sports / recreational fishery

Recreational fisheries in Spain are managed at a regional level, with a recreational sea fishing licence required for any fishing of this nature; commercial activity is prohibited for

any recreational fishing. In the Canary Islands, the total number of licences for recreational fisheries (including fisheries from a boat, diving or from the coast) was 31 172 in 2020[10]. Importantly, recreational fisheries are not categorized within métiers, but fall under three different fishing licenses:

1. Recreational fishing from boat using surface trolling.
2. Recreational spearfishing. It is allowed in specific areas of the coastal (inland) waters.
3. Recreational fishing on the surface, carried out from land or from boat without using surface trolling.

On average, recreational fisheries account for around 40% of total catches, reaching 70% in some islands (MAPA, 2005; Pascual-Fernández et al., 2012; Jiménez-Alvarado, 2019). Target species for the recreational fishery are numerous, including the majority of demersal species targeted by the artisanal fleet (e.g. parrotfish, porgys). Compliance with the minimum size limits for all species is mandatory. It is advisable that species landings from recreational activity are registered/monitored and the main species included in national work plans. At present, all recreational activity is regulated by a maximum weight captured (5 kg/person/day), but landings by species is not registered; the system of first sale notes in place for the professional fishing is not developed for the recreational activity.

1.5.2 Foreign fisheries

According to the Government of the Canary Islands and the Secretaria General de Pesca (SGP) of the Ministerio de Agricultura, Pesca y Alimentación (MAPA), vessels from the autonomous region of Madeira (Portugal) catch the black scabbardfish in the waters of the Canary Islands (CECAF area 34.1.2) within the framework of the bilateral agreement between these two insular regions (personal communication, 2020). This fishing agreement was signed in May 2012[11] in Oporto and entered into force in May 2013. This agreement stipulates an equitable exchange of fishing units between Madeira and the Canary Islands fleets for black scabbardfish and tunas within the first 12 nautical miles out from each respective region's coastline. The Madeira vessels have access to black scabbardfish and tuna, while the Canary Islands fleet has access to tuna only. The maximum number of vessels allowed to fish in each other's waters is 38, and only ten by country can fish simultaneously. According to the SGP there are some Canary Islands boat owners that are interested in the exploitation of the black scabbardfish, but access to this resource is currently exclusive to Madeira's boats only. Despite this, there is no understanding how this would impact the allocation of vessels, how allowing such access would impact on stock levels of this species, or how existing data collection systems would accommodate this new fishery.

Although strictly speaking, boats from the Spanish mainland cannot be considered foreign fleets, there are some longline vessels based on the Spanish mainland i.e., Andalucía, which retain swordfish and blue shark (see section 2.1.2). Such catches are reported under Spanish jurisdiction.

10 https://www.gobiernodecanarias.org

11 BOE-a-2013-6872. https://www.boe.es/eli/es/ai/2012/05/09/(2)

A small number of Canary Islands-based vessels are operating in waters outside the EU. The Fisheries Agreement between the EU and Morocco[12] established fishing opportunities for demersal fish (Fishing Category 3, Artisanal Fishing of the South), with permission for 10 licenses of EU vessels operating with the authorized gear "pole and line", and recently traps have also been authorised (2020 Joint Scientific Committee to the EU-Morocco SFPA[13]). The métier is MIS_DEF_0_0_0 and only 2 artisanal vessels are now operating under this fishing category. There are no sampling obligations for this métier under MRD or the EU-Morocco SFPA, due to its low level of landings and effort.

1.6 Other non-target marine organisms

1.6.1 Bycatch species

The majority of species caught in the artisanal fisheries are retained for commercial uses. There is a part of retained catch that may not be landed at the first sale points, but consumed by crew on the boats or used as bait. Some discards could take place due to the existence of minimum conservation reference sizes (MCRS). Some live bycatch is known from the fleet of tuna bait boats.

1.6.2 Endangered, threatened and protected species (ETPs)

These are recorded as bycatch during observations on board. Information of incidental bycatch in the sampling at sea is requested in annual reports under the DCF (TextBox 1F of Spanish annual reports since 2016).

1.7 Summary of fisheries

Following the description of the resource and fleet structure above, the table below shows the main species captured in the Canary Islands by métier and fishing gear group.

12 Sustainable Fisheries Partnership Agreement between the European Union and the Kingdom of Morocco ST/12983/2018/INIT (OJ L 77, 20.3.2019, p. 8–55).

13 Report of the 2020 meeting of the Joint Scientific Committee to the EU-Morocco Fisheries Partnership Agreement. 30 September 2020. 79 p.

Table 3: Description of fisheries in the Canary Islands.

Traps MIS_DES_0_0_0	**Purse Seiners** PS_SPF_10_0_0	**Lines (handlines, longlines, handle jigging)** MIS_DES_0_0_0	**Traditional Nets (gillnets, lift nets etc.)** MIS_DES_0_0_0	**Tuna Baitboats (handline and pole line)** LHP_LPF_0_0_0 (MSP)
Domestic commercial fisheries				
Parrotfish, seabream, shrimp, moray eel, common octopus, common cuttlefish.	Atlantic chub mackerel, jack mackerel, European pilchard, round sardinella	Amberjack, dentex, porgy, alfonsino, groupers, European hake, pencil squid, flying squid.	*Mullus surmuletus*, *Sparisoma cretense*, *Boops boops*, *Spondyliosoma cantharus*, *Pagellus bellotii*, *Diplodus sargus*, *etc.*	Bigeye tuna, yellowfin tuna, albacore tuna, Atlantic bluefin tuna, skipjack tuna
Domestic sport / recreational fisheries				
Surface trolling from boat	*Acanthocybium solandri*, *Sphyraena viridensis*, *Seriola* spp, *Sarda sarda*, *Katsuwonus pelamis*, *Thunnus* spp., among others			
Other Surface fishing	*Sparisoma cretense*, Sparidae, Scorpaenidae, Serranidae, Muraenidae, etc.			
UW fishing	*Sparisoma cretense*, Serranidae, Sparidae, Scorpaenidae, etc.			
International fisheries				
Vessel type 1	*Aphanopus carbo*			

Institutional structures

1.8 Data collection

The organisation responsible for the implementation of the national work plan for data collection, which includes fisheries relevant to the Canary Islands, is the *Secretaria General de Pesca* (SGP), which belongs to the *Ministerio de Agricultura, Alimentación y Medio Ambient*e (MAPA). The SGP ensures that activities are implemented on time and data provided to the European Commission. Biological and fishing activity data for Canary Islands fisheries are collected by IEO.

The specific characteristics of the artisanal fisheries targeting demersal and small pelagic stocks operating in the Canary Islands require sampling on board by scientific observers. Each month, a minimum of 3 trips are monitored by scientific observers in vessels representative of the activities in the main zones. Observers collect data on length frequency for all species caught (target and not target).

Monthly length sampling of target species of demersal, small and large pelagic is implemented at market landing sites of the Canary Islands. Biological sampling (sex and maturity) of target small and large pelagic species is undertaken; from 2016, the collection of hard structures (otoliths) for age and growth of the Atlantic chub mackerel was included in national work plans.

Regarding fishing activity, scientific observers collect information on gears, fishing strategies, catch typology by métier and zone, fishing effort, data on main fishing grounds. They also collect information on discards and any incidental bycatch of fish, turtles, invertebrates and birds.

Length data and activity information is processed by scientists in the oceanographic centre of IEO in Tenerife for the provision of scientific advice. The SGP is in charge of collecting and analysing the economic and social data relevant to the DCF (including aquaculture and processing industries).

The institutional process of data collection:

Collection of data for scientific and management purposes, (including data required under the DCF and the Control Regulation), takes place within an institutional network where diverse bodies within the EU, Spain and the Canary Islands interact in the framework of the EU and international commitments (Figure 7); this process is not always effective due to the high number of bodies associated with such data collection. This process is funded by the EMFF, national and regional budgets. As of 2019, the EMFF Union Priority 3 (UP3) funding not related to the DCF had not been employed by the regional government in the current EMFF's operational program (2014-2020). In addition, beyond the official channels of data collection, other entities (e.g. universities) collect data for marine and fisheries research. These are not part of routine sampling programs and usually respond to the data needs of research projects. Lastly, insular governments in the Canary Islands (e.g. Gran Canarias, Tenerife) conduct some activities (non-DCF) for the collection of data for purposes of management of littoral resources and local fisheries. The link between academia, local governments and others for funding, storage and accessibility of their data is, at this stage, unclear and poorly documented.

The process of regular data collection in the Canary Islands is shown in Figure 7. MAPA, as the Managing Authority for the EMFF, allocates funding for regular data collection for two purposes: (1) data collection under the DCF; and (2) regional data collection needs of the Government of Canary Islands. Regarding the first point, the IEO receives funding from MAPA and, as IEO is an Intermediate Body[14] for the EMFF, allocates funding to their diverse regional centres (e.g. the IEO centre at Tenerife Island). The compilation of these scientific data is coordinated between the IEO and the Fisheries Secretariat in Madrid. The IEO submits these data to the Fisheries Secretariat, and this body in turn submits the data to the European Commission (EC) for use in scientific advice and other commitments, e.g. the scientific process of international bodies such as ICCAT. With regards to the use of these data for research purposes, IEO interacts directly with ICES, CECAF and ICCAT in their different working groups.

The Canary Islands government gathers first sales and other transversal data under the EMFF UP3, not DCF (e.g. fleet data and catches), which are submitted to the Fisheries Secretariat in Madrid in the framework of the Control Regulation. These data are in turn compiled by the Spanish Secretariat and sent to the EC.

There is an active process of data exchange between entities in the Canary Islands, and the data is employed in diverse working groups. Universities undertake data collection for the purposes of their primary research and in the framework of projects funded, in most of the cases, by the MAC programs, which are funds devoted to the regions of Macaronesia: Madeira, Azores and Canary Islands and that belong to Interreg. Thus, data collected by universities are not collected on a regular basis but on an *ad hoc* basis, and can be provided to the regional government and IEO. In turn, universities also participate in the scientific process within ICES and STECF and their researchers participate in Working Groups where they also contribute/analyse data. The insular governments of Gran Canarias and Tenerife also conduct data collection for local needs, but information about the regularity of these data being collected, funding and how these data are stored, processed and made accessible to third parties remain unclear.

Despite the fishing sector does not play a formal role in data collection within the DCF and for other scientific purposes they collaborate with the government and scientists in data collection such as, for example, collection of fishery dependent data and observers' programs. It is worth commenting about the institutions which represent the fishing sector at regional, national and EU level. The *cofradías*, fishing guilds, are ancient institutions with many centuries of history and are found all along the Spanish littoral, in the Atlantic, Mediterranean and the Outermost Region of the Canary Islands. They represent the interest of the fishermen, both boat owners and crew members, and are bodies with a role as collaborative corporations with the regional government (Aranda and Murillas, 2015). *Cofradías* are organised into federations. In the Canary Islands, there are 27 of these corporations which are organised into two federations, one by province: Tenerife and Las Palmas[15]. In turn, there is also the overarching Regional Federation of the Canary Islands[16]. *Cofradías* take part of the National Federation of Fishing Guilds of Spain. *Cofradías* and their federations also participate in the Advisory Councils where they convey the insights of the sector and are directly represented before the EC. The Canary Islands

14 An Intermediate Body is a legal entity acting under the responsibility of a Managing Authority (in this case the MAPA) and which carries out duties related to the management of the EMFF's Operational Programme.

15 https://www.gobiernodecanarias.org/pesca/temas/entidades_pesqueras/federaciones_cofradias_pescadores

16 https://cofradiascanarias.com/

sector participates in the Consejo Consultivo de las Regiones Ultraperféricas (CC-RUP[17]) which started its activities in 2019[18]. The CC-RUP secretariat is located in Azores and the current chair is the president of the Regional Federation of Fishing Guilds of Canary Islands. This Advisory Council represents all nine ORs and is a key instrument into the process of fisheries regionalization of the EU, conveying the recommendations of fishing organisations and other interest groups in relation to management measures proposed by the EC and Member States. It is also worth commenting that prior the creation of the CC-RUP the Macaronesia ORs were represented by the South Western Waters Advisory Council (SWWAC or CC-SUD)[19]. Producer Organisations (POs), in turn, are bodies representing the interest of the boat owners. They are an essential element of the EU's Common Market Organisation. Their functions comprise production and commercialisation plans, which are financed by the EMFF, and plan the harvesting activity. They also facilitate quota trading within its members and with other POs. Moreover, they provide information on quota uptakes to the national government (Aranda and Murillas, 2015). POs also participate on the work of the ACs. In Canary Islands there are three POs, two of them devoted to small scale tuna fishing activities and one dedicated to industrial fishing in third countries waters.

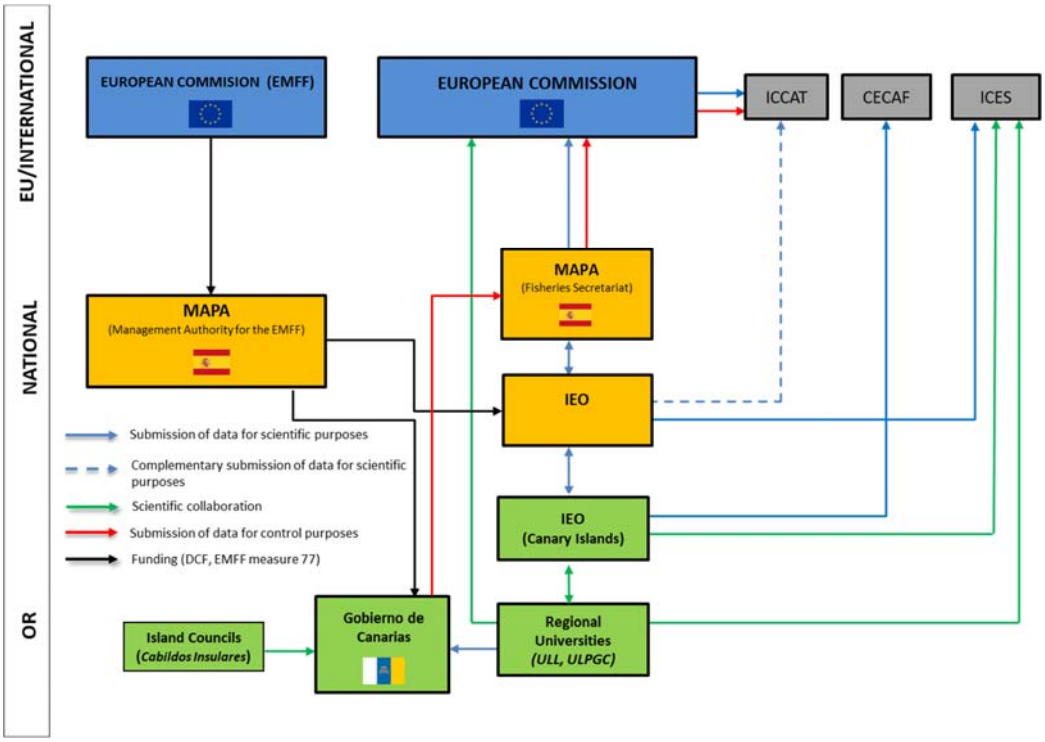

Figure 7: Institutional diagram of DCF and other data collection in Canary Islands.

1.9 Scientific advice

IEO is the relevant body for the provision of data and scientific advice in the Canary Islands, with such information being the basis for management decisions for the islands' fisheries resources (both at the Spanish and EU levels). Due to the geographical location

17 Also known as the outermost regions Advisory Council (ORAC).

18 https://www.ccrup.eu/es/inicio-2/

19 https://cc-sud.eu/index.php/en/

of the Canary Islands, there are two main international fisheries bodies for which the provision of scientific data and advice are essential and mandatory under the national data program: ICCAT for tuna and tuna-like species and CECAF for small pelagic and demersal species. The relevant scientific committees of these two bodies (SCRS in ICCAT and Scientific Sub-committee in CECAF) provide the scientific advice for internationally managed stocks.

In the framework of the Sustainable Fisheries Partnership Agreements (SFPAs) between the EU and some western African coastal states, Joint Scientific Committees (JSC) are established in order to provide advice to the Mixed Committee. The Mixed Committee is in charge of monitoring the implementation of these agreements and who could adopt alterations of the protocol. Scientists from the IEO in Tenerife participate in some of these JSCs.

In the context of the scientific process of ICCAT and CECAF, IEO's scientists participate regularly in the relevant assessment working groups, and in the scientific committees of both bodies. Data on Canary Islands fisheries are also relevant for the work of STECF, in particular for working groups meetings related to the DCF and ORs. Given that some ICES species-specific workshops and working groups are relevant for the Canary Islands fisheries, IEO scientists also participate in these activities (Figure 7). It is also worth highlighting that some academists from the Canary Islands universities are also engaged in the scientific work of ICES and STECF trough active participation in working groups.

1.10 Research institutions

DCF sampling is performed by IEO, although there are other institutions (universities, regional organisations) whose activities contribute to improve the knowledge of Canary Islands fisheries and thus to the provision of better scientific advice (see previous section). Data collection requirements are regularly monitored/assessed by the STECF as well as by the different structures within the DCF schemes (e.g. Regional Coordination Groups).

1.11 Monitoring, control and surveillance

Monitoring Control and Surveillance (MCS) and collection of transversal data, such as first sales notes, is conducted following the requirement of the Control Regulation[20]. These requirements are carried out by the Fisheries Inspection service of the General Directorate of Fisheries of the Canary Islands government, and submitted to the MAPA (Figure 7). These first sales notes (collected on the landing sites) and logbooks (only for vessels ≥12 m) provide information on landings and values, which are also relevant for scientific purposes. Figure 7

As the majority of the fishing fleet consist of vessels below 10 m length, they do not have the obligation to employ electronic Vessel Monitoring Systems (VMS). Inspection of fishing activities for compliance with regulations is conducted by the Fisheries Inspection service of the General Directorate, which can impose sanctions. According to the interviewees and with news published quite often in the media there is evidence of active IUU fishing in the

20 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50)

region. It seems that the control system and legal means should be strengthened to deter illegal activities in the region.

Funding and funding structures for data collection

1.12 European Maritime and Fisheries Fund (EMFF)

1.12.1 Member State funding

Within the EMFF Operating Program (2014-2020) EUR 1.087 million[21] was allocated to Spain for the implementation of the program.

Funding for data collection is part of the Union Priority 3 (UP3): "Support for the implementation of the CFP". As of August 2021, Spain has a budget of EUR 152 million in this category. Measure 3.1 of UP3: "Improvement and contribution to scientific knowledge and better data collection and management" encompasses EUR 77 million. The State General Administration manages this data collection funding through the IEO and other Intermediate Bodies (IBs). Within the framework of the DCF, the IEO is in charge of data collection activities in the Spanish territories, including the Canary Islands, with the exception of the Autonomous Community of the Basque Country, where the regional research institute AZTI conducts data collection.

1.12.2OR funding

As of January 2019, the Canary Islands was allocated around EUR 83 million from the EMFF (Table 4). Out of this figure, 72% of the resources are devoted to the financial compensation for the conditions of insularity and remoteness of this region, which is granted to fishing and aquaculture operators. This compensation is within UP5, "Promote commercialization and transformation" and is regionally known as the POSEICAN.

Table 4: EMFF allocated to Canary Islands as of January 2019 (source: MAPA)

Union Priority	Assigned according to Financial Plan (EUR)
1. To promote sustainable fisheries	4,454,000
2. To promote sustainable aquaculture	5,443,028
3. To promote the implementation of the CFP	369,362
Measure 3.1: Improvement and contribution to scientific knowledge and better data collection and management	*120,812*
4. To promote employment and territorial cohesion	4,230,000
5. To promote commercialization and transformation	65,500,000
6. To promote the implementation of the IMP	NA
7. Technical assistance	2,900,000
Total	**82,896,390**

21 EMFF distribution at national level according to the Operating Plan, as of August 2021. https://www.mapa.gob.es/es/pesca/temas/fondos-europeos/po-femp-v5_20082021_tcm30-575719.pdf

Source: MAPA. Notice that data collection for regional needs is within Union Priority 3 and amounts EUR 120 812 (January 2019).

Data collection for Canary Islands fisheries can be funded from two funding sources:

(i) Funds administrated by the Government of The Canary Islands in its condition of EMFF's IB; and
(ii) Funds managed by the IEO in its condition of IB.

Concerning (i), the Canary Islands was allocated EUR 120,812 from the EMFF in 2019 for collection of fisheries data in relation to local needs (non-DCF data) (see Measure 3.1 of UP3, Table 4). This represents 0.15 % of the total EMFF funding for Measure 3.1 in Spain. This budget is administrated by the IB of Canary Islands. As of January 2019, there were no projects presented by the Government of Canary Islands associated with this budget.

Concerning (ii), available data from 2019 on the level of EMFF allocation by IBs shows that Measure 3.1 consisted of EUR 79 million, of which EUR 64.3 million was managed by the IBs of the State General Administration, including IEO. Of this, IEO was allocated EUR 54.4 million from EMFF and is entitled to administrate this in its condition of IB[22]. The funds are devoted to diverse data collection activities conducted by the IEO laboratories in the diverse Autonomous Communities.

Some of the projects conducted since 2016 by the IEO laboratory of Canary Islands (Tenerife) related to fisheries data collection and co-funded by EMFF are: PACA-BIO Pesquerías Artesanales de Canarias – Biología de recursos vivos (Artisanal fisheries in the Canary Islands - Biology of living resources) and PACA-BADE (Pesquerías Artesanales de Canarias – Bases de Datos y Estadística (Artisanal fisheries in the Canary Islands - Data Bases and Statistics).

1.13 Other sources of funding

IEO and other parties in the Canary Islands (e.g. universities and the regional government), have participated in studies not directly connected with the DCF but which are relevant and provide fisheries knowledge. Such studies include GEPETO (Interreg) and ORFISH, which was funded by the EMFF direct management and coordinated by the Guadeloupe region.

22 http://www.ieo.es/documents/10640/32146/ieo25.pdf/f6c359b2-8e90-40ee-84ea-02fe94972d17

There are structural funds like the European Regional Development Fund (ERDF) which coordinates the MAC program (under the umbrella of 'Interreg'), which funds fisheries research and other activities like institutional strengthening and the environment. This program is devoted solely for the three ORs in Macaronesia and countries in Western Africa and Cape Verde. This fund has been mostly employed by universities for marine environment and ecosystems, and aquaculture research, but important fisheries projects have been also carried out under this funding. For example, a MAC project related to fisheries is MARPROF (2010-2012) which was aimed at providing a preliminary measure of stock abundance of deep-sea crustacea and better use of these in human consumption. This project was co-founded by the regional government of Canarias. The Table 5 below provides information on projects relevant for fisheries in the region from different funding sources. The MAC program has three Axes: (i) Scientific research; (ii) Environment; and (iii) Institutional strengthening.

Table 5: Selected projects funded by EMFF, ERDF (Interreg's MAC program) and other funding sources.

Project title	Objective	Funding source	Amount (EUR)	Beneficiary	Years
PLASMAR	To establish the bases for MSP in the islands, and in relation to fishing to establish an EAFM to the state of the fishing resources and to establish the spatial distribution of the biomass and fishing efforts	Interreg's MAC program	1,034,355.25	ULPGC and others	2014-2020
MACAROFOOD MAC / 2.3d / 015	To create a public-private partnership that develops synergies between marine and social sciences and gastronomy promoting tourism and local marine product. This strategy will improve the competitiveness of SMEs, favouring internationalization and innovation in the value chain.	Interreg's MAC program	624,801.00	ULPGC and others	2014-2020
MARISCOMAC MAC / 2.3d / 096	Development of technical conditions and scientific bases for the sustainable exploitation of fishing resources in the coastal and deep waters of Madeira, Canary Islands and Cape Verde and their commercialization and transfer of knowledge and technology to the fishing industry.	Interreg's MAC program	465,604.00	Municipality Chamber of Funchal and others	2014-2020
MARPROF-CV MAC / 3 / C124	MARPROF-CV continue to explore new perspectives in the field of sustainable development and the appreciation of Cape Verde's deep-sea resources,	Interreg's MAC program	671,842.00	Canary Islands Government and others	2007-2013
GOBAMP CSO 2013	Challenges for governance of artisanal fisheries activities, building synergies with conservation and tourism.	Ministry of Economy and competitiveness	59,290.00	ULL and others	2014-2017
ORFISH MARE/2015/06	Objectives: developing and optimizing fishing techniques to alleviate fishing pressure on coastal fish resources;	EU, EMFF direct management	750,000	Government of Guadeloupe	2017-2018

Project title	Objective	Funding source	Amount (EUR)	Beneficiary	Years
	raising awareness of the opportunities to develop innovative low-impact fishing techniques for small-scale fisheries; and creating sustainable fishing opportunities that will help employment in the fishing industry.			(leader) and others in PT, SP and FR	
PACA-BIO	This project covers DCF research activities of IEO on biological data of small pelagic and demersal species of interest in the artisanal fisheries of the Canary Islands. Funded by FEMP (80%). This project also includes other research activities on biology and life cycle of some target species of fish and cephalopods.	EU (EMFF)-IEO	55,272 (NB. staff expenses not included)	IEO	2016-2021 (the project is carried out since 2012)
PACA-BADE	Analysis of time series of fishery data for scientific monitoring of demersal and small pelagic resources of the Canary Islands. This project is linked to PACA-BIO.	IEO, EMFF	24,736	IEO	2016-2021
TURTROP	Monitoring the Spanish fleet and associated tropical tuna purse seine; tropical Spanish fleet and associated baitboat based in Dakar (Senegal) and The Canary Islands. It also aims to improve the understanding of the biology of the main big tropical species (yellowfin tuna, bigeye tuna and skipjack tuna) and small tuna (frigate tuna, Atlantic bonito, little tunny, wahoo). Moreover, the strategic situation of the Canary Islands, southern boundary of temperate tuna and northern for tropical tunas, making it an ideal place to study the behaviour of tunas and influences of environmental parameters on abundance, distribution and biology	EU (EMFF)-IEO	51,300 (staff expenses not included)	IEO	2019-2021 (the project is carried out since 2002)

Project title	Objective	Funding source	Amount (EUR)	Beneficiary	Years
MARCANTROP	Tagging activities in the east Atlantic within the framework of the Atlantic Ocean tropical tuna Tagging Programme (ICCAT-AOTTP). The objective was the conventional, electronic and chemical tagging of tropical tunas in the coastal zone between Morocco and Liberia, and in the Canary Islands zone.	ICCAT-IEO	88,422 (NB. staff expenses not included)	IEO	2016-2019
ESMARBI	The ESMARBI project deals with the development and application of the MSFD of the biodiversity Descriptors, as well as the assessment and new proposals for inclusion in the Spanish Inventory of Habitats and Marine Species, the Spanish Catalogue of Threatened Species, and the Spanish Catalogue of Endangered Habitats.	EU-IEO	223,320 (NB staff expenses not included)	IEO	2013-2016
COST ACTION FA 1301	A network for improvement of cephalopod welfare and husbandry in research, aquaculture, and fisheries	EU (Horizon 2020)	400,000	EU research institutes, including IEO	2015-2017
ESMARES2-C1EC	To address the obligations of the MSFD (2008/56/EC), transposed to the Spanish legislation in the Law 41/2010, for the Descriptor 3 (D3) of the Good Environmental Status (GES). It includes two parts: Commercial Species (EC1) and Commercial Species-additional data (EC2).	EU (FP7))-IEO	736,038	IEO	2019-2021
CEPHS&CHEFS	The objective of "Octopus, Squid, Cuttlefish, Sustainable Fisheries and Chefs" are to develop markets and products based on cephalopods, increasing profitability of the value chain, and fishers' competitiveness. Biological and socioeconomic sustainability will be	Interreg Atlantic Area	2,007,062	Several EU research institutions, including IEO	2017-2021

Project title	Objective	Funding source	Amount (EUR)	Beneficiary	Years
	evaluated and capacity to deal with economic challenges arising from the Landing Obligation, globalization, etc. will be enhanced.				
RESMARCAN	Monitoring of the fishing activity and assessment of the protection effect in the MPAs of the Canary Islands.	Spanish Ministries of Environment and Fishing	41,165 (NB. staff expenses not included)	IEO	2002-2012
INDEMARES-FUERTEG	Inventario y designación de la Red Natura 2000 en áreas marinas del Estado Español - Subproject Área de Fuerteventura-Gran Canaria.	EU (LIFE)-IEO	868,033	IEO	2009-2013
INDEMARES-CONCEPCION	Inventario y designación de la Red Natura 2000 en áreas marinas del Estado Español - Subproject Banco de la Concepción (Canary Islands).	EU (LIFE)-IEO	704,028	IEO	2009-2013
INTEMARES_A21	Improvement of the knowledge of seven Spanish LICs of the Red Natura 2000. The two LICs in the Canary Islands are East and South of Lanzarote and Fuerteventura Islands, and "Banco de la Concepción" (northern Lanzarote Island)	EU (LIFE)-IEO	488,697	IEO	2017-2021
INTEMARES_A4	Impact of fishing activities in LICs of the Red Natura 2000. Selected zones for the study were Cañon de Aviles, Canarias, Gulf of Cadiz and Menorca Channel	EU (LIFE)-IEO	798,877	IEO	2017-2021
MAMAR-SP	"Macaronesian Maritime Spatial Planning – MarSP. Reinforcement of MSP in Macaronesian archipelagos Azores, Madeira and Canary Islands", assist the competent authorities of the MS concerned in promoting	EU (EMFF)-IEO	225,210	IEO	2018-2020

Project title	Objective	Funding source	Amount (EUR)	Beneficiary	Years
	the development of operative mechanisms of MSP until 2021.				
OMARCOST	Strategy for the environmental sustainability of the transboundary littoral. Indicators of Environmental Quality and Biodiversity- Management of Coast and MPA. Main objective: Define and implement a strategy for environmental sustainability of areas with an environmental, recreational and productive interest through environmental and sectorial management.	EU (ERDF)-IEO	297,934 (IEO)	IEO, ULL, ITC, and Moroccan institutions	2012-2014
GEPETO	"Gestion de las Pesquerias y Transnational Objetivos) made a concrete contribution to public policy for regionalization of fisheries management – GEPETO" focused on coordination, elaboration of fisheries atlas, management units, and long-term management plans for some pilot fisheries. Diverse stakeholders were part of the project.	Interreg MS, EC, and the Conference of Peripheral Maritime Regions funded this initiative.	86,745 (IEO, staff expenses not included)	IEO, AZTI, CETMAR, IPIMAR	2012-2014
ABACO	To evaluate the ecological indicators of the Macaronesia coastal area. Cape Verdean technicians will be trained by EU scientists allowing to achieve project's objectives. Regions covered: Azores, Madeira, Canary Islands, and Cape Verde (cooperation). In the EU'S ORs, some actions will be carried out on specific islands, while others involve monitoring activity.	Interreg	318,616 (IEO)	IEO, ITC, and others	2019-2021

1.14 OR funding for data collection

The table below shows funding for fisheries data collection, within and outside the DCF. Note that in the case of Interreg's projects and EU funded projects, the numbers provided are the sum of the projects provided in the previous Table 5.

Table 6. Funding for fisheries projects comprising data collection in the period 2014-2019

Source	Funding	Beneficiary	Observation
EMFF to IEO for DCF (Canary Islands)	7,958,000	IEO	Estimation for the period 2014-2020
Diverse Interreg[23] projects concerning diverse marine and fisheries topics	2,123,000	Diverse entities in Canary Islands and other Macaronesia regions	Fisheries data collection (outside de DCF) is only one of the many elements of these research projects. Consider also that other regions are covered by these projects.
Diverse European Commission's projects concerning fisheries in Macaronesia or comprising Macaronesia [24]	750,000	Diverse entities in Canary Islands and other ORs regions	Fisheries data collection (outside de DCF) is only one of the many elements of these research projects. Consider also that other regions are covered by these projects.

Current state of data collection obligations

The main obligations for data collection within the Canary Islands fisheries in the context of the EU-MAP concern collecting data on fisheries activities in national, international and third country waters. Despite this, fisheries in third country waters are only applicable to limited artisanal fisheries activity in Moroccan waters targeting demersal fish species.

Data collection obligations for the Canary Islands include the respective métiers of small pelagic, tuna and demersal species. Concerning length frequencies and other biological sampling, the EU-MAP establishes an obligation to collect data for a number of species provided that their catch is higher than 200 tonnes per year. For the Canary Islands, these species include parrotfish, sardine, mackerel, horse mackerel, sardinella, bluefin tuna, albacore, skipjack, bigeye tuna, yellowfin tuna and swordfish. Parrotfish catches do not always reach 200 tonnes per year, nevertheless it is selected for length sampling (at sea and at port) because is the most caught species in the demersal métier (MIS_DES_0_0_0); the majority of such catch will be locally consumed.

23 Projects: PLASMAR, MACAROFOOD and MARRISCOMAC

24 Project OR fish

Fulfilment of specific obligations under the different métiers have been improved in the recent decade, with the inclusion of a new fishing ground named "Canary" within the CECAF region (report RCG-LDF 2015) and two métiers for small pelagic fish (2013) and demersal species (2015) approved in the respective reports of RCG-LDF. Tuna métier for the Canary Islands was included in the DCF earlier (2003), and seasonal tagging campaigns have been conducted in the past, in cooperation with fishermen and supported by ICCAT.

In recent years, the Canary Islands has achieved considerable progress in the collection of information from small scale fleets, by establishing a programme of observers on board in Tenerife Island. The at-sea sampling scheme examines the retained and discarded catch (concurrent length sampling). This program was launched in 2015 for the métier MIS_DES_0_0_0 targeting demersal species. From 2016 onwards sampling intensity on board the demersal fleet was increased up to two samplings per month. Later, in 2017 the program was extended to the métier PS_SPF_10_0_0 targeting small pelagic fish (one sampling per month). The sampling on board is complemented with length sampling at market for the most important species. Funding for this work is DCF (80%), and IEO (20%) (Table 6). Additional length sampling is collected for commercial species that are not required stocks under the DCF, because their catches are lower than the minimum threshold required for data collection (i.e. 200 tonnes annually). The sampling network of IEO (Red de Información y Muestreo of IEO (RIM)) has covers the most relevant commercial species landed in the Canary Islands.

The current sampling obligations under DCF are:

a) Length sampling

- Concurrent length sampling[25] at market (main landing sites) for tuna fish (métier LHP_LPF_0_0_0 (MSP).
- Concurrent length sampling at sea of purse seiners PS_SPF_10_0_0 (1 sampling per month) and demersal fleet MIS_DES_0_0_0 (≥2 samplings/month) in Tenerife Island (and Gran Canaria from March 2021 onwards). Retained and discarded catches are sampled on board.
- Stock-specific length sampling at market of the main target species of all métiers. This covers parrotfish (MIS_DES_0_0_0), and targeted small pelagic species (PS_SPF_10_0_0) and tuna (LHP_LPF_0_0_0). Sampling is performed on a monthly basis and covers the main landing sites of each métier in the whole archipelago.

b) Biological Sampling

- Large pelagic samples caught in the Canary Islands are sampled in the lab to obtain reproductive data. Species sampled are bigeye tuna, skipjack tuna, yellowfin tuna, albacore tuna and Atlantic bluefin tuna. Growth structures (otoliths) have been collected for the latest species (Atlantic bluefin tuna), under the framework of specific projects co-funded by ICCAT. The number of biological samplings and temporal coverage within the year depends on the availability of specimens for

25 As defined in Chapter I of Annex of Commission Decision No. 2010/93/EU: sampling all or a predefined assemblage of species, simultaneously in a vessel's catches or landings.

sampling in the landing sites, and is limited by the high prices of these species at market, as these species are all bought from fishers.

- Four small pelagic species are monthly sampled in the lab to collect biological-reproductive parameters (samples caught in Tenerife Island, métier PS_SPF_10_0_0): horse mackerel, mackerels, pilchard and round sardinella. Collection of hard structures (otolith, spines) for growth analysis is also carried out for mackerels and Atlantic bluefin tuna.

As for obtaining a series of indices of abundance / biomass independent of the fishery, the IEO has been conducting pilot experiences since 2016 in order to establish a methodology using acoustic methods applicable in the Canary Islands for the main small pelagic species. However, it is an issue that is still under study and factors such as the geomorphological characteristics of the islands may be making it difficult to obtain satisfactory results, and it is necessary to continue with the effort to adapt acoustic tracking designs and trawl fisheries for the identification of echo-signals that allow obtaining abundance indices for the Canary Islands.

With regard to the EU-MAP (2022 - 2027), it does not seem necessary to enlarge the number of species for sampling in the Canary Islands, although it seems appropriate to envisage the extension of length sampling to include biological sampling of parrotfish to update the biological knowledge of the species for a future stock assessment, as the main target species of the demersal fleet (métier MIS_DES_0_0_0). In addition, although unknown, general overfishing has been identified in the fishing grounds where artisanal fleets operate. Since the early 1990s the biology of the species has not been updated, and González (2008) provided reasonable indications to think that the species is in a state of overexploitation in the Canary Islands.

The inclusion of data from recreational fisheries would also be advisable. In addition, a programme of observers on board the tuna bait boat fleet would be of great interest in the Canary Islands, as it could allow the collection of data on live bycatch and of the live bait caught by this fleet, which comprise of small pelagic species targeted by the métier of purse seiners (mostly mackerels).

Regarding spatial coverage, it would be desirable to extend the biological sampling and at sea sampling to eastern part of the Canary Islands. In 2021 the programme of observers on board has been implemented to cover, for the demersal and purse seiner métiers, the eastern part of the Canary Islands (i.e. Gran Canaria Island). Such work will improve and clarify the degree of mixing of the populations of small pelagic species across the archipelago. This implementation is planned to be included in the next Spanish DCF work plan.

Fisheries management and conservation measures

1.15 Management and conservation measures

1.15.1 National

The Regional Government established in 2003 the "Ley de Pesca" (Fisheries Act), which regulates *inter alia* the commercial and recreational fishing activities within internal maritime waters. This law was amended in 2019 in order to give further consideration to some fisheries activities linked to tourism. The Regulation of this law (Decree 182/2004)

was established in 2004 and regulates the fishing in the Canary Islands, including the specific use of fishing gears.

Minimum conservation sizes for fish caught in internal maritime waters are established in Decree 155/1986. This law includes minimum sizes for a number of commercially important species (parrotfish, several sparid and serranid species, red mullet, tropical tunas, mackerel and horse mackerel). The Real Decree 1076/2015, amends former rules for fishing modalities and fishing gear (updated in Orden 2536/2015) and updates the list of minimum conservation sizes for some species caught in waters around the Canary Islands. Later updates of fishing gear and modalities were published in Orden 2536/2015 and Orden 441/2019. Trawling is banned in the Canary Islands, and in waters adjacent to the Canary Islands.

The Canary Islands holds an area of 100 nm for exclusive use of its fishing fleet (Regulation EU 1380/2013, art. 5). This exemption expires in 2022.

Some coastal areas are protected by temporal or spatial closures, while the Canary Islands also have three Marine Reserves: La Palma (Legal Order of July 18, 2001) , La Graciosa (Decree 62/1995), and La Restinga (Decree 30/1996) However, there is no active monitoring of such reserves to examine the effects of fishing reduction on the area closed, the potential spill over effects (i.e. fishes moving outside of the MPA) on fisheries in adjacent, or the potential impact of moving fishing effort into regions outside of the MPA (Despite this, in Macaronesia fisheries management, emphasis is placed on the use of MPAs as a management measure. The use of such spatial management implies the understanding of environmental variables, oceanography, habitats, area effects, etc on fisheries; such inclusion of a range of parameters are not predominantly undertaken in traditional fisheries management. Therefore, the work carried out to develop MPAs may then be useful furthering an ecosystem based approach for managing fisheries. Other management measures, both at regional and national level are available online[26].

1.15.2 International

For demersal and small pelagic stocks outside the Canary Islands' EEZ, the relevant fisheries body for management is CECAF. However, CECAF is an advisory body providing science-based advice but management recommendations are not legally binding. Thus, it cannot establish conservation and management measures as an RFMO but scientific recommendations could be provided for the CECAF area 34.1.2, where the Canary Islands is located.

Regarding tuna fisheries, management and conservation measures are established in the framework of ICCAT recommendations. A multiannual recovery plan for Atlantic bluefin tuna in the eastern Atlantic and Mediterranean applies from 2007 to 2022 (Regulation (EU) 2016/1627)[27]. One of the ICCAT recommendations having a major impact in Canary Islands fisheries is Rec [19-04] regarding the management plan for Atlantic bluefin tuna. This recommendation establishes a 100 tonne "sectorial quota" for tuna bait boat vessels of EU ORs. According to Council Regulation (EU) 2020/123 (TAC/quota Regulation for 2020) a share of 87.3 tonnes corresponds to Canary Islands artisanal fleet. Rec [16-06]

26 See https://www.gobiernodecanarias.org/pesca/servicios/normativa/

27 Regulation (EU) 2016/1627 of the European Parliament and of the Council of 14 September 2016 on a multiannual recovery plan for bluefin tuna in the eastern Atlantic and the Mediterranean, and repealing Council Regulation (EC) No 302/2009. (OJ L 252, 16.9.2016, p. 1–52)

for albacore tuna and Rec [19-02] for tropical tunas are also relevant for the Canary Islands fleet, which holds a share of the Spanish allocation within the EU quota. Catch limits for billfish relevant for Canary Islands are to be established early in 2020, Rec [19-05].

Artisanal purse seiners targeting small pelagic species (anchovy, horse mackerel, jack mackerel and mackerel), for which scientific evidence demonstrates high survival rates, have an exemption from the landing obligation (Art. 15(4)(b) of Regulation (EU) 1380/2013[28]). This was established in Regulation (EU) 2014/1394[29] concerning a Discard Plan for certain pelagic fisheries in south-western waters.

Other regulations affecting the Canary Islands are:

- Regulation (EU) 2019/1241 prohibits the deployment of bottom set gillnets, entangling nets and trammel nets at depths greater than 200 m, or bottom trawls or similar towed gear within an area including the Canary Islands.
- Council Regulation (EU) 2020/123 (TAC/quota Regulation for 2020) included a quota to be established for horse mackerel (JAX/341SPN) in waters around the Canary Islands.

1.16 Background to scientific advice and data requirements

1.16.1 National

Scientific advice to the regional, national and EU administrations is provided by the IEO, which collects information for all relevant fisheries in the area. IEO scientists are responsible for the collection of fisheries data at national level. The Canary Islands Universities (Las Palmas de Gran Canaria, La Laguna) also perform advisory commitments to the regional government.

There have been some efforts undertaken to gather expertise from the different Canary Islands fisheries research institutions. During 2008, the REPESCAN Workshop was held at Las Palmas de Gran Canaria (González, 2008) to review the level of exploitation of Canarian stocks. As a result, the Canary Islands government has a report assessing the state of general overexploitation of demersal fishery resources within the archipelago. In 2012, scientific advice about minimum sizes for most of the important fisheries species of the Canary Islands was published. In 2020, the Fishery Office of the regional government created a working group for the management of the fishery resources, with participation of research institutions like IEO and local universities. The main goal of this working group will be to analyse and discuss proposals from the fishing sector in the Canary Islands. Within this group, since 2020, a new concept of "fishery essentiality", which is linked to the economic viability of artisanal fisheries and fisher's behaviour; this term expresses how essential that species is to that fishery in an economic sense. This is under review to be published, and is being used to influence management decisions.

28 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. (OJ L 354, 28.12.2013, p. 22–61)

29 Commission Delegated Regulation (EU) No 1394/2014 of 20 October 2014 establishing a discard plan for certain pelagic fisheries in south-western waters. (OJ L 370, 30.12.2014, p. 31–34)

1.16.2 International

In the international sphere, IEO scientists participate in the relevant assessment working groups reporting to the Scientific Sub-Committee of CECAF and to the Standing Committee for Research and Statistics (SCRS) of ICCAT. Moreover, IEO staff also participate in the Joint Scientific Committees of the different SFPAs between the EU and some NW African coastal states. The IEO regularly provide the information on main fisheries species (sardine, horse mackerel, Atlantic chub mackerel, sardinella and parrotfish) to the relevant regional fisheries body (CECAF) with a view to use this information in a future stock assessment focusing on the Canary stocks (FAO 2018; 2020)

The DCF contains clear provisions in terms of sampling requirements and data collection which are in line with the needs and standards of the above-mentioned end users. In this context, the Regional Coordination Groups (RCG) under DCF provide elaboration of proposals on methodologies, strategies or sampling schemes under regional related topics. Those related to CECAF are discussed in the RCG Long Distance Fisheries.

Shortcomings or obstacles to fisheries management

The table below provides a potential framework to structure information obtained from literature review and stakeholder consultation for the analysis, which may be specific to the metier (gear/vessel) or at a higher level, such as "domestic commercial fisheries". Given the predominance of small-scale multi-gear fisheries in the Canary Islands, the Table 6 concerns all the domestic fisheries and all métiers.

Table 6: Summary of shortcomings or obstacles to fisheries management

Category	Shortcoming or obstacle
Stocks	Stock boundaries unknown. Gaps in knowledge of stock status, which may lead to overfishing (overfishing has been identified in most fishing grounds where the SSF operates).
Institutional structures	There is a general need to improve the communication amongst stakeholders (Authorities, Scientists and Fishers), particularly between Fishery and Environmental Offices at national, regional and local levels. There is a lack of a Regional Scientific Institution of reference (apart from universities). The IEO-Canary Islands is a National Institution in charge of DCF requirements in the archipelago but also works in other regions where Spanish fleets operate.
Funding and funding structures	Data collected in the framework of EU funded projects and other funding is in general not easily accessible for research entities and other interested actors. Ensure the use of EMFF funds allocated to the regional government.
Data collection and other reporting obligations	Biological sampling of target species is limited to small pelagics (Tenerife Island). The biological sampling performed of tuna species has not enough coverage (high price of specimens). The Canary Archipelago presents well known latitudinal gradients of the characteristics and the circulation scheme of the water

Category	Shortcoming or obstacle
	masses, with very different conditions among islands, which should be considered in the future and cover samplings in other relevant islands. There is a need to quantify bait captures of small pelagics (mostly as live-bait by tuna bait boats). A program of observers on board this fleet would be advisable for this purpose, and also to collect bycatch data. The absence of fishery independent indices of biomass. First sale data: Registration of landings has gaps for labelling accurately the name of species. Guilds lack the resources to have effective first sales registration in all landing sites, which may lead to problems in the declaration of first sale prices. Fishing effort by species is difficult to estimate accurately as it is usually directed by a mix of gears to a multiple species (mixed and multi-specific fisheries). Complexity in assigning the capture and effort of a trip to a specific metier ("metierization") due to the polyvalence and opportunistic use of different gears during the trip. As well, first sale data lack of reliable information about fishing gear, which undermines *metierization* possibilities. Fisheries footprint (geographical distribution of fishing effort) does not exist for the fleet (the majority) lacking VMS and/or AIS Recreational activities: a challenge for data collection. There is a need to implement a recreational fishing data collection system with less uncertainly due to its significant role in the fishing activity and the ecological system. The need to incorporate fishing mortality caused by recreational fisheries is crucial for assessment and management of the fisheries. Genetic data collection could help to monitor the effect of MPAs on conservation of resources. The socioeconomic data collected under the DCF seems scarce and not considering the peculiarities of the small-scale fisheries. Data available in institutions such as IEO but there are limitations of time/staff to analyse them (e.g. age and growth data, on-board sampling data).
Management and conservation measures	Management measures are not fully based on science. Only large pelagic stocks are assessed, and have TACs in use, under ICCAT mandate. Potentially unbalanced fleet (i.e. overcapacity of the fleet in relation to the fishing opportunities (Regulation (EU) 1380/2013[30]) due to (i) poor estimation (probably underestimated) of local fishing products value because the sale and marketing system devalue prices; (ii) underestimation of the fishing ground size as it

[30] OJ L 354/22 (28.12.2013) p. 22-61

Category	Shortcoming or obstacle
	is standardized to 1 mile because there is no VMS, and (iii) great underestimation of the fishing effort as it is estimated using the first sale data (e.g. existence of fishing days in which fish is not landed because is kept frozen for several days, or because is caught by traps that are still in the water). This shortcoming comes from the interview with the Fishery Directorate of the Regional Government. Recreational catches are estimated of being up to 70% of the total catches in the Canary Islands, however the landings by species are not reported/collected. MPAs. Management of Marine Reserves is not supported by monitoring by a scientific institution of reference since 2011-2012. Marine Reserves are required to support fisheries management in islands within the archipelago where they do not currently exist.
Others	The level of IUU fishing activity has not been estimated throughout the Canary Islands.

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1.17 References

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1.18 Institutions

Here we provide details of each institution. The schematic diagram with their relationships is shown in Figure 7.

Gobierno de Canarias, Dirección General de Pesca. Landing data (First Sale Notes) are collected by this department from the main landing sites of each island. It promotes and coordinate the exercise of the functions in matters of maritime fishing, shellfish and aquaculture, fishing inspection and surveillance, management of the fishing sector, commercialization and fishing industrialization, fisheries research, professional training in maritime fishing and teaching of recreational navigation and activities recreational and professional underwater activities. See at:
http://www.gobiernodecanarias.org/transparencia/temas/organizacion/informacion-organizativa/departamentos/organigrama/organigrama/ficha-unidad/?uo=39153

Ministerio de Agricultura, Pesca y Alimentación, Secretaría General de Pesca Sostenible. *Management and MCS.* It ensures that the national activities and data are implemented and provided on time. It receives the landing data from regional governments (e.g. Canary Islands) and provides them as national representative for DCF and official data calls, with the scientific advice and support of IEO. See at: https://www.mapa.gob.es/es/ministerio/funciones-estructura/organigrama/funciones-dg-pesca-sostenible_tcm30-536062.pdf

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Instituto Español de Oceanografía (IEO-CSIC), Centro Oceanográfico de Canarias. The IEO prepares, coordinates and manages research and technological development programs on living marine resources in the different seas and oceans, with special reference to those that are of interest to the fishing sector in Spain. It represents the State in international scientific forums related to oceanography and fisheries, in coordination with the Ministries of Foreign Affairs and Cooperation, and of the Environment, and Rural and Marine Affairs. The IEO will be considered a reference body for the declaration of fisheries protection zones, marine protected areas and other spaces. There is an Oceanographic Center in the Canary Islands located in Tenerife working on the monitoring (DCF) and research of the artisanal fisheries in the Archipelagos. See all functions of IEO at: http://www.ieo.es/en/funciones

Universidad de La Laguna (Tenerife). Research activities (specific projects, thesis, articles) that contributes to improve the knowledge of the Canary Islands species and thus to the provision of better scientific advice. Two research groups are involved in fishery research.

- *Grupo de investigación en Biodiversidad, Ecología Marina Y Conservación. Facultad de Biología* Mainly focused in the field of biodiversity and marine ecology. Details at:https://www.ull.es/investigacion/grupos-investigacion/biodiversidad-ecologia-marina-y-conservacion-bioecomac/
- *Instituto Universitario de Investigación Social y Turismo.* Details at https://www.ull.es/institutos/instituto-universitario-de-investigacion-social-y-turismo/informacion-general/

Universidad de Las Palmas de Gran Canaria (Gran Canaria). Research activities (specific projects, thesis, articles) that contributes to improve the knowledge of the Canary Islands fisheries and thus to the provision of better scientific advice. Mainly focused in the field of marine ecology applied to fisheries. Several institutes and research groups are involved in fishery research:

- *Grupo Ecología Marina Aplicada a Pesquerías* http://www.iunat.ulpgc.es/iunat-contenido-TWpZPQ
- *Departamento de Biología* https://aplicacionesweb.ulpgc.es/gir/detalle/2917
- *ECOAQUA Group. Parque Científico Tecnológico Marino, Taliarte* https://ecoaqua.ulpgc.es/es

ICCAT (International Commission for the Conservation of Atlantic Tunas). Assessment and scientific advice of tuna and tuna-like species in the Atlantic Ocean. Assessments underpin the scientific advice for management that is provided by the Standing Committee on Research and Statistics to the Commission: They aim at evaluating the sustainability of current and proposed future harvest practices in light of the Commission's objective to maintain the populations at a level that permits their maximum sustainable catch. https://www.iccat.int/en/assess.html

CECAF (Fishery Committee for the Eastern Central Atlantic). FAO international body. Regional Fisheries Management Organization to assess the state of resources within the CECAF area (area FAO 34) and make recommendations on fisheries management and exploitation options aimed at ensuring sustainable fisheries. The CECAF Scientific Sub-Committee established three permanent Working Groups, further subdivided in five Working Groups to address small pelagic species (North and South), demersal species (North and South), and artisanal fisheries. The general objective for the small pelagic and demersal Working Group is to assess the state of resources within the CECAF area and make recommendations on fisheries management and exploitation options aimed at ensuring sustainable fisheries. The general objective for the artisanal fisheries Working Group is to improve regional knowledge on small-scale fisheries in CECAF member countries (latest report: http://www.fao.org/3/ca9183b/ca9183b.pdf). The Scientific Sub-Committee reviews the results of the Working Group assessments and formulates management advice for the stocks, which are then endorsed by the Member Countries during the Committee sessions. Working Groups should meet as required and on an inter-session basis. However, CECAF is facing continuous structural and financial difficulties that hampers the efficiency and paces to provide regular scientific advice for fisheries management. Only the small pelagic WG (North) manages to meet every year while for the remaining ones the frequency is less regular. The FAO/CECAF report of each WG is usually available with certain delay, by the following year. Source http://www.fao.org/cecaf/en/

Martinique

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Martinique Profile Report

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Acronyms

Term	Description
AFD	Agence Francaise de Developpement
ASFIS	Aquatic and Science Fisheries Information System
CNSP	Centre national de surveillance des pêches
COPEM	Collectif Pêche Martinique
CROSS	Centres régionaux opérationnels de surveillance et de sauvetage
CRPMEM	Comité regional des pêches marines et des élevages marins
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DM	Direction de la Mer
DPMA	Direction des pêches maritimes et de l'aquaculture
EASME	Executive Agency for Small and Medium Sized Enterprises
EMFF	European Maritime and Fisheries Fund
ENSAM	Ecole Nationale de la Sécurité et l'Administration de la Mer
ETP	Endangered, Threatened and Protected
EU	European Union
FAD	Fish Aggregating Device
GEI	Groupe EI
Ifremer	Institut Français de Recherche pour l'Exploitation de la MER
IRD	Institut de Recherche pour le Développement
LEMNA	Laboratoire d'économie et de management de Nantes-Atlantique
MCS	Monitoring, control and surveillance
NGO	Non-governmental organisation
OBSDEB	Observation des Marées au débarquement
OFB	Office Français pour la Biodiversité
OR	Outermost Region
SIH	Système d'information halieutique
SIPA	Système d'information de la pêche et de l'aquaculture
SMEFF	Sustainable management of external fishing fleets
WECAFC	Western Central Atlantic Fisheries Commission

1 Introduction

1.1 Geographic and economic characteristics

Administrative status: Martinique is also a single territorial collectivity of France[1]. It is an Outermost Region of the European Union. Geography: Martinique is only one island of 1 128 km^2 with a coastline of 452km (Lemoigne *et al.*, 2013)

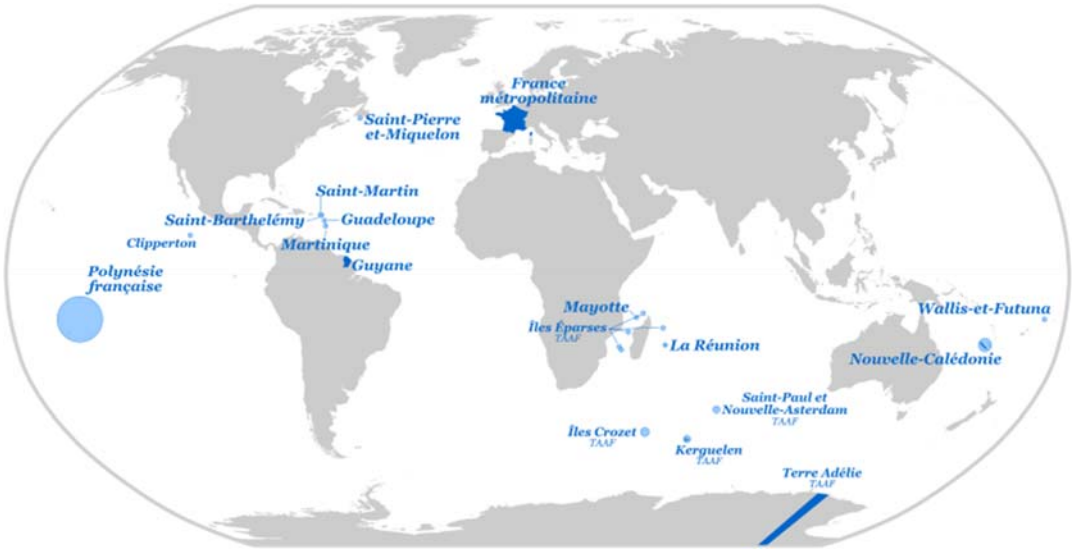

Figure 1: France Metropolitan vs Outermost Regions and French Territories (source Wikipedia https://fr.wikipedia.org/wiki/Fichier:France_Overseas.svg)

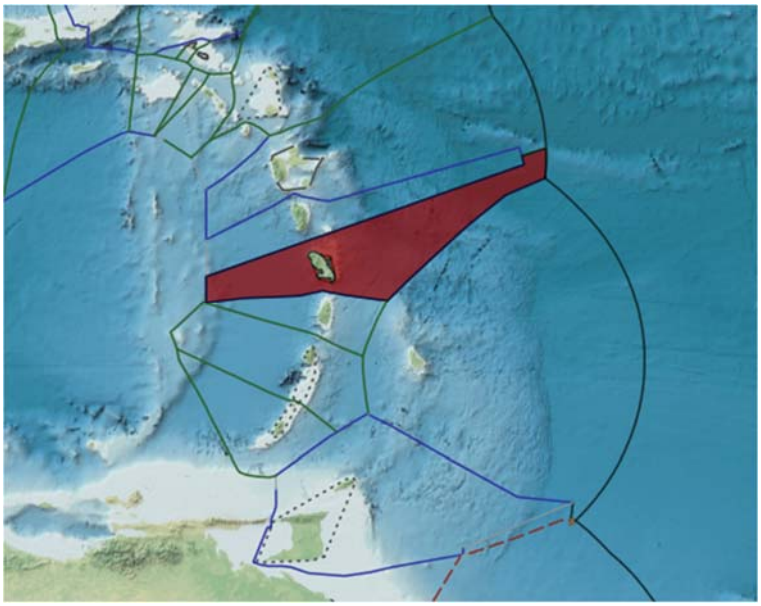

Figure 2: Map of Martinique and its EEZ (source: https://www.marineregions.org/eezdetails.php?mrgid=33178&zone=eez)

[1] Note: in this document, the term Metropolitan France ("*France métropolitaine*") will be used to differentiate the French territory in Europe from the Outermost Regions (Guadeloupe, Martinique, St Martin, French Guiana, La Réunion and Mayotte).

Figure 2 presents the position of Martinique in the lesser Antilles arc, between Dominica 90 km north and St Lucia 40 km south. It is situated 190 km south of Guadeloupe, and 6 850 km from Paris, capital of Republic of France in Europe.

Table 1: General geographic indicators

Description	Unit	Source
Country area	1,128 km2	FAOSTAT2
Land area	1,128 km2	FAOSTAT1
Coastal Line	452 km	Lemoigne, 2013
Population size	372 594	INSEE, 2019
Exclusive Economic Zone (EEZ) area	47 000km^2	Senat[3] / VLIZ[4]

1.2 Fisheries statistics

The total wild capture fisheries production for Martinique as reported by FAO is presented in Figure 3. Up to and including 2013, reported catch statistics were estimates only. However, from 2013 onwards reported catches from SIH were integrated into the data. Figure 4 illustrates this alignment of values after 2013 between the two datasets. The difference comes from increased estimated values by FAO for Marine Fish 'nei', which are higher than those reported by the Institut Français de Recherche pour l'Exploitation de la Mer[5] (Ifremer). However, the reason for this discrepancy is unclear.

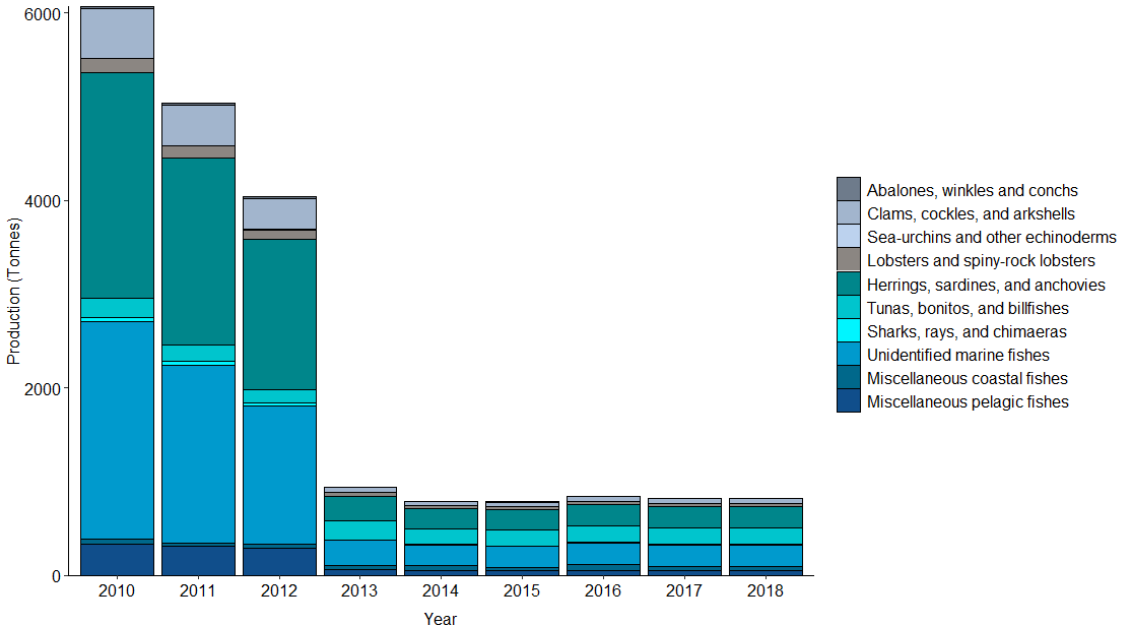

Figure 3: Total capture production (source: FAO FishStat)

2 http://www.fao.org/faostat/en/#data/RL

3 https://www.senat.fr/rap/r13-430/r13-43012.html

4 http://www.marineregions.org/

5 French Research Institute for the Exploitation of the Sea

There is evidence to suggest tension between fishers associations and Ifremer[6]. Fishers associations estimated catches around 10 461 tonnes when Ifremer reported only 1 400 tonnes. The 10-year time series then published by Ifremer (Figure 4) proved that 1 600 tonnes was more realistic, with a decrease over 10 years to 750 tonnes in 2017, which is in line with decreases in fishers population.

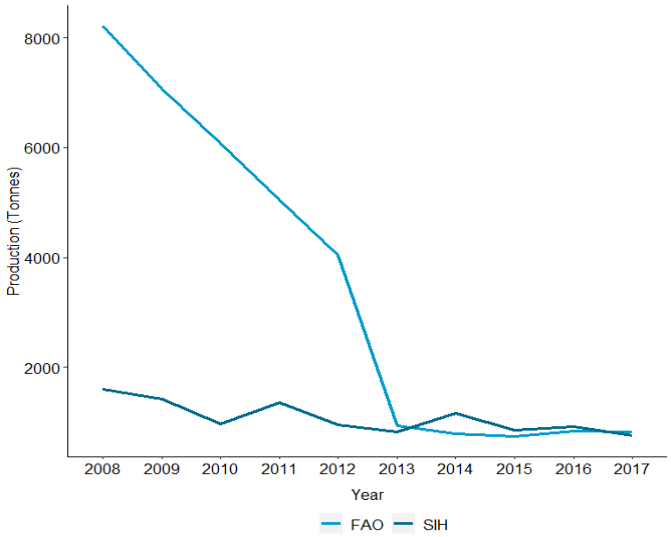

Figure 4: **Comparison total capture production reported by FAO and SIH between 2008 and 2017**

Regarding trade of fish and fishery products (import/export), there is extremely disaggregated data available on the French customs website[7], which would require an in-depth extraction and compilation of data, which is outside the scope of this study. In addition, there are no specific time series available for Martinique with regards to consumption of fish per capita. Information for national (i.e., France) consumption shows 24.2 kg per person per year for fish, and 35.6 kg per person per year[8] for all seafood products (Figure 5).

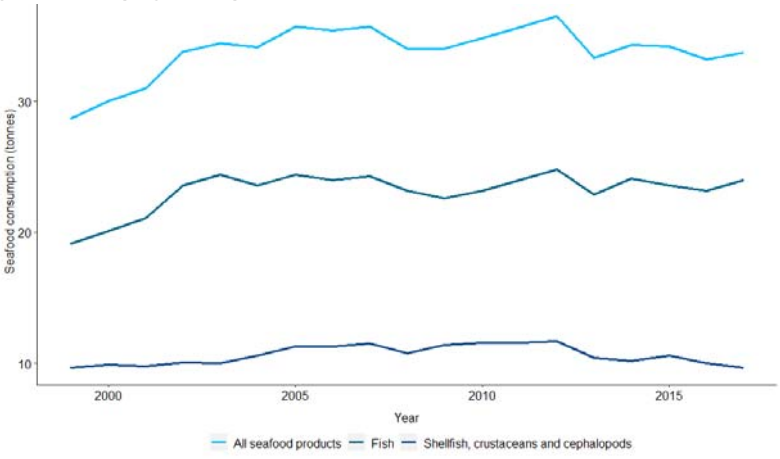

Figure 5: **Composition of per capita fish supply for France, including OR (source: FranceAgrimer)**

6 https://lemarin.ouest-france.fr/articles/detail/items/les-donnees-chiffrees-de-la-peche-contestees-en-martinique.html

7 https://www.douane.gouv.fr/la-douane/opendata?f%5B0%5D=categorie_opendata_facet%3A459

8 https://www.umr-amure.fr/wp-content/uploads/2018/08/situation-peche.pdf

1.3 Regional fisheries management

EU-France is a contracting party to the International Commission for the Conservation of the Atlantic tunas (ICCAT[9]), which is a tuna Regional Fisheries Management Organization (t-RFMO). ICCAT recommendations are binding to Contracting and Cooperating Parties (CPC). EU-France is also a member of the Western Central Atlantic Fisheries Commission (WECAFC). WECAFC is a regional fishery body established under article VI of FAO, though its recommendations are not legally binding to France.

9 https://www.iccat.int/en/index.asp

2 Fish stocks and other marine organisms and associated fishing activities

The number of exploited stocks in Martinique all occur within the EEZ (Table 2). All reported stocks are extracted from Blanchard et al. (2018), which has compiled all stocks for Martinique. Some information provided within this table was also taken from Weiss et al. (2019), which provide a summary of catches in Martinique for 2018; 2019 has not yet been published. Lastly, this work has also used the yearly summary of exploited stocks in Martinique, which is published by Ifremer. Of the total of 65 stocks monitored only five are subject to formal stock assessments (Table 2). The list of stocks presented reflects this variety of catches and the topology of the multigear artisanal fisheries in Martinique.

Table 2: Number of stocks monitored in Martinique (source: Blanchard et al. 2018, part II).

Region	S	Se	%ne	Dpe (tonnes)	%De	V (EUR million	% Ve
Martinique	65	5	94	248	31	9.4	28

Legend: S, species or group of species whose landing is monitored; Se, number of stocks subject to formal assessment; % ne, percentage of stocks (species) or group of stocks not subject to assessment; Dpe, landings in quantity (tonnes) of assessed stocks; % Of, percentage of stocks assessed by weight; V, value of landings (EUR million); % Ve, percentage of stocks valued in 2017.

In-country consultations with Ifremer during January, 2021 indicated they had assessed that the information collected for 12 main fished species within Martinique (e.g., snapper, lobster, conch) was sufficient to implement a first data limited models to under stock assessments for this species[10] (Froehlicher et al. 2019). Their work has shown that data limited models using the current knowledge of such fisheries (e.g., catch and effort data, as well as some biological parameters) provided reliable stock assessment information. For all the other species in which there was not a formal stock assessment, the basic biological data needed for such assessments (e.g., breeding rate, natural mortality rate, mortality by predation) were not sufficiently collected for such species to undertake a reliable stock assessment. Importantly, a study by Ifremer has been started in 2020 to collect more biological data (using funds from the Agence Francaise de Developpement (AFD) to buy fish directly from fishers) to fill gaps in the biological knowledge of the main fished species in Martinique waters to conduct and improve stock assessments of such species.

10 https://archimer.ifremer.fr/doc/00595/70677/71784.pdf

Table 3: Assessed stocks within Martinique waters

Species	Scientific name	RMFO	Date	Assessment
Yellowfin tuna	*Thunnus albacares*	ICCAT	2016	Overexploited / not overfished
Blue marlin	*Makaira nigricans*	ICCAT	2018	Overexploited / overfished
White marlin	*Tetrapterus albidus*	ICCAT	2012	Overexploited / not overfished
Atlantic sailfish	*Istiophorus albicans*	ICCAT	2016	Not Overexploited /not overfished (West Stock)
Skipjack tuna	*Katsuwonus pelamis*	ICCAT	2014	Not Overexploited / not overfished (West Stock)

Fisheries in Martinique catch a large variety of fish. The type of multigear artisanal fisheries (see Section 2.2.1 Domestic fisheries) operating in the island's water does not target specific species and is an opportunistic type of fisheries. Interviews conducted with fishers in Anse d'Arlet and Le François highlighted typical daily shifts in gear over a week. A seasonality exists for the large pelagic fishes, while some species are subject to conservation measures. Commercial fish stocks

2.1.1 Small and medium pelagic

There are a range of small pelagic (Table 4) and medium pelagic fishes (Table 5) fished within Martinique waters. Such species include needlefish, carangids, clupeids, flying fish, halfbeak, scad, barracuda, seerfish (Spanish mackerel), rainbow runner and shark.

Table 4: Small pelagic fishes fished within Martinique waters.

ASFIS Code	French name	Scientific name	ASFIS en Name
BEN	Orphies, aiguilles (divers)	*Belonidae*	Needlefishes, etc. nei
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad
CGX	Carangidés nca	*Carangidae*	Carangids nei
CLU	Clupéidés nca (Harengs, sardines, anchois, etc.)	*Clupeoidei*	Clupeoids nei
FLY	Exocets nca	*Exocoetidae*	Flyingfishes nei
GBA	Barracuda	*Sphyraena barracuda*	Great barracuda
HAX	Demi-becs nca	*Hemiramphus spp*	Halfbeak
MSD	Comète maquereau	*Decapterus macarellus*	Mackerel scad
SDX	Comètes nca	*Decapterus spp*	Scads nei
YTL	Sériole limon	*Seriola rivoliana*	Longfin yellowtail

Table 5: Medium pelagic fishes fished within Martinique waters.

ASFIS Code	French name	Scientific name	ASFIS en Name
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei
BEN	Orphies, aiguilles (divers)	*Belonidae*	Needlefishes, etc. nei
DGX	Squales nca	*Squalidae*	Dogfish sharks nei
GBA	Barracuda	*Sphyraena barracuda*	Great barracuda
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei
RRU	Comète saumon	*Elagatis bipinnulata*	Rainbow runner
SBL	Requin griset	*Hexanchus griseus*	Bluntnose sixgill shark

2.1.2 Large pelagic

There are a range of large pelagic fishes that are fished within Martinique waters (Table 6). Such species included a range of marlin, sailfish and tuna, as well as dolphinfish.

Table 6: Large pelagic fishes fished within Martinique waters.

ASFIS Code	French name	Scientific name	ASFIS en Name
BIL	Makaires,marlins,voiliers nca	*Istiophoridae*	Marlins,sailfishes,etc. nei
BLF	Thon à nageoires noires	*Thunnus atlanticus*	Blackfin tuna
BON	Bonite à dos rayé	*Sarda sarda*	Atlantic bonito
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
SAI	Voilier de l'Atlantique	*Istiophorus albicans*	Atlantic sailfish
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna
SPF	Makaire bécune	*Tetrapturus pfluegeri*	Longbill spearfish
SWO	Espadon	*Xiphias gladius*	Swordfish
TUN	Thonidés nca	*Thunnini*	Tunas nei
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna

2.1.3 Demersal

There are a large range of demersal fishes that are fished within Martinique waters (Table 7), dominated by species associated with coral reef habitats. Importantly, this varied list of species contains not only bony fishes, but rays and skates, as well as a range of invertebrates (e.g., crabs, lobster).

Table 7: **Demersal stocks fished within Martinique waters.**

ASFIS Code	French name	Scientific name	ASFIS en Name
ANW	Demoiselles	*Pomacanthidae*	Angelfishes nei
RAJ	Rajidés nca	*Rajidae*	Rays and skates nei
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei
BXF	Coffres nca	*Ostraciidae*	Boxfishes nei
CLU	Clupéidés nca (Harengs, sardines, anchois, etc. divers)	*Clupeoidei*	Clupeoids nei
CON	Strombes nca	*Strombus spp*	Stromboid conchs nei
CRA	Crabes de mer nca	*Brachyura*	Marine crabs nei
DIO	Porcs-épics	*Diodontidae*	Globefish, porcupine fish
DYL	Grondin volant	*Dactylopterus volitans*	Flying gurnard
EEO	Vivaneau royal	*Etelis oculatus*	Queen snapper
FFX	Poissons-bourses nca	*Monacanthidae*	Filefishes, leatherjackets nei
GDJ	Blanches nca	*Gerreidae*	Mojarras, etc. nei
GPX	Mérous nca	*Epinephelus spp*	Groupers nei
GRX	Grondeurs, diagrammes nca	*Haemulidae (=Pomadasyidae)*	Grunts, sweetlips nei
HAX	Demi-becs nca	*Hemiramphus spp*	
HCZ	Marignans nca	*Holocentridae*	Squirrelfishes nei
KPC	Crabe moro	*Carpilius corallinus*	Batwing coral crab
KUI	Troque des Antilles	*Cittarium pica*	West Indian top shell
LOS	Cigales nca	*Scyllaridae*	Slipper lobsters nei
MGS	Mulets	*Mugil spp*	
MUI	Murènes nca	*Muraenidae*	Morays nei
MUX	Rougets nca	*Mullus spp*	Surmullets(=Red mullets) nei
MXI	Crabe royal des Caraïbes	*Mithrax spinosissimus*	Channel-clinging crab
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei
OCT	Pieuvres, poulpes nca	*Octopodidae*	Octopuses, etc. nei
PWT	Perroquets nca	*Scaridae*	Parrotfishes nei
PZO	Pterois volitans	*Pterois volitans*	Red lionfish
RAJ	Rajidés nca	*Rajidae*	Rays and skates nei
ROB	Crossies nca	*Centropomus spp*	Snooks(=Robalos) nei
RSQ	Crabe cyrique	*Arenaeus cribrarius*	Speckled swimcrab
SBL	Requin griset	*Hexanchus griseus*	Bluntnose sixgill shark
SBX	Dentés, spares nca	*Sparidae*	Porgies, seabreams nei
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei
SNY	Vivaneau queue jaune	*Ocyurus chrysurus*	Yellowtail snapper

ASFIS Code	French name	Scientific name	ASFIS en Name
SQZ	Calmars côtiers nca	*Loliginidae*	Inshore squids nei
SUR	Chirurgiens nca	*Acanthuridae*	Surgeonfishes nei
TAR	Tarpon argenté	*Megalops atlanticus*	Tarpon
TRI	Balistes nca	*Balistidae*	Triggerfishes, durgons nei
TWV	Oursin blanc	*Tripneustes ventricosus*	Sea egg
VLO	Langoustes	*Palinuridae*	Spiny lobsters nei
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei

2.1.4 Species under ICCAT management

European Union being an ICCAT Contracting Party, France has to comply with the Commission regulations and recommendations. Therefore, there are a range of species catches in Martinique that have to be reported to ICCAT, which are listed in Table 8.

Table 8: List of species caught in Martinique that have to be reported to ICCAT.

ASFIS Code	French name	Scientific name	ASFIS en Name
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
TUN	Thonidés nca	*Thunnini*	Tunas nei
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
BLF	Thon à nageoires noires	*Thunnus atlanticus*	Blackfin tuna
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei
BIL	Makaires,marlins,voiliers nca	*Istiophoridae*	Marlins,sailfishes,etc. nei
SAI	Voilier de l'Atlantique	*Istiophorus albicans*	Atlantic sailfish
SWO	Espadon	*Xiphias gladius*	Swordfish
SPF	Makaire bécune	*Tetrapturus pfluegeri*	Longbill spearfish
BON	Bonite à dos rayé	*Sarda sarda*	Atlantic bonito

2.1.5 Catch structures

The catch structure in Martinique in 2018 is presented in Figure 6 below. Given the variety of species and local regulation this structure may evolve across the years, although the general trend is expected to be relatively similar between years. The catch structure within Martinique shows the variety of species fished. Large pelagics represent 33% of this catch (predominantly encompassing yellowfin tuna 15%, dolphinfish 9.5% and marlin 9%), while the remaining 60% are demersal fish comprising reef fish, crustaceans and 'other species' / 'misc fish' (24%). Importantly, the high percentage of reef fish, crustaceans and 'other species' / 'misc fish' illustrates the likely difficulty in collecting data on such a wide range of landed species landed, or during sales.

Although the enhancement of such catch data would be preferable, in reality a sample based strategy that encompasses 180 species in total is substantial. In other countries, it is usually recommended to focus on the main commercial species and to collect the other data at family level. Such development of methodology is associated with the cost and time to undertake the work, as well as the needed engagement of fishers (i.e., they have to accept that all individuals within their catch are weighed individually, which will take a considerable time).

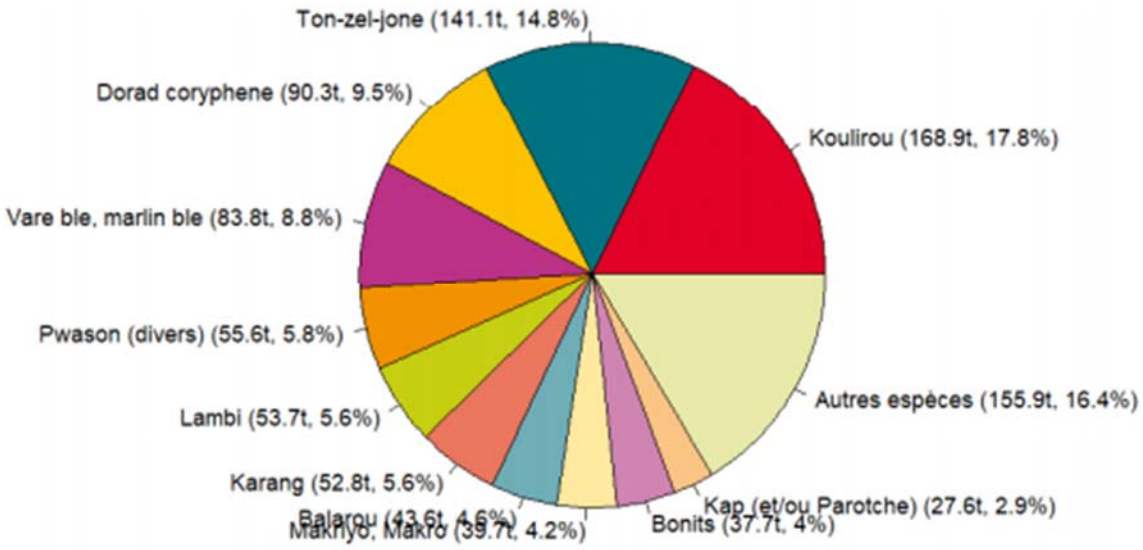

Figure 6: Martinique catch structures in 2018 (source: Weiss et al. 2019).

The following table provides correspondence of local creole names of fish presented in Figure 6 to English and scientific names.

Table 9: Martinique Creole names with correspondence with international classification and English name

Creole or French name	English name	Scientific name	ASFIS code
Balarous	Halfbeaks nei	*Hemiramphidae*	JKX
Bonits	Tunas nei	*Thunnini*	TUN
Coulirous / Koulirous	Bigeye scad	*Selar crumenophtalmus*	BIS
Dorad coryphene	DolphinFish	*Coryphaena hippurus*	DOL
Kap	Parrotfishes nei		PWT
Karang	Carangids nei	*Carangidae*	CGX
Lambi	Stromboid conchs nei	*Strombus spp*	CON
Makriyo, makro	Mackerel scad	*Decapterus macarellus*	MSD
Marlin ble, Vare ble	Blue marlin	*Makaira nigricans*	BUM
Pwason (divers) / autres espèces	Marine Fish nei	*Osteichthyes*	MZZ
Ton-zel-jaune / ton-zèl-jône	Yellowfin tuna	*Thunnus albacares*	YFT

2.1.6 Declining and emerging stocks

Martinique has faced for the last 20 years several issues with pollution related to the use of Chlordecone[11]. This organochlorine pesticide was utilised between 1972 and 1993 in banana plantations to reduce banana weevil infestation, and resulted in substantial local (and now regional) soil and water pollution. Since 2002, Ifremer has been studying the impact of chlordecone pollution on fisheries[12]. The institute provided the scientific evidence to enable protection measures related to fish consumption within Martinique.

The first important prefectural decree which impacted fisheries sector was decree # 2012335-0003, 30 November 2012[13], which resulted in no fishing zones being placed within the eastern part of Martinique and in the Bay of Fort-de-France. As a consequence of such fishing regulation, fishers are encouraged fishing further from the coast, and/or fish deeper than previously undertake. Figure 9 shows that continental shelf is very limited on the west coast, though is more extended in the east coast. Fishers from Fort-de-France have to change from fishing in the bay to deep fishing. In the East Coast, fishers have to go further, hence, therefore likely spending a night at sea.

Such changes in fishing activities has two impacts: the need to renew the fleet with modern vessels to ensure more safety at sea, and offering facilities on boats for fishers to stay at sea overnight. Collectif Pêche Martinique (COPEM), a professional fishers association (On-site interview with Mr Hughes Coco, COPEM co-president) has initiated studies to create a modern version of the traditional fishing boat '*Yole*', which combines the two new emerging needs: fishing deeper and further from the coast. Proposed boat models will stay below 12m length to continue ensuring resilience of fisheries sector to extreme events and to stay adapted to the variety of exploited stocks. In parallel, a trend is emerging with more pelagic targeting and new species opportunities explored.

Figure 7: bathymetric profile of Martinique
Source: https://www.geoportail.gouv.fr/donnees/carte-mondiale-fonds-marins using https://www.gebco.net/ data.

11 https://en.wikipedia.org/wiki/Chlordecone

12 https://wwz.ifremer.fr/Recherche/Departements-scientifiques/Les-projets-Ifremer-dans-les-Antilles/La-contamination-du-milieu-marin-par-le-chlordecone

13 https://www.observatoire-eau-martinique.fr/images/3-Mer_et_littoral/4-R%c3%a9glementations/p%c3%aache_en_mer/Arrete_prefectoral_20123350003.pdf

2.2 Fleet structure

Of the 1 020 registered vessels making up the Martinique fleet (539 of which are active), only 27 vessels of ≥ 10 m are subject to electronic logbook or declaration of catch using paper logbooks. Of these vessels, four harvest red snapper within French Guyana waters, or catch offshore pelagic fish around local FADs. These vessels make trips of several days and are not taken into account in the estimates of number of trips and disembarkations. Activity surveys, however, cover the whole fleet of skiffs and vessels over 10 m.

2.2.1 Domestic fisheries

2.2.1.1 Artisanal fishery

The typical vessel is the *Yole* which is a fiberglass hull between 6-9 m in length (within Martinique, the Yole comprises 426 of the 539 active vessels, encompassing 79% of the fleet). These hold one or two outboard engines (power varies, can go up to 150–200 HP each), and are undecked. Some are equipped with a small cabin. These fleet characteristics are confirmed by Ifremer statistics on the average vessel in Martinique: 7.3 m long, 101 HP, gross tonnage of 2.0 tonnes, an average age of 2.1 years and 1.7 crew (Système d'Informations Halieutiques 2020c). Although larger vessels exist (i.e., 11-12 m, decked with on-board diesel engines), only 4 are active, and predominantly target shrimp in French Guyana.

The majority of vessels within Martinique (65%) operate within the 12 nm. Of the rest of the fleet, 20% operating on a regular basis outside the limit of the 12 nm, while the remaining fleet move between both regions. Given the high level of chlordecone pollution (an organochlorine pesticide, used in Martinique until 1993 to reduce banana weevil infestation on banana plantations), which contaminate inshore marine organisms, the proportion of vessels operating outside the 12 nm limit has increased in the past years.

Figure 8: Number of active vessels per length class in Martinique (source Weiss et al. 2019).

Length class	Coastal	Mixed	Offshore	Total
< 5 m	5			5
5 - 6 m	34			34
6 - 7 m	125	10	5	140
7 - 8 m	218	92	35	345
8 - 9 m	24	39	11	74
9 - 10 m	5	5	8	18
10 - 11 m		2	6	8
11 - 12 m		1	3	4
Total	**411**	**149**	**68**	**628**

Note: vessels having carried out more than 75% of their activity within 12 miles are qualified as "Coastal". Those having operated between 25 and 75% of their activity in this zone are qualified as "Mixed". Finally, those having operated more than 75% of their activity outside the coastal area are qualified as "Offshore".

2.2.1.2 Industrial fishery

No vessel above 12 m operate in Martinique.

2.2.1.3 Sports / recreational fishery

There is limited information available on sport / recreational fisheries activities. To refine statistics on this sector, a study is being conducted on recreational fisheries[14] with the RECREAFISH project. It calls for voluntary local recreational fishers (tourists are not part of this study) to document their fishing activities during one year and report this through paper reports and electronic logbooks to Ifremer. An incentive is in place through a lottery at the end of the project for participants to win vouchers.

2.2.2 Foreign fisheries

No foreign vessels operate in Martinique.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

The topology of fisheries in Martinique is comprised predominantly of small scale fisheries with small multigear vessels. This fleet do not target specific species, therefore the concept of by-catch is not easily applied. All fishes caught are landed and sold or kept for personal use.

2.3.2 Endangered, threatened and protected species

No data are available specifically on ETP species within Martinique. This is likely due to the local ban on catch of sea turtles, mammals and corals (see section 6). Ifremer statistics shows catches of species with conservation measures such as conch (*Lobatus gigas*, closed season), lobster (*Panulirus spp.*, ban on breeding lobster) and white urchin (*Tripneustes ventricosus*).

2.4 Summary of fisheries

Below provides a summary of the main gears and fishing techniques utilised within Martinique, showing the high diversity of gears used (Table 10).

14 https://wwz.ifremer.fr/antilles/Activites-projets/Halieutique/RECREAFISH

Table 10: Main gears / fishing technique and potential catch (where data is available) in Martinique in 2018.

French name	English name	Potential catch
Casier	Pots	Caribbean spiny lobster (26%), Other fish (15%), Snappers spp (11%)
Ligne traînante	Offshore trolling lines	Dolphinfish (52%), Wahoo (12%), Carangids nei (12%)
	Fish Aggregating Device (FAD)	Yellowfin tuna (45%), Blue Marlin (22%), Dolphinfish (14%)
Filet maillant fixe	Fixed driftnet	
Plongée en apnée	Free diving	White Urchin (48%), Parrotfishes nei (18%), Octopodidae (9%)
	Bottom gillnet	Marine Fish nei (35%), Parrotfishes nei (12%), Carangids nei (10%)
	Coastal trolling line	Blackfin tuna (24%), Tunas nei (20%), Barracudas nei (14%)
Senne de plage	Beach seines	
Tremail	Trammel net	Caribbean spiny lobster (61%), Parrotfishes nei (18%), Stromboid conchs nei (8%)
Filet maillant encerclant	Circling gillnet	
Ligne à main (à main ou avec canne	Handline (with or without pole)	Yellowtail snapper (23%), Barracudas nei (14%), Queen snapper (14%)
Palangre de fond	Bottom longline	
Charter de pêche récréative	Recreational fishing charter boat	
Sennes	Seines	Bigeye scad (68%), Mackerel scad (19%), scads nei (5%)
Palangre dérivante	Drifting longline	
	Surface nets	Halfbeaks nei (91%), Flyingfishes nei (7%), Needlefishes, nei (2%)

French name	English name	Potential catch
	Longline	Sharks nei (46%), Queen snapper (19%), Snappers Spp (10%)
	Conch net	Stromboid conchs nei (100%)

Source : DCP.

Martinique. 2019. Observation des Marées au débarquement - OBSDEB, 2020 https ://archimer.ifremer.fr/doc/00646/75849/ Nasses.

Martinique. 2019. Observation des Marées au débarquement – OBSDEB, 2020. https://archimer.ifremer.fr/doc/00646/75842/ Plongée en apnée.

Martinique. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00646/75851/ Lignes traînantes au large (pêche à Miquelon).

Martinique. 2019. Observation des Marées au débarquement – OBSDEB, 2020. https ://archimer.ifremer.fr/doc/00646/75847/ Filets maillants de fond.

Martinique. 2019. Observation des Marées au débarquement - OBSDEB, 2020.https://archimer.ifremer.fr/doc/00646/75846/ Lignes traînantes côtières.

Martinique. 2019. Observation des Marées au débarquement – OBSDEB, 2020. https ://archimer.ifremer.fr/doc/00646/75848/ Source : Sennes.

Martinique. 2019. Observation des Marées au débarquement – OBSDEB, 2020. https://archimer.ifremer.fr/doc/00646/75852/ Source : Filets de surface.

Martinique. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00646/75845/ Source : Doucine.

Martinique. 2019. Observation des Marées au débarquement – OBSDEB, 2020. https ://archimer.ifremer.fr/doc/00646/75843/ Source : Palangres.

Martinique. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00646/75850/ Source : Filets à lambis.

Martinique. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00646/75844/

SECTION 2 –KEY FINDINGS

- The fishery sector in Martinique is mostly small scale fisheries, dominated by one type of active vessel designed to be multigear (legacy from the old wooden *Yole*) and catching a large variety of species.
- It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch).
- Stocks are well identified and catch are routinely monitored.
- Catches and number of fishers have reduced by half over the last 10 years for several reasons, the hard sea and operation conditions make work harsh and not appealing for young people.
- Impact of chlordecone hampers the potential development of the sector and will certainly encourage emergence of new stocks exploitation (deep species).
- Stocks under ICCAT mandates are monitored and five (5) are assessed. Other stocks in Martinique have not been formally assessed; studies and new biological data collection will fill this gap in the coming years.

3 Institutional structures

Data collection in France is well structured (**Error! Reference source not found.**). In Martinique, data collection is directly managed and conducted by Ifremer (with co-management from SIH, Brest and Martinique). Data are collected by local enumerators according to a quarterly sampling programme provided by SIH (Fisheries Information System). Catch information are collected throughout the year, including length frequency data. Effort information related to previous year are collected during the first three months of the current year. All data are fed back to SIH for raising and production of statistics and reporting.

3.1 Data collection

The overarching institution related to data collection is the Directorate for Marine Fisheries and Aquaculture (DPMA) under the Ministry of Agriculture and Food[15]. Its roles are to ensure that France meets its obligation towards EU Common Fisheries Policy (1380/2013)[16], and its related Data Collection Framework (Council Regulation (EC) 2017/1004)[17], under the 2017-2019 EU-MAP[18] and the 2020-2021 EU-MAP (consisting of two Commission Decisions)[19].

In-field data collection involves several national institutions and research institutions:

- Ifremer: organize data collection from samples (biological data) and manage the SIH.
- Institut de Recherche pour le Développement (IRD): Tuna monitoring
- FranceAgrimer: In charge of collecting logsheets from fishers when there is no electronic reporting, with delegation of data entry at the local level.

Other national bodies with local branches have an intermediary role in data collection:

- Direction de la Mer (DM): this organisation can be involved in logsheet data entry (Martinique) for FranceAgrimer

15 https://agriculture.gouv.fr/

16 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22).

17 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

18 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

19 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

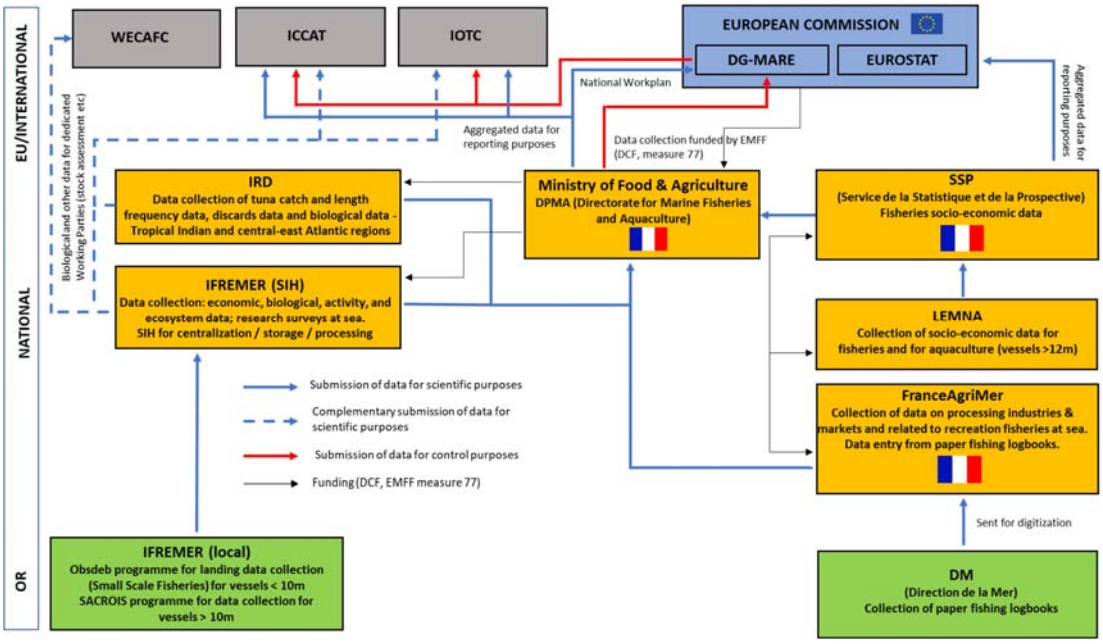

Figure 9: Institutional organization of data collection in France with Martinique level.

3.1.1 Overall workflow of data collection in France and its ORs

The 2017-2019 EU-MAP and the 2020-2021 EU-MAP mandates multi-annual plans for data collection with lists of species, thresholds, data fields, etc. DPMA provides the National programme of work, revised on an annual basis, as needed. This document describes how France is going to comply with the DCF obligations, while each OR organizes its own fisheries monitoring system.

According to DPMA, the following workflow is in place for catch reporting, following the fisheries Control Regulation (EC) 1224/2009[20]:

- Vessels below 10 m (paper logsheets) and vessels 10 to 12 m (paper logbooks) send their paper-based catch data to the local Sea Directorates for quality control, which then transmit them to FranceAgrimer for data entry in the SACAPTE system, from where they are integrated into the SIH.
- Vessels above 12 m: e-logbooks are directly uploaded into the SIH. VMS data and sales data are also directly uploaded to SIH, but without data relevant to ORs.

Ifremer is responsible for 90% of data collection within Martinique, with IRD responsible for collecting data on tuna fisheries (although this is minor for Martinique, as IRD mainly collects data from high sea fleets).

Ifremer is *de facto* "managing" fisheries data collection issues in ORs for DPMA. Ifremer has strived over the past year (2020) to set up a single focal point for all data-related questions, to make things easier when DPMA requests information from them. DPMA is also pushing for all fisheries data to flow into the SIH, whatever the institution involved

[20] Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

for data collection, to avoid multiplication of tools. The ultimate goal being one single tool at IFREMER to get all information and statistics on fisheries.

In the ORs, FranceAgrimer implement one-off surveys on recreational fisheries. They are also in charge of digitizing of paper logsheets and logbooks

SSP and LEMNA implement socio-economic surveys on all French vessels on the fleet register, including in the ORs and report to DMPA.

3.1.2 Data collection and other reporting obligations in Martinique

Data collection is under the management and supervision of the Ifremer station in Martinique in collaboration with the SIH team in Brest. It follows OBSDEB methodology (see Weiss, 2016 for its description). This system implements enumerator-based data collection, according to a sampling scheme produced at central level by the National Fisheries Information System (SIH). Landing data are recorded on a daily basis, and average effort is computed from activities interviews conducted during the first three months of the year ("*Calendrier d'activités*").

Fisheries statistics activities are presented and discussed by all fisheries sector stakeholders during yearly SIH steering committees. Issues and problems are raised to Ifremer by stakeholders such DM.

Data collection is conducted by a team of 5 data collectors hired by Ifremer on short term contracts. The typical profile is young professional graduated as a marine biologist or fisheries expert, recruited as civil service volunteers ("*Volontaires du service civil*") for a period of one or two years. The turnover of staff associated this system could be seen as an issue, but the system allows the overlap of time between recruits, to effectively train them to collect data.

Three types of information are routinely collected and entered directly into SIH by data collectors.

- Effort information through "*calendrier d'activité*" = activity calendar (which is the last year of activity of all registered fishers, with data collected through interviews);
- Catch data through landing surveys; and
- Biological data: length frequencies

Vessels between 10 and 12 m are requested to report fishing activities through logsheets. DM collects and sends paper copies to FranceAgrimer system which punch data in their system. DM also record these declarations for their own statistics. These data have not yet been formally studied compared to Ifremer results, but DM data indicates similar trends between SIH and their records of logsheet data (January 2021 interview with DM).

Logsheets are certainly a source of data to be considered for Martinique, with logsheet reporting dramatically increasing in the past year, but such data is not used to provide official data. To ensure their use in official statistics, the accuracy and reliability of logsheets still need to be confirmed, while controls of declaration will be required to ensure long term reliability of the source of information. The flow is already entering SIH for ORs. Ifremer acknowledged the need for comparison but no timeline was given for such a key activity.

No information or data are collected from Martinique on recreational fisheries although BVA have implemented one-off surveys on recreational fisheries. There is limited socio-economic data collected by Ifremer (i.e., number of crew, price of fish).

During stakeholder interviews, no concern were raised on statistics quality and accuracy in Martinique related to fishing activities. Nonetheless, a review of fisheries sector in Guadeloupe and Martinique (Laisne and Viel, 2018) highlighted issues in data collection without quoting sources. DM shared issues of lack of socio-economic data according to DCF requirements, which delayed endorsement of fleet renewal plan by EU (the socio-economic data issue is discussed later in the report, see Section 5).

In summary:

- Ifremer methodology is documented (Weiss et al, 2017);
- Sampling schemes are provided to Ifremer data collectors' team on a quarterly basis to collect effort data during the first 3 months of the year ("*Calendrier d'activité*"), catch and biological data through landing sampling;
- Yearly summary reports are published as well as detailed report per métier: the whole process of data collection, processing and reporting is documented and transparent; and
- A SIH steering committee meets on a yearly basis to share concerns and issues among fisheries sector stakeholders and Ifremer.

3.1.3 The SIH

The SIH (Système d'Informations Halieutiques or Fisheries Information System) was developed under the framework of the ecosystem-based approach to fisheries, to cover both ecosystem resources and uses. The overarching aim of this system is to gather all fisheries information in a single system. This covers collected catch and effort data, as well as existing data. The system was developed to then harmonise the data, store and preserve them, and make the data available to partners.

The SIH was prototyped in 2007 in Martinique. It took years to validate and expand the tool to other data, then in 2017, it was institutionalized with a dedicated team in the Brest office of Ifremer, with regional focal points which serve as a relay for the national SIH people based in Brest.

The SIH is organised in 4 modules, all managed by Ifremer:

Ecosystems: Data collection for this module happens mostly in Metropolitan France (i.e., not in the ORs), and can include abundance indices for stock assessments, campaigns etc.

Exploited resources: This module examines population structure and collects the main biological parameters for stocks. This involves biological observation of landings, including in markets and factories. There is some biological sampling in the ORs, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers. Biological sampling on large pelagics under the mandate of RFMOs (ICCAT, IOTC) is considered as generally good. In 2021, Ifremer plans to do more biological sampling in the ORs, mainly based on buying fish from professional fishers in landing sites, on a larger range of species, as per STECF recommendations.

Landings & effort: In Mainland France, data flow is considered good (e-logbooks etc), but not in ORs. The standard flow of reporting is as follows: fishers send their logbooks or logsheets to the local Direction de la Mer, which sends them after quality control to

FranceAgrimer for data entry (in-house or by subcontractors). One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed. The overall reporting rate for the ORs is currently estimated at 50%. In this regard, the role of the local DMs is very important to train fishers, support them etc. for data reporting. To address this issue of reporting, Ifremer developed OBServatoire des DEBarquements (landings observatory) (OBSDEB), which works by performing sampling at landing sites, to rebuild catches and effort on the last 7 days. For 2021, Ifremer's objective is to improve catch and effort reporting by fishers. The outcome of the development of OBSDEB is that instead of relying on reporting, OSBDEB samples landings to estimate catches etc. so it does not improve declarations, it supplements them.

Socio-economic data: Data on activities: month per month reconstitution of activity with métier, species & distance from coast. From there, segmentation of the fleet is derived. This information is used as basis for sampling plans. Availability of such data varies depending on the ORs.

LEMNA collects data from vessels with proper accounting. IFREMER tries and collect data from vessels without such information or refusing to provide them.

Database: SIH uses a central database named HARMONIE. It is used for storage, Quality Assurance, validation, aggregation, anonymisation, processing, statistics… and also for providing data to end users.

The current objective is to compile all available data from Ifremer, IRD and the National Museum of Natural History (MNHN) in the Ifremer Harmonie database used by the SIH, so that all data is already in a single system and format, ready for data calls. Data would be harmonised using the ICES RDBES data standard, which includes metadata on methodologies, campaigns, processing etc.

There is also work on harmonising sampling plans, data collection protocols, Quality Assurance methods, estimation and processing etc.

Harmonie and the related software etc are mostly developed and maintained in-house (DSI, Direction des services informatiques), with software development partly outsourced to external contractors, based on Ifremer specs.

Data calls: Ifremer is usually in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the caller (DPMA, ICES, ICCAT). There is a good collaboration with the Atlas of European Tuna fisheries[21] maintained by IRD to compile all tropical tuna fisheries data (which are not collected by Ifremer). In the case of IOTC, IRD is in charge of compiling requested data.

3.1.4 Reporting to regional/international organizations

DPMA does not report statistics *per se* to the European Commission but provides an Annual Report on the implementation of DCF through the Work Plan (2017-2019, 2020-2021).

DPMA reports statistics related to data calls from EC, ICES, RFBs (WECAFC, SIOFA) and RFMOs (ICCAT, IOTC, GFCM).

21 https://sirs.agrocampus-ouest.fr/atlas_thonV5-DEC/index.php?atl_version=0&idlang=uk

SSP sends statistics to Eurostat and FAO, with disaggregation per OR.

Ifremer and IRD both contribute biological data directly to dedicated regional working groups (e.g., WECAFC shrimp and groundfish working groups) to which the EU is a participant.

3.2 Scientific advice

Ifremer and IRD play a central role in the production of national scientific advice.

These advices are either requested by local authorities such as Direction de la Mer (DM) or by central French authorities such as Direction de la Pêche Maritime et de l'Aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation. This is particularly important in Martinique in the context of protection measures taken related to impact of Chlordecone on fisheries sector.

As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests.

Access to actual SIH datasets is only granted on request, including for internal users.

- Internal users: if granted, they have access to raw datasets. In some cases, SIH staff prepares datasets for internal users (e.g., users who do not need and/or could not use raw data). VMS data is a specific case where access is given after very careful review of the request.
- External users: if granted, they have only access to prepared datasets, properly aggregated and anonymised.

All requests (including access to data or data calls) are reviewed by a dedicated structured, called CREDO (Cellule de Réponse aux appels de DOnnées).

The review process includes:

- Determining who would prepare/provide the data within Ifremer.
- Who will use the data and for what.

The review process depends on the dataset:

- Ifremer only for less sensitive datasets.
- Ifremer plus DPMA for data such as SACROIS and OBSMER which include business-confidential information. For these there is a quarterly steerco meeting to review requests.

Access to data is mostly free, though Ifremer used to charge when data was requested by private for-profit entities such as engineering bureaus for impact studies. But the administrative overhead linked to charging for such information is so high that now they tend to just provide the data for free.

In the context of the French Government's policy on access to public data (open data), there is global review on the access to data in Harmonie, but this is a complex issue. DPMA mentions that in other areas, such as agricultural data, access is done entirely through an online tool (Agreste portal). This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data.

Overall, Ifremer reviews around 200-300 data requests each year. Ifremer also publishes fisheries data summaries, in the form of PDF fact sheets on given fisheries, métiers etc. Those are published on an annual basis and are accessible to everyone on the Ifremer website. The production of those documents is highly automated based on procedures and scripts stored in the SIH.

Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (such as working parties and scientific committee) to which France participates through the EU.

RFMOs (IOTC and ICCAT) share aggregated data with the public and share fine grained data with their Working Parties according to their data confidentiality policy. They can also grant access on request for fine grained data to external scientists etc, subject to approval by the Members.

RFMOs provide scientific advice based on the work of their scientific working groups and through their Scientific Committee. This scientific advice is made available to the general public on the respective RFMO websites.

3.3 Research institutions

Ifremer in Martinique conduct a number of research activities in addition to its involvement in data collection activities. A study of recreational fisheries is being conducted in 2021 by Ifremer[22]. A study on socio-economic data is planned for 2022 in Martinique (source: Interview Ifremer Martinique).

3.4 Monitoring, control and surveillance

Logsheets are required for vessels between 10 - 12 m, however implementation of the EU Regulation 1224/2009[23] has been low until recent years. Outreach and training efforts have been deployed to encourage fishers to report, in a general effort to better document fishing activities. This has increased reporting, with DM stating that only 10% of the fishers do not report their catch. Several letters are sent to non-responders, with a fee of EUR 50/month if no logsheet is reported for active vessel. Such documentation is to ensure fishers are eligible for European subsidies, especially in terms of accounting and social contributions to different tax and contribution regimes.

DM is in charge of collecting logsheets and share paper copies to FranceAgrimer for data entry in their System, while regular surveillance activities are also being conducted by DM. At the local level, the Prefect ("Préfet") as local representative of the French State have the responsibility for MCS and delegate to local DM staff the implementation and enforcement of regulations.

DM issued a 2 year sub-national control-at-sea plan, with priorities identified for MCS activities. Fisheries is one of such priorities in the Caribbean. The plan defines objectives for controls and enforcement. For Martinique (from January 2021 interview with DM MCS officer), fisheries (including activities to reduce IUU fishing and regulate enforcements) is

22 https://wwz.ifremer.fr/antilles/Activites-projets/Halieutique/RECREAFISH

23 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

one of the two priorities in the plan, second being the marine environment. Control objectives for Martinique for the current plan are 145 days of control, 20 air control missions, 80 landing controls (including assessing at least 30% of Venezuelan vessels landings, especially to control the provenance of catches, as Grenada banned Venezuelan fishing between March to November, these vessels fishing in Grenada used to land fish in Martinique)

Controls are conducted by MCS coastal Units (*Unités Littoral de Contrôle Maritime)*, National Navy, maritime police ("*Gendarmerie*"), and customs. DM has a role of planification and coordination, with reports centralized by DM. These fields units have official mandates to control and issue fines. After infringement, DM centralises all reports and its director can issue penalties and request a referral to court. All penalties are defined in Code Rural et de la pêche maritime[24].

DM is supported by Centres régionaux opérationnels de surveillance et de sauvetage-Operational Regional Centers for surveillance and Rescue (CROSS[25]) and the Centre national de surveillance des pêches, National Center for fisheries surveillance (CNSP[26]) regarding any review of legal obligations. Operational Units receive regular training on MCS through ENSAM[27] (Ecole Nationale de la Sécurité et l'Administration de la Mer, National School for Sea Security and Administration). Specific training for Police and Customs officers related to fisheries are also regularly organized.

At the level of RFMOs, control is enforced by Member States but the RFMO body in charge of compliance can identify Members that are not compliant and ask them to remedy the situation.

3.4.1 MCS data for scientific purposes

Ifremer obtains administrative and control data from DPMA's Système d'information de la pêche et de l'aquaculture (Fisheries and aquaculture information system[28], SIPA), including vessel registration and characteristics, and VMS data. Although given the size of vessels in Martinique, VMS is not mandatory for the archipelago's fleet.

3.5 Institutional capacity

3.5.1 National level

DPMA considers that the major factor hampering work of Ifremer is a lack of human resources. In particular are the lack of local staff in the ORs, including fisheries experts in the field. Although monies can be obtained through EMFF, this does not cover hiring long term staff.

The objective of DPMA is to include under DCF all activities that should be part of regular data collection. In most cases, Ifremer and IRD implement all the activities themselves, but in Martinique 100% of data collection is done by Ifremer.

Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which had not been

24 https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006071367/

25 https://www.ecologie.gouv.fr/sites/default/files/17142_CROSS_50ANS_BATweb.pdf

26 https://agriculture.gouv.fr/quest-ce-que-le-centre-national-de-surveillance-des-peches-cnsp

27 https://www.ecole-affaires-maritimes.fr/16-ressources/les-memoires/bt.html

28 http://www.sipa.agriculture.gouv.fr

planned/budgeted. Often requests passed by DPMA through an official request to Ifremer take priority, which can impact routine and project work. Recruitment within IRD is an issue too, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed.

There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge). Contracts are currently on a 3-year basis, but the next ones will be for 4 years.

3.5.2 Martinique

As stated before, data collection is under full management of Ifremer Martinique and SIH in Brest. Interviews with Ifremer Martinique indicated that staff and funds are in line with Ifremer mandates, but remain limited when any new requests for supplemental studies are received.

SECTION 3 – KEY FINDINGS
• Responsibilities and tasks for French Fisheries sector monitoring are well defined at national and local level. Several actors are involved depending types of data to be collected • In Martinique, Ifremer plays a central role though implementation of sample based surveys collecting catch and effort data (OBSDEB programme) and biological data (OBSVENTE programme) • Ifremer designs data collection methodology, provides tools for data entry, processing and computation (SIH, managed in Brest, France) and conduct field activities to collect data from fishers. • Compliance with Council Regulation (EC) 1224/2009[29] regarding logsheet self-declaration by fishers has greatly increased with outreach and training of fishers delivered by DM and is an opportunity to collect more information, upon validation of reliability of these declaration • Gaps are known related to socio-economic data and recreational fisheries. Study for recreational fisheries have been kicked-off in 2020 to improve this knowledge, and a socio-economics one is planned for 2022. • DPMA centralized data from the different partners and disseminates reports according to national (SSP which reports to EUROSTAT then FAO), regional here ICCAT and WECAFC requirements. • Ifremer plays a central role for scientific advice in Martinique in support to local regulations (related to Chlordecone for instance) • Ifremer capacity is in-line with its mandate but does not allow for request for supplemental information.

29 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

4 Funding and funding structures for data collection

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member state funding

DPMA provided a description of how the EMFF process works in France.

Top-down:

1. The Commission votes a global envelope for EMFF. It is the result of a political consensus.
2. A national envelope is scaled according to complex rules including different criteria
3. A percentage of this envelope is assigned to data collection (Article 77)

Bottom-up:

At the French national level, the needs from the different institutions are collected according to DCF requirements and national priorities (such as for recreational fisheries). A draft of the total budget for DCF data collection is made available.

Final negotiation: this draft is assessed against the DCF percentage available in EMFF for France. Discussions starts again to find the correct balance between priorities. It is a complex exercise with no magic recipe.

EMFF funds 80% of the eligible costs (not all data collection activities are eligible). The remaining 20% is supported by the institution's own budget.

DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. It takes usually 4-5 months to complete the process.

DPMA is also a beneficiary of the EMFF, through Article 77.

There are some projects related to the collection of data (funded by the EMFF under Articles other than Article 77) that refers to DCF:

- Article 28: scientific partnership;
- Article 39: improvement of gear selectivity;
- Article 40: large marine ecosystem knowledge (to be confirmed); and
- Article 76: MCS funding.

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.

Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French *Cours Des Comptes*[13]. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

France received under the EMFF 2014-2020 EUR 588 Million. In this respect, the EMFF Operational Programme for France 2014FR14MFOP001 (DPMA, 2015) described the proposed use of EMFF by France, including OR:

- Union Priority 1 (UP1): EUR 150.9 million (25.7% of total EMFF allocation) will aim at a better balance fisheries activities and environmental protection and sustainability. It will address (among others) fleet capacity by adjusting fleet capacity to resources, modernisation of the fleet, investments in port infrastructures in line with requirements under the discards ban, and improving traceability of fisheries products and processing.
- Union Priority 2 (UP2): EUR 88.8 million (15.1% of EMFF allocation) will go towards meeting the objectives of the French national strategic plan for aquaculture that aims at boosting competitiveness and sustainability of the French aquaculture sector.
- Union Priority 3 (UP3): EUR 122.3 million (20.8% of EMFF allocation) will go towards compliance with CFP rules regarding control and data collection. This include Article 77 of interest to this study: total budget in the programme is EUR 66.1 million. This is the main source of EMFF funding for DCF data collection at the national and OR level.
- Union Priority 4 (UP4): EUR 22.6 million (3.8% of EMFF allocation) will help ensure better territorial cohesion of fisheries and aquaculture. Foreseen activities include maintaining and creating new jobs, reinforcing the position of fisheries and aquaculture within the development of coastal territories, strengthening the FLAGs network, and increasing added value through innovative projects and research.
- Union Priority 5 (UP5): EUR 163.2 million (27.8% of EMFF allocation) will go towards improving the marketing, diversification and valorisation of seafood products. The French OP gives a central role to producer organisations (PO) that currently place almost 50% of the French production on the market, through the implementation of production and marketing plans and the reinforcement of POs across its territory (both mainland and outermost regions). Please note compensation for additional costs for seafood marketing etc in the six French ORs has more than doubled compared to the 2007-2013 period.
- Union Priority 6 (UP6): EUR 5.3 million (0.9% of EMFF allocation) will go towards strengthening the efficiency of maritime surveillance and widening the network of marine protected areas and improving knowledge on the marine environment and interactions with human activities.
- EUR 34.8 million (5.5% of EMFF allocation) are allocated to technical assistance in order to reinforce the implementation system, ensure efficient administration of the EU funding, including support to reducing burden on beneficiaries, improving administration and publicity and information measures.

Financial information:

- Total OP budget: EUR 774 353 018
- Total EU contribution: EUR 587 980 173, including EUR 66 146 872 for DCF
- Total national contribution: EUR 186 372 845

EMFF is operationally managed by DPMA. Some of the fund management is delegated to sub-national level (*Régions*).

4.1.2 OR funding

No specific budget has been proposed by the EMFF operational programme for French ORs. There has been highlighted within the programme the importance of supporting Martinique fishers to mitigate the impact of Chlordecone on fishing activities. Engagement of budget according to need within the total envelop (here UP1) is delegated to Martinique *Communauté Territoriale*.

Use of EMFF funds in the OR can be extracted from France's financial report. (Liste des opérations du programme national FEAMP 2014-2020, 2019). The total use of EMFF funds in Martinique was EUR 9 043 520.66 (at December 2019), with 65% for infrastructure (Articles 43), 14% for technical backstopping (Article 78) and 7% for aquaculture (several Articles). There was no specific engagement line for Article 77 related to DCF data collection for Martinique. This Article is engaged at the national level.

4.2 Other sources of funding

Ifremer has a total annual budget in 2017 of EUR 194.4 million (Cours des Comptes[30], 2019); with the following breakdown: (i) EUR 154.4 million directly supported by the national budget (subsidies for public services support), and (ii) approximately EUR 40 million from contracts and projects; the EUR 40 million includes support from EMFF.

EMFF reimburses 80% of eligible expense, which usually corresponds to 60% of the expenses. The remaining 40% are covered by Ifremer national budget.

The other source of funding is France's regular national budget, which can provide funds under various mechanisms:

- Grant agreement with IFREMER and IRD;
- "*Convention socle halieutique*" with IFREMER: used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan; and
- Triannual agreement with IRD.

IRD mentioned that funding can be allocated by DG MARE or CINEA (formerly EASME) to specific projects for field data collection or meta-analysis. Several examples in recent years include (though these are not Mayotte specific):

- Scientific advice on shark management in RFMOs: data exploration and retrieval and analysis (3 years);
- Shark management in Atlantic about key species (18 month);
- RECOLAP: evaluation of implementation of Electronic Monitoring Systems (EMS) in small longliners (only Réunion);
- Meta analysis of CMMs in longline fisheries in Atlantic about hook shapes etc; and
- Pilot study funded by DCF on whitetip ban on retention -> survival rate post release in purse seine and longline fisheries. POREMO.

4.3 OR funding for data collection

Given the centralization of the data collection programme in Ifremer with a global support from SIH in Brest (Bretagne, France Metropolitan), funds for Article 77 are managed and

30 *Cours des comptes* = Account court, the French National Institution in charge of controlling National Accounts.

engaged at the national level. These are then managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and the ORs, including sub-contracting with external vendors for data collection in some ORs.

The already cited "Liste des opérations du programme national FEAMP 2014-2020, 2019" provides the detail for FEAMP activities under Article 77.

Table 11: EMFF funds received by the various French institutions under Article 77.

Institution name	Total eligible funds (EUR)	Total funding received (EUR)
Agence Des Aires Marines Protegees	293 416.05	234 732.84
Agence Francaise Pour La Biodiversite	914 730.00	731 784.00
Franceagrimer	44 961.90	35 969.52
Ifremer	41 517 440.00	33 213 492.00
Inra	1 025 238.00	820 190.00
IRD - Institut De Recherche Pour Le Developpement	9 628 639.00	7 702 911.00
Ministere De L'agriculture De L'alimentation Maa	9 670 201.00	7 736 160.00
Museum National D'histoire Naturelle	1 084 263.00	756 113.00
Universite De Nantes	3 049 192.00	2 439 353.00

As indicated in section 3 (Institutional Structures), Ifremer is the only institution involved in data collection within Martinique. There is no breakdown per OR in the list of expenses related to Article 77. A breakdown was provided by Ifremer in 2021 of expenses engaged specifically for the OR (Table 12). This breakdown encompasses specific field activities directly related to data collection. Added to this amount, a percentage should be considered of SIH activities related to organization of data collection in Martinique (Providing of quarterly sample scheme, technical support to data entry) and the analysis and raising of statistics, and production of statistics.

Table 12: Expenditures incurred (EUR) by Ifremer for data collection in Martinique.

OR	Data type	2017 (EUR)	2018 (EUR)	2019 (EUR)
Martinique	Biological Data	14 573.89	48 079.48	49 695.63
	Economic Data	0	0	376.11
	Effort and Landing data	186 949.61	192 929.20	227 855.29
	TOTAL Martinique	201 523.50	241 008.68	277 927.03

SECTION 4 – KEY FINDINGS

- DCF data collection funding comes from two main sources: EMFF and national budget
- France received for EMFF 2014-2020 EUR 588 million
- EMFF funds in Martinique: EUR 9 043 520.66
- Article 77 for EMFF DCF data collection represents EUR 66 146 872
- No specific EMFF funding for Martinique related to Article 77 is identified
- Ifremer indicated that activities related to data collection in Martinique represented a total of EUR 277 927.03 in 2019
- Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess

5 Current state of data collection and other reporting obligations

DCF obligations as per Commission Delegated Decision (EU) 2019/910 (EU, 2019) are listed in **Error! Reference source not found.**. DCF obligations as per Commission Delegated Decision (EU) 2019/910 (EU, 2019) are detailed in Chapter III Data Requirements:

Section III.2. lists requirements related to biological data on stocks caught by Union commercial fisheries in Union and outside Union waters and by recreational fisheries in Union waters:

a) Catch quantities by species and biological data from individual specimens enabling the estimation of:
   i. For commercial fisheries, volume and length frequency of all catch fractions (including discards and unwanted catches) for the stocks listed in Tables 1A, 1B and 1C, reported at the aggregation level 6 as set out in Table 2. The temporal resolution shall be coordinated at marine region level based on end-user needs;
   ii. For commercial fisheries, mean-weight and age distribution of catches of the stocks listed in Table 1A, 1B and 1C. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;
   iii. For commercial fisheries, sex-ratio, maturity and fecundity data for stocks listed in Tables 1A, 1B and 1C of catches at frequencies needed for scientific advice. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs; and
   iv. For recreational fisheries, annual volume (numbers and weights or length) of catches and releases for the species listed in Table 3 and/or the species identified at marine region level as needed for fisheries management purposes End user needs for age or other biological data as specified in paragraphs (i)-(iii) shall be evaluated for recreational fisheries at marine region level.

Within the regulations 2019/910 Table 1B lists stocks that are specifically to be reported for Martinique (listed within Table 13).

Table 13: Martinique compliance to DCF species reporting requirement as per table 1B of 2019/910 decision

List of stocks as per Table 1B	Data available in 2018 (see **Error! Reference source not found.**
Snappers (*Lutjanidae*)	Yes
Grunters (Haemulidae)	Yes
Groupers (*Serranidae*)	Yes
Lion Fish (*Pterois volitans*)	Yes
Tuna-like fish (*Scombridae*)	Yes
Blue marlin (*Makaira nigricans*)	Yes
Dolphinfish (*Coryphaena hippurus*)	Yes

France work plans for data collection in fisheries and aquaculture sectors for 2017-2019[31] and 2020-2021[32], refer to data collection being undertaken through sample based surveys (e.g., Text Box 4A in 2020-2021 workplan). Species under DCF are not specifically mentioned. The STECF, in 2020[33], conducted an analysis of the Work Plans and National Reports submitted by all EU Member States with ORs. Regarding France, it concluded that there was a lack of specific mention of the individual ORs in the work plans and national reports. It also noted a number of specific issues identified for some French ORs, including application of catch thresholds (see complete STCF19-19 report for more details).

Table 13 shows that Martinique complies 100% with DCF requirements for species regarding catch volume for II.2.a.i. Although length frequencies are not publicly available from Ifremer in their summary, although data are collected through OBSVENTE programme and available on request. 2019/910 Table 1C (listed as Table 14) adds to that list the stocks in marine regions under Regional Fisheries Management Organisations (RFMOs) and Sustainable Fishing Partnership Agreements (SFPAS), ICCAT and WECAFC.

Table 14: **Martinique compliance to DCF species reporting requirement as per table 1C of 2019/910 decision for ICCAT**

Species Common name	Scientific name	Data available in 2018 (see **Error! Reference source not found.**)
Yellowfin tuna	*Thunnus albacares*	Yes
Bigeye tuna	*Thunnus obesus*	Not in the list of caught species
Skipjack tuna	*Katsuwonus pelamis*	Yes
Albacore tuna	*Thunnus alalunga*	Not in the list of caught species
Bluefin tuna	*Thunnus thynnus*	Not in the list of caught species
Swordfish	*Xiphias gladius*	Not in the list of caught species
Blue marlin	*Makaira nigricans (or mazara)*	Yes
Sailfish	*Istiophorus albicans*	Yes
White marlin	*Tetrapturus albidus*	Not in the list of caught species
Blue shark	*Prionace glauca*	Not in the list of caught species
Bullet tuna	*Auxis rochei*	Not in the list of caught species
Atlantic bonito	*Sarda sarda*	Not in the list of caught species
Atlantic back skipjack	*Euthynnus alleteratus*	Not in the list of caught species
Blackfin tuna Atlantic	*Thunnus atlanticus*	Yes

31 https://datacollection.jrc.ec.europa.eu/documents/10213/1131890/France_WorkPlan_2017-2019.pdf/03a63d30-0e32-4289-a839-47c6b914ae44?version=1.1&download=true

32 https://datacollection.jrc.ec.europa.eu/documents/10213/1283898/FRA_WP_2020-2021_text.pdf/3fcdda81-ae34-4238-a3b3-c9602bb3ae5a?version=1.0&download=true

33 Scientific, Technical and Economic Committee for Fisheries (STECF) – Outermost Regions (OR) (STECF-19-19). Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-20811-2, doi:10.2760/834602, JRC121427

Species Common name	Scientific name	Data available in 2018 (see **Error! Reference source not found.**)
Plain bonito Atlantic	*Orcynopsis unicolor*	Not in the list of caught species
Serra Spanish mackerel	*Scomberomorus brasiliensis*	Not in the list of caught species
Cero	*Scomberomorus regalis*	Not in the list of caught species
Frigate tuna	*Auxis thazard*	Not in the list of caught species
King mackerel	*Scomberomorus cavalla*	Not in the list of caught species
West African Spanish mackerel	*Scomberomorus tritor*	Not in the list of caught species
Atlantic Spanish mackerel	*Scomberomorus maculatus*	Not in the list of caught species
Wahoo	*Acanthocybium solandri*	Not in the list of caught species
Dolphinfish	*Coryphaena hippurus*	Yes

During the ICCAT 26th Regular Meeting of the Commission (Palma de Mallorca, Spain, 18-25 November 2019) the EU delegation presented its annual report on catches for the biennial period 2018-2019[34]: For the French Antilles (which includes Martinique) it was reported that dolphinfish (*Coryphaena hippurus*), Atlantic blue marlin (*Makaira nigricans*) and yellowfin tuna (*Thunnus albacares*) represents 70% of landings. In addition, there was no reported issue in DCF obligation compliance within the French Antilles.

Table 15 shows the species to be reported for WECAFC for all French ORs in the region (Guadeloupe, Martinique and French Guiana). The main species with regional management plans (Conch[35] and lobster[36]) and large pelagics are monitored in Martinique and data are reported for these species. Compliance to DCF WECAFC requirements can be considered of good quality for these species regarding catch volume for II.2.a.i; length frequencies are collected but not made publicly available (Can be accessed upon request to Ifremer SIH and authorization from DPMA).

Table 15: Martinique compliance to DCF species reporting requirement as per table 1C of 2019/910 decision for WECAFC

Scientific name	Common name	Data available in 2018 (see **Error! Reference source not found.**)
Panulirus argus	Caribbean Spiny Lobster	Yes
Strombus gigas	Queen Conch	Yes

34 https://www.iccat.int/Documents/BienRep/REP_TRILINGUAL_18-19_II_3.pdf

35 http://www.fao.org/documents/card/en/c/b3134e3b-59f6-44dc-a195-aefec1bf33a4/

36 https://clmeplus.org/doculibrary/marplesca-the-regional-caribbean-spiny-lobster-panulirus-argus-fishery-management-plan/

Scientific name	Common name	Data available in 2018 (see **Error! Reference source not found.**)
Shark-like Selachii, Rajidae	Sharks, rays & skates	Yes
Coryphaena hippurus	Dolphin fish	Yes
Acanthocybium solandri	Wahoo	Yes
Epinephelus guttatus	Red Hind	Not in the list of caught species
Lutjanus vivanus	Silk snapper	Not in the list of caught species
Lutjanus buccanella	Blackfin snapper	Not in the list of caught species
Lutjanus campechanus	Red snapper	Not in the list of caught species
Penaeus subtilis	Penaeus shrimp	Not in the list of caught species

Regarding chapter III section 2.a.ii and section 2.a.iii on commercial fisheries related to mean-weight and age distribution of catches, limited data are reported. Generally speaking, there is a need for more research on biological parameters to conduct stock assessment (except for some large pelagics) within Martinique.

No reporting is done for chapter III section 2.a.iv on recreational fisheries.

The STECF in its 2020 report (op. cit.), concluded that:

"*Before 2018, no data was provided for fleet segments less than 12 metres in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks*."

Section III.3. lists requirements for data to assess the impact of Union fisheries on marine ecosystems in Union waters and outside Union waters:

a) For all types of fisheries, incidental by-catch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, including the species listed in Table 1D, including absence in the catch, during scientific observer trips on fishing ships or by the fishers themselves through logbooks.
b) Data to assist in the assessment of the impact of fisheries in Union waters and outside Union waters on marine habitats.
c) Data for estimating the level of fishing and the impact of fishing activities on marine biological resources and on marine ecosystems, such as effects on non-commercial species, predator-prey relationships and natural mortality of fish species in each marine region.

Many of listed species in Table 1D of the regulations are not relevant to Martinique. The list contains sharks and rays, mammals and crustacean species to be reported for certain areas or for all regions / oceans. Due to the nature of artisanal fisheries in Martinique, the impacts listed in Section III.3 are considered a non-issue.

Section III.4. lists requirements for detailed data on the activity of Union fishing vessels (9) in Union waters and outside Union waters as recorded under Regulation (EC) No

1224/2009. Data to assess the activity of Union fishing vessels in Union waters and outside Union waters consist of the variables as indicated in Table 4.

SIH provides information per métier on vessel activity, such as average vessel size, GT and power, as well as total landing and value. Average number of crew is also mentioned. There is a high level information on effort (days at sea for instance) but no detailed information. Compliance to III.4 is considered good.

Section III.5. lists requirements for social and economic data on fisheries to enable the assessment of the social and economic performance of the Union fisheries sector.

a) Economic variables as indicated in Table 5A according to the sector segmentation of Table 5B and according to the supra-regions as defined in Table 5C, and for enterprises making profit; and
b) Social variables as indicated in Table 6. Social data shall be collected every three years starting in 2018.

The STECF in its 2020 report (op. cit.), mentioned that:

"*Before 2018, no data was provided for fleet segments less than 12 metres in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks*."

SECTION 5 – KEY FINDINGS
• Compliance to DCF obligation related to volume is good for all species, except endangered, threatened and protected • Compliance to DCF obligation related to other biological data and parametres (length frequencies, sex-ratio, maturity etc..) is known to be low except for certain large pelagic for which stock assessment has been conducted. A programme is planned for 2021 and onwards to collect more data. • No data from recreational fisheries. A study is on-going to address this lack of data • Compliance to DCF activity requirement is considered good • Compliance to DCF socio economic is very low. A study will be initiated in 2022

6 Fisheries management and conservation measures

6.1 Implementation of DCF data collection obligations and potential issues

Regarding biological data: catch and effort information are collected by Ifremer. However, there is a lack of information on biological parameters to conduct stock assessment of the main commercial species within Martinique. A new campaign with the financial support of Agence Française de Développement has been implemented with buying of fish from fishers to increase samples to be analysed. There is also a lack of socio-economic data for Martinique. A study is planned for 2022.

Lastly, the impact of recreational fisheries on the local ecosystem is largely unknown. Here again, as previously mentioned, a study is being conducted by Ifremer to better assess recreational fisheries sector in Martinique.

Regarding the new EU-MAP, Ifremer and IRD were consulted on the new DCF species list and mentioned the need to add species from the ORs. Ifremer and IRD mentioned that there are small species important for SSF that are not covered or not covered anymore by the DCF EU-MAP, and that the list of species should be extended (see similar recommendation in January 2020 STECF report[37]), so that species important for the ORs can be covered by EMFF.

37 STECF EWG1919, 'REPORT TO THE STECF - EXPERT WORKING GROUP ON Outermost Regions (OR) (EWG-19-19), Brussels, 13-17 January 2020'. 2020.

7 Fisheries management and conservation measures

7.1 Management and conservation measures

7.1.1 National

At national level, management and conservation measures are imposed through local regulations. The range of legal options available within Martinique encompass regulations for professional fishers, recreational fishers, restriction of fishing activities due to Chlordecone or the use of national parks (i.e., Marine Protected area). Table 16 below lists management and conservation measures from Decree number n ° R02-2019-04-25-003[38] regulating professional maritime fishing in Martinique. This list provides all regional and national regulations considered to issue this decree.

Table 16: list of management and conservation measures Decree number n ° R02-2019-04-25-003 regulating professional maritime fishing in Martinique

Type of measure	Measure	Description	Applied to ICCAT?
Gear restriction	Explosives, soporific or toxic substances prohibited		No
	Electric device prohibited		No
	Bottom trawling is prohibited		No
	Use of respiratory equipment (scuba diving or similar prohibited		No
	Trammel net is prohibited		No
	Limitation in mesh size	Restriction on mesh size for all nets wit exception: whose mesh size does not measure, in the wet state, at least 80 mm measured stretched mesh	Maybe (as concern all net, including purse seine)
	Limitation in use of net	maximum drop height of a bottom gillnet is limited to 4 m	No
	Length of drifting gillnets	One vessel can't have more than 1.5 km total length for all onboard gillnets	Yes
	Driftnets limited to one species	Only the catch of flying fish is permitted using driftnets	No
	Beach seine mesh size limitation	The meshes of the central part of the net may not be less than 38 mm (19 mm side), measured in the wet state	No
	Traps and pots size limitation	The use of any trap or pot with a mesh size of less than 34 mm is	No
	Trap and Pots	Subject to declaration	No
FAD measures	Require authorization		Yes
Species	Beach seine Juvenile species	Seining of juvenile demersal fish is prohibited	No
Fishing			

[38] http://www.dm.martinique.developpement-durable.gouv.fr/IMG/pdf/arrete_du_08.04.2019-1.pdf

Type of measure	Measure	Description	Applied to ICCAT?
period and conservation	White sea urchins (*Tripneustes ventricosus*)	It is open occasionally and partially, by prefectural annual decree	No
	Breeding lobsters (female with eggs)	prohibited at all times and in all places	No
	Queen conch fishing	prohibited from January 1 to June 30 included	No
	Queen conch landing	landed whole (with their shell).	No
	Land crabs (*Cardisoma guanhumi*)	banned from June 16 to February 14	No
	Landed fish size	Minimum size is 15 cm with exceptions	Yes, measures on tune are defined
	Queen conch size	Shell with formed hole, minimum 7 mm thick	No
	Burgo (*Cittarium pica*)	minimum size 6 cm	No
	Clams (*Codakia orbicularis* and *Phacoïdes pectinatus*)	minimum size of 4 cm	No
	Octopus (*Octopus vulgaris*)	minimum weight of 750 g	No
	Land crabs (*Cardisoma guanhumi*)	minimum carapace width 7 cm	No
	King lobster (*Panulirus argus*)	length of the carapace measured from the tip of the rostrum to midpoint of the distal border of the cephalothorax: 8 cm	No
	Brazilian lobster (Panulirus guttatus)	length of the carapace measured from the tip from the rostrum to the midpoint of the distal border of the cephalothorax: 6 cm	No
	Species ban	All sea turtles	No
	Species ban	All corals (orders *Scleractinia, Milleporina, Stylasterina* and *Antipatharia*)	No
	Species ban	All mammals	Yes (?)
	Species ban	Hammerhead sharks (*Sphyrnidae* spp.) The silky shark (*Carcarhinus falciformis*) Thresher sharks (*Alopias* spp.) The whale shark (*Rhincodon typus*) The great white shark (*Carcharodon carcharias*) The basking shark (*Cetorhinus maximus*) The oceanic shark or longiman (*Carcharhinus longimanus*)	Yes (?)

Type of measure	Measure	Description	Applied to ICCAT?
		The common chagrin shark (*Centrophorus granulosus*) The whitetip shark (*Hexanchus griseus*) The Lich Shark (*Dalatias licha*) Sawfish (family *Pristidae*) Manta and mobula rays (*Mobulidae* family) Leopard ray (*Aetobatus narinari*)	
	Shark conservation	prohibited to mutilate live or dead sharks, whether or not they are permitted to peach. It is also prohibited to buy, offer for sale or sell the fins of shark	Yes
	Other species ban	Seahorses and pipefish: all species (family of *Syngnatidae*) Echinoderms (phylum of *Echinodermata*): all species seafood, brittle stars, sea cucumbers, sea urchins with the exception of white sea urchins (*Tripneustes ventricosus*) whose fishing is subject to temporary authorizations All species of grouper (family *Serranidae*) except crowned grouper (*Epinephelus guttatus*), cone ouatalibi (*Cephalopholis fulva*) and crowned cat (*Cephalopholis cruentata*) The blue zawag (*Scarus coelestinus*) The Flemish zawag (*Scarus guacamaia*) All species of angelfish (family *Pomacanthidae*)	No

Regulation imposes ban on fisheries in relation to chlordecone: Prefectural Decree n° 2012335-0003 30/11/2012 (see Figure below)

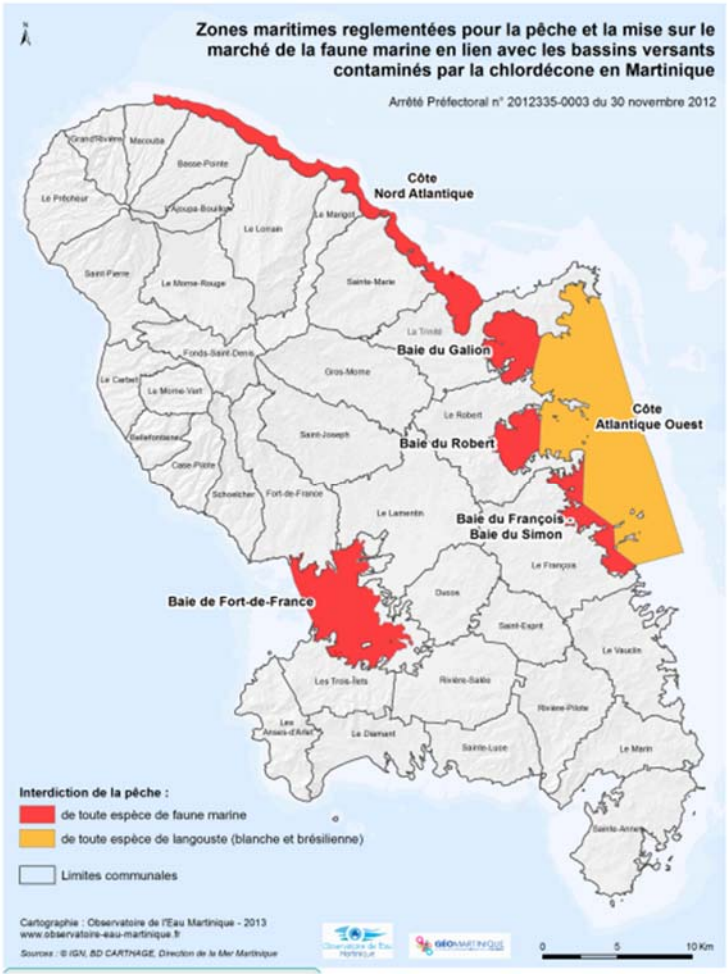

Figure 10 : Distribution of fishing ban in Martinique as a result of chlordecone pollution. Legend: Ban on all species fisheries (red), ban all lobster species fisheries (*Panulirus spp*) (orange).

Source: https://www.observatoire-eau-martinique.fr/cartotheque/carte/100. (prefectural regulation # 2012335-0003 30 November 2012).

Additional regulation imposes complete for ecosystem preservation:

- Decree 99-1527 27/06/1999 related to fishery ban for *cantonnement* of *Ilet à Ramier*;
- Prefectural Decree n°99-22 Bis 08/01/1999 related to fishery ban for *cantonnement* of *Baie du trésor*; and
- Prefectural Decree n°20160932 du 21/09/2016 related to fishery ban for *cantonnement* of *Case-Pilote*, for a duration of 5 years from 21 September 2016 au 21 September 2021.

7.1.2 International

Being an Outermost region of the EU, all EU regulations apply to Martinique, through their implementation in the French national regulations.

SECTION 6 – Fisheries management and conservation measures

- Martinique has a complete legal framework related to management of fisheries supported by scientific advice coming from Ifremer and recommendations from fishers associations; and
- These measures have a direct impact on the small scale fisheries sector to go fishing farer and deeper, which will require to adapt some regional and national legislation to recognize the archipelago specificity (farer means quickly to go really deep).

8 Shortcomings or obstacles to fisheries management

The table below provides a potential framework to structure information obtained from literature review and stakeholder consultation for the analysis, which may be specific to the metier (gear/vessel) or at a higher level, such as "domestic commercial fisheries".

Table 17: Summary of shortcomings or obstacles to fisheries management within each fishery

Category	Shortcoming or obstacle
Stocks	Impact of chlordecone hampers the potential development of the sector and will certainly encourage emergence of new stocks exploitation (deep species)
Data collection	Gaps are known related to socio-economic data and recreational fisheries. Studies have been kicked-off in 2020 to improve this knowledge.
Funding and resources	None identified for Martinique
DCF Obligation	Level of reporting to DCF obligation related to other biological data and parameters (length frequencies, sex-ratio, maturity etc) is known to be low except for certain large pelagic for which stock assessment has been conducted. A programme is planned for 2021 and onwards to collect more data.
	No data from recreational fisheries. A study is on-going to address this lack of data
	Level of reporting for DCF socio economic data is very low. A study is planned for 2022
Resource monitoring and assessment	Martinique fisheries are artisanal, opportunistic, and catch a wide range of species.
	The composition of catches is largely dominated by a "marine fishes nei" group, followed by "other species nei".
	Only some large pelagic stocks are assessed, because they are under ICCAT mandate.

NB. Given the predominance of small scale multigear fisheries in Martinique, this information concerns all metiers.

9 Information sources

9.1 References

Blanchard, F., Guyader, O., Reynal, L., Weiss, J., 2018. Connaissance des stocks pêchés par les flottilles des territoires français qui sont aussi régions ultra-périphériques de l'Union européenne (Guadeloupe, Guyane, La Réunion, Martinique, Mayotte, Saint Martin). Réponse à la saisine DPMA 18-13767 (Réponse à la saisine DPMA No. DG/2019.275). IFREMER.

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Froehlicher, H., Pawlowski, L., Weiss, J., Reynal, L., Thouard, E., 2019. Evaluation des ressources démersales du plateau insulaire martiniquais.

Lemoigne B., Paulineau M., Nachbaur A. Stépanian A. (2013). Établissement d'un état de référence du trait de côte de la Martinique : situation en 2010 et évolution historique depuis 1951. Rapport final. BRGM/RP- 61686-FR150 p 85

Weiss Jérôme, Duchêne Julie, Le Blond Samuel, Reynal Lionel, Derridj Olivier, Demanèche Sébastien, Berthou Patrick, Le Roy Emilie, Leblond Emilie, 2019. Synthèse des pêcheries de Martinique 2018. Ifremer-sih-2019.04, 19 p.

9.2 Legislation

EU Legislation

Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22–61).

Commission Implementing Decision (EU) 2016/1251 of 12 July 2016 adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019 (notified under document C(2016) 4329) C/2016/4329 (OJ L 207, 1.8.2016, p. 113–177).

Commission Implementing Decision (EU) 2016/1701 of 19 August 2016 laying down rules on the format for the submission of work plans for data collection in the fisheries and aquaculture sectors (notified under document C(2016) 5304) C/2016/5304 (OJ L 260, 27.9.2016, p. 153–228).

Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

Martinique Legislation

Decree number n ° R02-2019-04-25-003 regulating professional maritime fishing in Martinique.

Decree number n ° R02-2019-04-08-004 regulating recreational maritime fishing in Martinique.

Regulation imposes ban on fisheries in relation to Chlordecone: Prefectural Decree n° 2012335-0003 30/11/2012.

Decree 99-1527 27/06/1999 related to fishery ban for *cantonnement* of *Ilet à Ramier*.

Prefectural Decree n°99-22 Bis 08/01/1999 related to fishery ban for cantonnement of Baie du trésor.

Prefectural Decree n°20160932 du 21/09/2016 related to fishery ban for cantonnement of Case-Pilote, for a duration of 5 years from 21 September 2016 au 21 September 2021.

Guadeloupe

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Guadeloupe Profile Report

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Acronyms

Term	Description
AFD	Agence Francaise de Developpement
ASFIS	Aquatic and Science Fisheries Information System
CRPMEM	Comité regional des pêches marines et des élevages marins
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DM	Direction de la Mer
DPMA	Direction des pêches maritimes et de l'aquaculture
EASME	Executive Agency for Small and Medium Sized Enterprises
EMFF	European Maritime and Fisheries Fund
ETP	Endangered, Threatened and Protected
EU	European Union
FAD	Fish Aggregating Device
GEI	Groupe EI
ICCAT	International Commission for the Conservation of the Atlantic tunas
Ifremer	Institut France de Recherche pour l'Exploitation de la MER
IRD	Institut de Recherche pour le Développement
LEMNA	Laboratoire d'économie et de management de Nantes-Atlantique
MCS	Monitoring, control and surveillance
NGO	Non-governmental organisation
OBSDEB	Observation des Marées au débarquement
OFB	Office Français pour la Biodiversité
OR	Outermost Region
RFB	Regional Fishery Body
SIH	Système d'information halieutique
SIPA	Système d'information de la pêche et de l'aquaculture
SMEFF	Sustainable management of external fishing fleets
SSP	Service de statistiques et de la prospective
VMS	Vessel monitoring system
WECAFC	Western Central Atlantic Fisheries Commission

1 Introduction

1.1 Geographic and economic characteristics

Guadeloupe is a region ("Région", Administrative level 1[1]) of the Republic of France and is a unique department ("Département", Administrative level 2). This entity is an Outermost Region (OR) of the European Union (EU)[2].

Guadeloupe is an archipelago of over 12 islands, though the population is based predominantly on 5 main islands (Roques, 2010): Basse Terre (900 km^2 / 214 km [area / coastline]) and Grande Terre (585 km^2 / 224 km) (which are usually referred to as 'Guadeloupe'), as well as Marie Galante (157 km^2 / 63 km), La Désirade (30 km^2 / 40 km), and Les Saintes (14.67 km^2 / 53 km, encompassing the two islands of Terre-de-bas and Terre-de-haut).

Figure 1: France Metropolitan vs Outermost Regions and French Territories Source: https://fr.wikipedia.org/wiki/Fichier:France_Overseas.svg

1 In this document, the term Metropolitan France ("*France métropolitaine*") will be used to differentiate the French territory in Europe from the Outermost Regions (Guadeloupe, Martinique, St Martin, French Guiana, La Réunion and Mayotte).

2 Note: In this document, the term Metropolitan France ("France métropolitaine") will be used to differentiate the French territory in Europe from the French Outermost Regions.

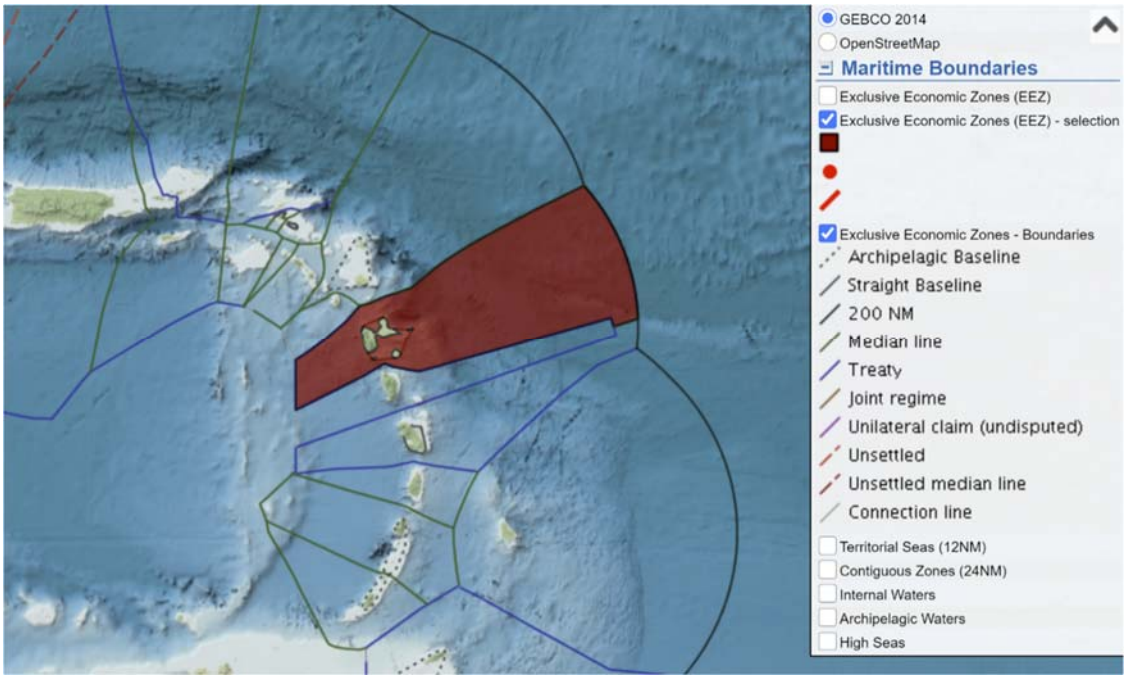

Figure 2: Map of Guadeloupe and its EEZ
source: https://www.marineregions.org/eezdetails.php?mrgid=33177&zone=eez

Guadeloupe is a French Archipelago within the lesser Antilles arc. It has northern boundaries with Antigua and Barbuda and southern boundaries with Dominica (Figure 2). Figure 3 illustrates the Guadeloupe archipelago and the geographical distribution of the different islands: Basse-Terre and Grand-Terre (known as Guadeloupe Island). The second larger island is Marie Galante, south of Grand-Terre. Equally in size are Les Saintes, south of Basse-Terre and la Désirade East of Grand-Terre (Table 1).

There are eight main fishing ports in Guadeloupe, ten fishing facilities of departmental interest (Departmental Ports Scheme) and approximately one hundred landing points spread over all the different islands of the archipelago. The main fishing ports are those of Désirade (75 active fishing vessels), Saint-François (46 active fishing vessels), Deshaies (25 active fishing vessels), Sainte-Rose (24 active fishing vessels), and Le Moule (23 active fishing vessels). Some landing points have been set up to allow ice supplies and to offer sales structures for the products (i.e. tables under shelters).

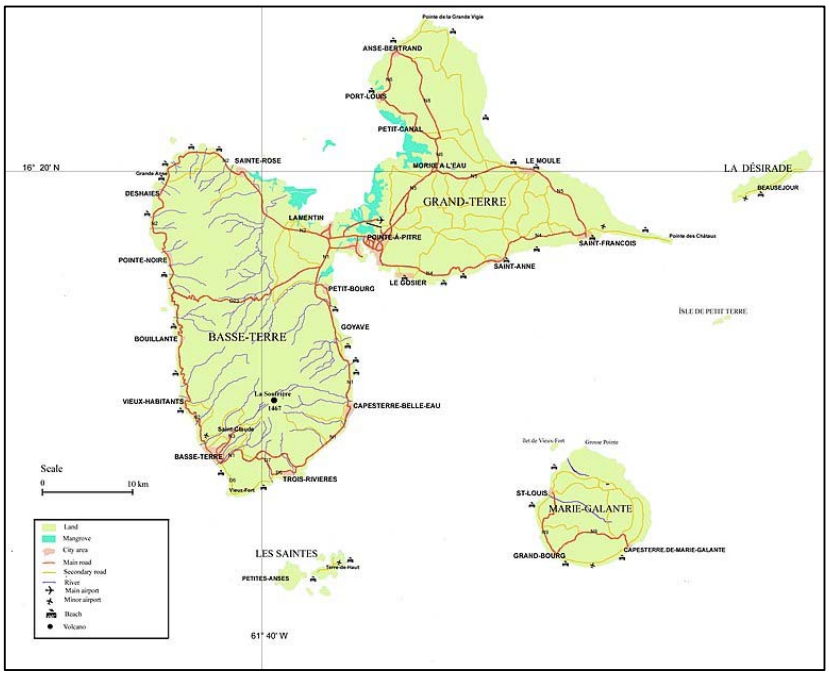

Figure 3: Map of Guadeloupe archipelago
Source: https://fr.wikipedia.org/wiki/Guadeloupe#/media/Fichier:Map-guadeloupe.jpg

Table 1: General geographic indicators

	Description	Unit	Source
Archipelago area	Basse Terre (Eastern Island)	900 km^2	Roques, 2010
	Grande Terre (Western Island)	585 km^2	
	Marie Galante	157 km^2	
	La Désirade	30 km^2	
	Les Saintes	14.67 km^2	
Land area	Basse Terre	900 km^2	
	Grande Terre	585 km^2	
	Marie Galante	157 km^2	
	La Désirade	30 km^2	
	Les Saintes	14.67 km^2	
Inland water area	Basse Terre +Grande Terre	Negligible [3]	
	Marie Galante		
	La Désirade		
	Les Saintes		
	Population size	394 110 (2016)	INSEE, 2019
	Exclusive Economic Zone (EEZ)	86 000 km^2	Senat[4] / VLIZ[5]

3 https://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_6/Mon_hydr/19971.pdf

4 https://www.senat.fr/rap/r13-430/r13-43012.html
5 http://www.marineregions.org/

1.1 Fisheries statistics

Although there are no disaggregated data for Guadeloupe, Figure 4 illustrate global capture data for marine species reported to FAO by France. There is a drop in production in 2012, though this does not seem to be associated with any natural disaster, shift in fisheries practices or impact of climate change. On discussions with Institut Français de Recherche pour l'Exploitation de la Mer (Ifremer), this decrease is in line with decreases in the number of fishers within Guadeloupe.

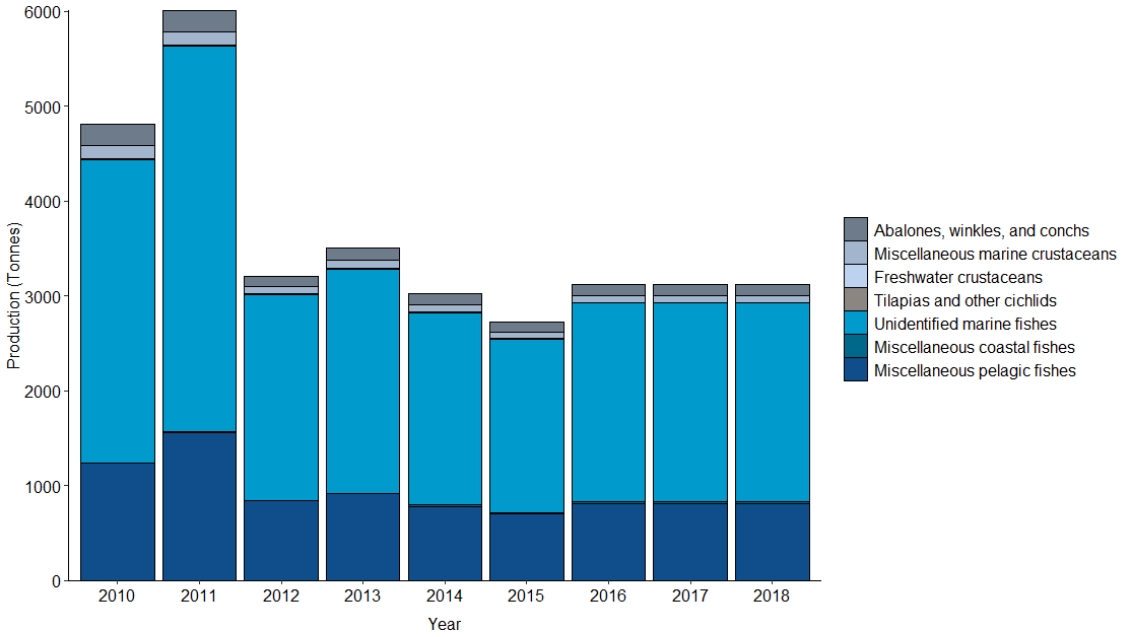

Figure 4: Global captures in Guadeloupe (FAO Fishstat)

If data from FAO and Ifremer SIH (Système d'Informations Halieuthiques) global values are compared (see Figure 5), a dramatic drop in fisheries capture occurred between 2011 and 2012 in FAO statistics, but this is an artefact of the changing the data source. In detail, although the entire timeline for the statistics are reported to be estimates for Guadeloupe, it seems that SIH data have only been used from 2012.

Regarding seafood product trade (import / export), there are extremely disaggregated data available from the French customs website[6] (Figure 6), of which there is no understanding of how the seafood trade has been impacted in Guadeloupe. Regarding consumption of fish per capita, specific time series for Guadeloupe could not be found, however the national value (i.e. France) for consumption is 24.2 kg per person per year for fish, and 35.6 kg per person per year[7] for all seafood products.

6 https://www.douane.gouv.fr/la-douane/opendata?f%5B0%5D=categorie_opendata_facet%3A459

7 https://www.umr-amure.fr/wp-content/uploads/2018/08/situation-peche.pdf

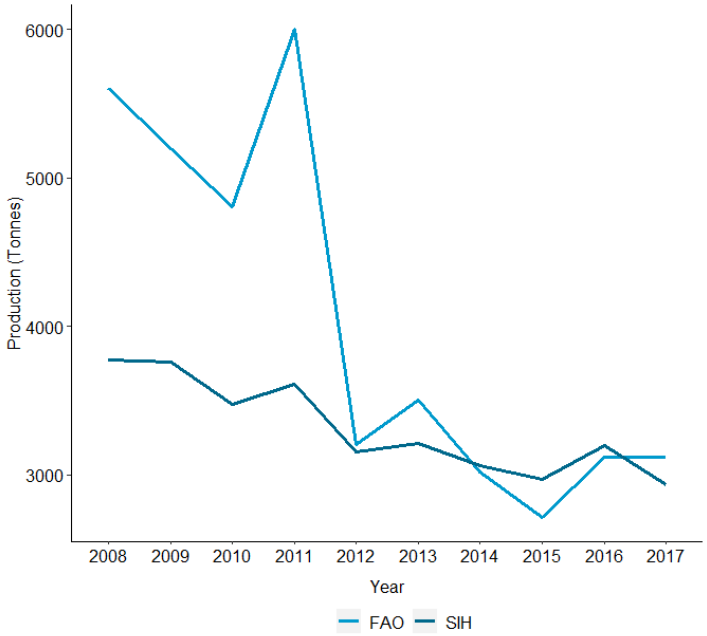

Figure 5: Comparison of global captures in Guadeloupe between FAO Fishstat and SIH

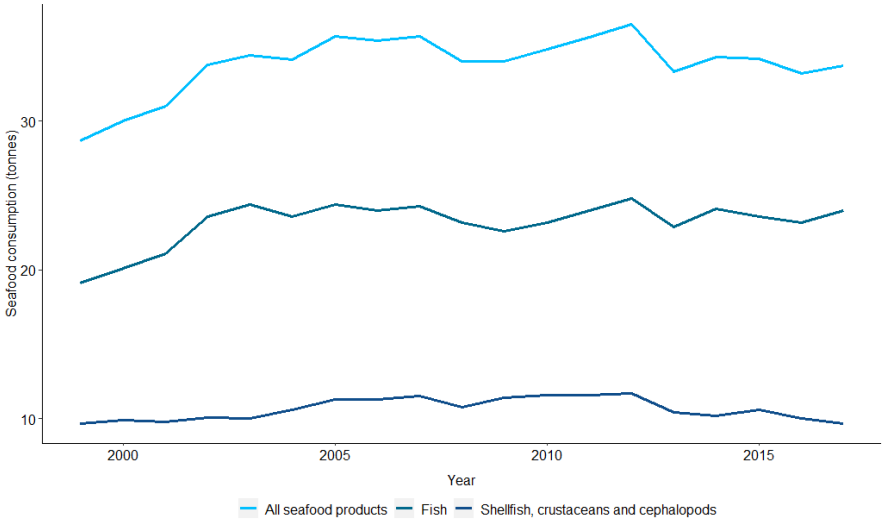

Figure 6: Composition of per capita fish supply for France, including OR
Source: FranceAgrimer

1.2 Regional fisheries management

EU-France is a contracting party of the International Commission for the Conservation of the Atlantic tunas (ICCAT[8]). ICCAT is a tuna Regional Fisheries Management Organization (t-RFMO). ICCAT recommendations are binding to Contracting and Cooperating Parties (CPC). EU-France is also a member of the Western Central Atlantic Fisheries Commission (WECAFC). WECAFC is a Regional Fishery Body (RFB) established under article VI of FAO, though its recommendations are not binding to France.

[8] https://www.iccat.int/en/index.asp

2 Fish stocks and other marine organisms and associated fishing activities

1.1 Commercial fish stocks

The exploited stocks in Guadeloupe are all taken within the EEZ of this country (Table 2). All reported stocks are extracted from Blanchard et al. (2018), which has compiled all stocks for Guadeloupe. Information on stocks is also provided from Weiss et al. (2020), which lists a summary of catches in Guadeloupe for 2018. Of the 59 stocks which are monitored only 5 are assessed (Table 2).

Despite this, in the yearly summary of exploited stocks in Guadeloupe published by the Institut Français de Recherche pour l'Exploitation de la Mer (Ifremer), which is the French Research Institute for the Exploitation of the Sea, not all 59 stocks are reported, as a ban on certain species may be present.

Table 2: Number of stocks monitored in Guadeloupe (source: Blanchard et al. 2018, part II)

Région	S	Se	Dpe	%De	V	%Ve
Guadeloupe	59	5	197	7	25	7

Legend: S: Species or group of species whose landings are monitored; Se: number of stocks subject to formal assessment; Dpe: landings in quantity (tonnes) of assessed stocks; % De: percentage of stocks assessed by weight; V: value of landings (EUR millions); % Ve: percentage of stocks valued in 2017.

Similar to Martinique, a study was conducted in 2020 (Pawlowski et al., 2021) to assess stock status for 13 main demersal species in Guadeloupe. However, the results in Guadeloupe were more uncertain than in Martinique. In total, 11 species could be assessed and represented on a Kobe Plot[9]. Authors highlighted uncertainties on these computed status using data limited models, especially because of short catch and effort available time series. Recommendations to improve data for better stock assessment were made, especially to increase the level of granularity of collected data for catch and effort (at species not family level), increase quantity of biological data collected, increase knowledge of recreational fisheries impact, development of new tools on the medium term to ease biological data collection.

For all the other species in which there was not a formal stock assessment (i.e. Table 2), the basic biological data needed for such assessments (e.g. breeding rate, natural mortality rate, mortality by predation) were not sufficiently collected for such species to undertake a reliable stock assessment. A study by Ifremer has been started in 2020 to collect more biological data (using funds from the Agence Francaise de Developpement (AFD), to buy fish directly from fishers) to fill gaps in the biological knowledge of the main fished species in Guadeloupe waters to conduct stock assessments of such species.

[9] A Kobe plot is a visual way to show the status of a stock. The plot is divided into four panels which correspond to a particular condition of the stock (overfishing, underfishing, overfished, underfished).

Table 3: Assessed stocks within Guadeloupe waters

Species	Scientific name	RMFO	Date	Assessment
Yellowfin tuna	*Thunnus albacares*	ICCAT	2016	Overexploited / not overfished
Blue marlin	*Makaira nigricans*	ICCAT	2018	Overexploited / overfished
White marlin	*Tetrapterus albidus*	ICCAT	2012	Overexploited / not overfished
Atlantic sailfish	*Istiophorus albicans*	ICCAT	2016	Not Overexploited /not overfished (West Stock)
Skipjack tuna	*Katsuwonus pelamis*	ICCAT	2014	Not Overexploited / not overfished (West Stock)

The multi-gear artisanal fishery that is the main type of fishery operating in the archipelago (see Section Fleet structure for more details) does not target specific species, is relatively opportunistic and is structured by daily shifts in gears. For example, interviews with fishers in Les Saintes (southern group of islands), Basse-Terre (Rivière sens) and Grande-Terre (St François) outline a typical week for fishers: one day fishing around anchored Fish Aggregating Devices (FADs)[10], which can result in a range of pelagic species being landed, which (dependent on the season) can include common dolphinfish and yellowfin tuna. The next day's fishing could be using pots (which are pulled up every 3-5 days, and target reef fish, termed 'groundfish'), the next day could be undertaken using nets to target yellowtail snapper, while the next day fishing could be based on using set lines.

There are some species in Guadeloupe that are subject to conservation measures (see Section 6, Fisheries management and conservation measures). Recently, on request from Guadeloupe Regional Committee for Marine fisheries and Aquaculture (CRPMEM)[11], there has been a ban on conch extended to the end of 2021 (2 year ban).

2.1.1 Small and medium pelagic

There are a range of small (Table 4) and large pelagic (Table 5) species fished within Guadeloupe waters. Such species include needlefish, carangids, clupeids, flying fish, halfbeak, scad, barracuda, seerfish (Spanish mackerel), rainbow runner and shark.

10 Such fishing may be on FADs that are officially registered by the fisher associations, or on the several hundred unregistered FADs that are created and disseminated by local fisheries. Both types of FADs are always anchored, as drifting FADs are forbidden.

11 https://www.guadeloupe.gouv.fr/Politiques-publiques/Environnement/Chasse-Peche/Peche-au-lambi-les-services-de-l-Etat-mobilises-pour-le-respect-de-la-reglementation

Table 4: Small pelagic fishes fished within Guadeloupe waters.

ASFIS code	French name	Scientific name	ASFIS en Name
BEN	Orphies, aiguilles (divers)	*Belonidae*	Needlefishes, etc. nei
CGX	Carangidés nca	*Carangidae*	Carangids nei
CLU	Clupéidés nca (Harengs, sardines, anchois, etc. divers)	*Clupeoidei*	Clupeoids nei
FLY	Exocets nca	*Exocoetidae*	Flyingfishes nei
HAX	Demi-becs nca	*Hemiramphus spp*	Halfbeak
SDX	Comètes nca	*Decapterus spp*	Scads nei
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad

Table 5: Medium pelagic fishes fished within Guadeloupe waters

ASFIS code	French name	Scientific name	ASFIS en Name
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei (Spanish mackerel)
RRU	Comète saumon	*Elagatis bipinnulata*	Rainbow runner
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei

2.1.2 Large pelagic

There are also a range of large pelagic fishes, including marlin, sailfish and tuna, as well as dolphinfish that are fished within Guadeloupe waters (Table 6).

Table 6: Large pelagic fishes fished within Guadeloupe waters

ASFIS code	French name	Scientific name	ASFIS en Name
BIL	Makaires,marlins,voiliers nca	*Istiophoridae*	Marlins, sailfishes, etc. nei
BLF	Thon à nageoires noires	*Thunnus atlanticus*	Blackfin tuna
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
SAI	Voilier de l'Atlantique	*Istiophorus albicans*	Atlantic sailfish
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna

ASFIS code	French name	Scientific name	ASFIS en Name
TUN	Thonidés nca	*Thunnini*	Tunas nei
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna

2.1.3 Demersal

There are a large range of demersal fishes that are fished within Guadeloupe waters (Table 7), dominated by species associated with coral reef habitats. Importantly, this varied list of species contains not only bony fishes and rays and skates, but also a range of invertebrates (e.g. crabs, lobster).

Table 7: Demersal fishes fished within Guadeloupe waters

ASFIS code	French name	Scientific name	ASFIS en Name
ANW	Demoiselles	*Pomacanthidae*	Angelfishes nei
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei
BXF	Coffres nca	*Ostraciidae*	Boxfishes nei
CON	Strombes nca	*Strombus spp*	Stromboid conchs nei
CRA	Crabes de mer nca	*Brachyura*	Marine crabs nei
DCP	Décapodes natantia nca	*Natantia*	Natantian decapods nei
DIO	Porcs-épics	*Diodontidae*	Globefish, porcupine fish
EEO	Vivaneau royal	*Etelis oculatus*	Queen snapper
FFX	Poissons-bourses nca	*Monacanthidae*	Filefishes, leatherjackets nei
GDJ	Blanches nca	*Gerreidae*	Mojarras, etc. nei
GPX	Mérous nca	*Epinephelus spp*	Groupers nei
GRX	Grondeurs, diagrammes nca	*Haemulidae (=Pomadasyidae)*	Grunts, sweetlips nei
GUX	Grondins, cavillones nca	*Triglidae*	Gurnards, searobins nei
HAX	Demi-becs nca	*Hemiramphus spp*	N/A (should be halfbeaks nei)
HCZ	Marignans nca	*Holocentridae*	Squirrelfishes nei
KPC	Crabe moro	*Carpilius corallinus*	Batwing coral crab
KUI	Troque des Antilles	*Cittarium pica*	West Indian top shell
LCX	Labre capitaine	*Lachnolaimus maximus*	Hogfish

ASFIS code	French name	Scientific name	ASFIS en Name
LOS	Cigales nca	*Scyllaridae*	Slipper lobsters nei
MGS	Mulets	*Mugil spp*	N/A (should be Mullets nei)
MUI	Murènes nca	*Muraenidae*	Morays nei
MUX	Rougets nca	*Mullus spp*	Surmullets(=Red mullets) nei
MXI	Crabe royal des Caraïbes	*Mithrax spinosissimus*	Channel-clinging crab
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei
OCT	Pieuvres, poulpes nca	*Octopodidae*	Octopuses, etc. nei
PWT	Perroquets nca	*Scaridae*	Parrotfishes nei
PZO	Poisson lion	*Pterois volitans*	Red lionfish
RAJ	Rajidés nca	*Rajidae*	Rays and skates nei
ROB	Crossies nca	*Centropomus spp*	Snooks(=Robalos) nei
RSQ	Crabe cyrique	*Arenaeus cribrarius*	Speckled swimcrab
SBX	Dentés, spares nca	*Sparidae*	Porgies, seabreams nei
SCS	Rascasses nca	*Scorpaena spp*	Scorpionfishes, rockfishes nei
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei
SNY	Vivaneau queue jaune	*Ocyurus chrysurus*	Yellowtail snapper
SOX	Soles nca	*Soleidae*	Soles nei
SUR	Chirurgiens nca	*Acanthuridae*	Surgeonfishes nei
TWV	Oursin blanc	*Tripneustes ventricosus*	Sea egg
UPC	Langoustine sculptée	*Eunephrops cadenasi*	Sculptured lobster
VLO	Langoustes	*Palinuridae*	Spiny lobsters nei
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei

2.1.4 Species under ICCAT management

With the EU being an ICCAT Contracting Party, France has to comply with the Commission regulations and recommendations. Therefore, there are a range of species catches in Guadeloupe that have to be reported to ICCAT (Table 8).

Table 8: List of species caught in Guadeloupe that have to be reported to ICCAT

ASFIS code	French name	Scientific name	ASFIS en Name
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna
TUN	Thonidés nca	*Thunnini*	Tunas nei
BIL	Makaires, marlins, voiliers nca	*Istiophoridae*	Marlins, sailfishes, etc. nei
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei
BLF	Thon à nageoires noires	*Thunnus atlanticus*	Blackfin tuna
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna
SAI	Voilier de l'Atlantique	*Istiophorus albicans*	Atlantic sailfish

2.1.5 Catch structures

Catch statistics may not be developed every year for all stocks, as several species may have closed seasons that encompass several years. For example, catch of conch (*Lobatus gigas*) have been closed across the 2020/2021 season as per Comité Régional des Pêches Maritimes et des Elevages Marins (CRPMEM) recommendation[12].

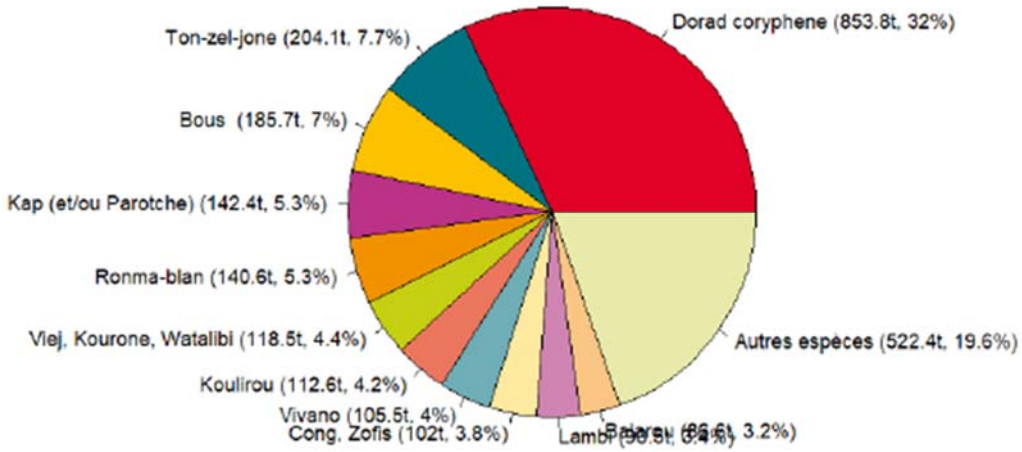

Figure 7: Guadeloupe catch structures in 2018 (source: Weiss et al., 2020).

The structure of the catch within Guadeloupe shows the variety of species fished. Large pelagic fishes represent 40% (dolphinfish 32% and yellowfin tuna 8%), the remaining

12 https://lemarin.ouest-france.fr/secteurs-activites/peche/36036-guadeloupe-pas-douverture-sur-le-lambi

60% are demersal fishes distributed between reef fish, crustacean and other species (20%).

The high percentage of the catch encompassing demersal fishes highlights the difficulty of collecting data on a large variety of species landed within Guadeloupe, associated with difficulties in collecting directly from fishers before and during sales to customers.

Table 9: Guadeloupe Creole names with correspondence with international classification and English name

ASFIS code	Creole or French name	English name	Scientific name
JKX	Balarous	Halfbeaks nei	*Hemiramphidae*
FFX	Bous	Filefishes, leatherjackets nei	*Monacanthidae*
DOL	Dorad	DolphinFish	*Coryphaena hippurus*
BIS	Coulirous / Koulirous	Bigeye scad	*Selar crumenophtalmus*
PWT	Kap	Parrotfishes nei	
CON	Lambi	Stromboid conchs nei	*Strombus spp*
SLC	Ronma blan	Caribbean spiny lobster	*Panulirus argus*
YFT	Ton-zel-jaune / ton-zèl-jône	Yellowfin tuna	*Thunnus albacares*
GPX	Vièj	Groupers nei	*Epinephelus spp*
SNA	Vivano / Vivaneaux divers	Snappers Spp	*Lutjanus spp*
NED	Zofis	Needlefishes, nei	*Tylosurus spp*
MZZ	Autres Espèces	Marine Fish nei	*Osteichthyes*

2.1.6 Declining and emerging stocks

Guadeloupe has faced for the last 20 years several issues with pollution related to the use of Chlordecone[13]. This organochlorine pesticide was utilised between 1972 and 1993 in banana plantations to reduce banana weevil infestation, and resulted in substantial local (and now regional) soil and water pollution. Since 2002 Ifremer has been studying the impact of chlordecone pollution on fisheries[14]. The institute provided the scientific evidence to enable protection measures related to fish consumption within Guadeloupe. The first important prefectural decree which impacted the fisheries sector was decree #2009-1478 of 23 September 2009, which imposed the first ban on fisheries of certain inshore species. Four following decrees have imposed further restrictions on fisheries, with the creation of no fishing zones in the southern coast of Basse Terre[15]. Section Fisheries management and conservation measures provides more information on these management and

13 https://en.wikipedia.org/wiki/Chlordecone

14 https://wwz.ifremer.fr/Recherche/Departements-scientifiques/Les-projets-Ifremer-dans-les-Antilles/La-contamination-du-milieu-marin-par-le-chlordecone

15 http://guadeloupe-peches.org/reglementation-chlordecone/

conservation measures. As a consequence of these no fishing zones on the southern coast of Basse-Terre, fishers have been encouraged to fish further from the coast, implying fishing in much deeper water (given the bathymetric profile of Guadeloupe). Figure 8 shows that the continental shelf is very limited in the Guadeloupe archipelago.

The limited shallow coastal area within Guadeloupe is particularly obvious in the southern part of Basse Terre, where water depth goes from 0-500 m (and beyond) a few kilometres from the coast. This poses the question of legislation relating to deep fisheries, as it remains the only option for certain Guadeloupe fishers. This is because deep fisheries close to shore are not allowed at the European level. Therefore, for Guadeloupe the legislation should be adapted to accommodate such regional specificity (i.e. depth is very high close to shore in Martinique and Guadeloupe). During interviews within the project, the CRPMEM General Secretary recalled article 349 of EU Treaty[16], recognizing the specificity of fishing activities within the ORs, and the urgent need to have tailored legislation framework developed for the ORs, including the Guadeloupe fisheries sector.

As a consequence of the lack of areas to fish close to the coast, fishers have to fish deeper if they want to go above restricted areas. Such movement of effort has enhanced the need to renew the Guadeloupe fleet with modern vessels. Such fleet renewal would enhance the safety of fishers fishing in the deeper waters, including the need for boats to have facilities for fishers to stay at sea overnight. In this respect, CRPMEM have initiated studies to create a modern of the traditional wooden fishing boat called "*Saintoise"* with 2 models: one to replace the day-trip boat and one to create a new model to stay overnight. In both cases, proposed models will stay within the 12 m size, to ensure the resilience of the fisheries sector to extreme events but also to enhance local fisheries to adapt to the variety of stocks available (i.e. inshore and offshore fisheries). In parallel, a trend is emerging with more pelagic fisheries being targeted and new species opportunities explored. In this respect, CRPMEM (discussed during interview with the Committee in January 2021) is currently conducting a study on the likely opportunities to fish a deep-water squid, the diamond squid (*Thysanoteuthis rhombus*).

Figure 8: Bathymetric profile of Guadeloupe
Source: https://www.geoportail.gouv.fr/donnees/carte-mondiale-fonds-marins using https://www.gebco.net/ data.

16 https://eur-lex.europa.eu/summary/glossary/outermost_regions.html

2.2 Fleet structure

All fishing vessels in Guadeloupe are below 12 m in length. Of these, 96% of the active vessels in 2018 are below or equal to 10 m. All vessels are multi-gear.

2.2.1 Domestic fisheries

Artisanal fishery

Ifremer statistics on the fleet in Guadeloupe show that they are on average 7.7 m long, have motors of 175 HP, a gross tonnage of 3 tonnes, are 17 years old and hold 1.8 crew (Système d'Informations Halieutiques, 2020b). This was confirmed with the in-country visit, with the typical vessel being fiberglass and undecked, and between 6-9 m long (426/539 registered vessels, 79% of the fleet) (Table 10). These vessels predominantly have one or two outboard engines (150 – 200 HP), and can hold a small cabin. There are larger vessels of 11 -12 m length, decked with on-board diesel motors, but these are limited in number and as they are slower than the smaller vessels, are not popular.

The majority of vessels within Guadeloupe (64%) operate within 12 nautical miles (nm) of the coast, while 23% operate on a regular basis outside the 12 nm limit. However, due to the high level of chlordecone contamination of inshore marine organisms the proportion of vessels operating outside the 12 nm is regularly increasing.

Table 10: Number of active vessels per length class in Guadeloupe (source: Weiss et al., 2020).

Length class	Coastal	Mixed	Offshore	Total
< 5 m	7			7
5 - 6 m	34	3	1	38
6 - 7 m	74	19	7	100
7 -8 m	124	29	9	162
8 - 9 m	72	59	33	164
9 - 10 m	28	12	7	47
10 - 11 m	1	3	6	10
11 - 12 m	7		4	11
Total	347	125	67	539

Note: Vessels having carried out more than 75% of their activity within 12 miles are qualified as "Coastal". Those having operated between 25 and 75% of their activity in this zone are qualified as "Mixed". Finally, those having operated more than 75% of their activity outside the coastal area are qualified as "Offshore".

Industrial fishery

No vessel above 12 m operates in Guadeloupe.

Sports/recreational fishery

There is limited information available on sport / recreational fisheries activities. Only 1 recreational charter boat is recorded by Ifremer in Guadeloupe. However, to refine

statistics on this sector, a study is being conducted on recreational fisheries[17] with the RECREAFISH. It calls for voluntary local recreational fishers (tourists will not form part of this study) to provide data on all fishing activities during one year and report this through paper reports to Ifremer. An incentive is in place through a lottery at the end of the project for participants to possibly win vouchers.

2.2.2 Foreign fisheries

No foreign vessels operate in Guadeloupe.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

As indicated above, the topology of fisheries in Guadeloupe is predominantly small scale fisheries with small multi-gear vessel. This fleet does not target a specific species, therefore there is little (if any) evidence to show that bycatch is prevalent in this fishery.

2.3.2 Endangered, threatened and protected (ETP) species

In statistics reported by Ifremer, no data are available specifically on ETP species. This is explained by the fact that Guadeloupe regulation bans the catch of sea turtles, mammals and corals (see Section Fisheries management and conservation measures).

Within a study conducted in 2015 (Louis-Jean, 2015) which aimed at quantifying the impact of fisheries on turtles, results showed that turtles represented 2% of total catches with an overall 49% mortality rate, which included a majority of juveniles. No global impact of such fisheries was assessed, but recommendations were made to adapt some fishing techniques to limit the incidental catch of turtles.

Statistics shows catches of species with conservation measures include conch (closed season), lobster (ban on breeding lobster) and white urchin (1 month open season).

2.4 Summary of fisheries

Table 11: Main gears / fishing technique in Guadeloupe in 2018 (Weiss et al., 2020), including species caught in domestic commercial fisheries in Guadeloupe

French Name	English Name	Potential catch
Casier	Pots	Miscellaneous Fish Pots: Filefish, (28%), Grouper nei (14.4%), Parrotfish nei (12.9%) Deep pots: Snapper (69%), Lionfish (8%) other species (7.7%)
Ligne trainante	Trolling line	Pelagic fishes
Filet maillant fixe	Fixed driftnet	Demersal fishes
Tramail	Trammel	Target species; Bycatch
Palangre de fond	Bottom longline	Groupers nei (71%), Yellowtail snapper (11%), Grunts, sweetlips nei (6%)

[17] https://wwz.ifremer.fr/antilles/Activites-projets/Halieutique/RECREAFISH

French Name	English Name	Potential catch
	Deep Longline	Queen snapper (52%), Snappers nei (47%); Other species (1%)
Filet maillant encerclant	Circling driftnet	Clupeidae circling nets: Herrings, sardines nei (100%) Halfbeaks circling nets: Halfbeaks nei (99%, Other species (1%) Bigeye scad circling nets: Bigeye scad (100%) Needlefishes circling nets: Needlefishes nei (100%)
Ligne a main (a main ou avec canne)	Hand line (with or without pole)	Groupers nei (32%), Yellowtail Snapper (20%), Snappers nei (15%)
Plongee en apnee	Free diving	Parrotfishes nei (84%), Spiny lobsters nei (16%)
Sennes	Seines	Yellowtail snapper (71%), Carangids nei (7%), Grunts, sweetlips nei (6%)
Divers filets	Nets nei	Deep nets: Snappers nei (77%), Queen snapper (8%), Tunas nei (6%) Lobster net: Lobster nei (73%), Spotted spiny lobster (9%), Rays (7%)
Charter de pêche récréative	Recreational fishery charter boat	
	Large Pelagic Lines and Longlines	Dolphinfish (54.4%), Yellowfin tuna (25%), Filefish (3%)
	Lobster pots	Spiny lobster nei (90%), Filefish leatherjackets nei (5%), Other species (3%)
	Gillnet	Parrotfish nei (79.5%), Other species (11%) Grunts, sweetlips nei (9.5%)
	Conch free diving	Stromboid conchs nei (100%)
	Urchin and Echinoderms free diving	*Tripneustes ventricosus* (100%)

Source:
Casiers à divers poissons. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77783/;
Palangres et lignes à grands pélagiques. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77796/;
Filets à langoustes. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77791/;
Filets droits. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77792/;

Filets à lambis. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020.https://archimer.ifremer.fr/doc/00666/77790/;
Lignes à main. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77794/;
Casiers à langoustes. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77784/;
Palangres profondes. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020.https://archimer.ifremer.fr/doc/00666/77797/ ;
Palangres. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77795/;
Casiers profonds. Guadeloupe. 2019. Observation des Marées au débarquement – OBSDEB, 2020. https ://archimer.ifremer.fr/doc/00666/77785/; Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77786/;
Filet encerclant à Coulirous. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77788/;
Apnée. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77778/;
Sennes. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77798/;
Apnée à lambis. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77781/;
Filet encerclant à orphies. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77789/;
Filets profonds. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77793/;
Filet encerclant à caillus. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77787/;
Apnée à Oursins, Echinodermes. Guadeloupe. 2019. Observation des Marées au débarquement - OBSDEB, 2020. https://archimer.ifremer.fr/doc/00666/77782/.

SECTION 2 - KEY FINDINGS

- The fishery sector in Guadeloupe is exclusively small scale fisheries, operating from one type of vessel designed to be multi-gear (legacy from the old wooden *Saintoise*) and catching a large variety of species
- This type of fleet offers a high resilience to a change in available fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (i.e. large pelagics, conch).
- Stocks are well identified and catch are routinely monitored.
- Catches and number of fishers have been halved over the last 10 years for several reasons, though tough working conditions with little appeal for young people is one of the major factors.
- The impact of chlordecone hampers the potential development of the sector, though encourages the emergence of new stocks exploitation (deep species like the diamond squid, *Thysanoteuthis rhombus*)
- Stocks under ICCAT mandates are monitored and five (5) are assessed. Other stocks in Guadeloupe have not been formally assessed; studies and new biological data collection will fill this gap in the coming years.

3 Institutional structures

Data collection in France is well coordinated (**Error! Reference source not found.**). In Guadeloupe, data collection is directly managed by Ifremer and utilized within the national Fisheries Information System (SIH), of which the team that runs the SIH is situated within Brest and Martinique), and outsourced to a private company.

Data collection is based on samples collected by data enumerators, in accordance with a quarterly sample scheme provided by SIH. Catch information and length frequency data are collected throughout the year. Effort information related to the previous year of fishing is collected during the first three months of the current year. Raising of data and development of statistics and reporting is undertaken by the SIH. In parallel, EC Common Fisheries Policy (CFP) reporting obligations[18] are being implemented in the archipelago, with self-reporting logsheets for all vessels between 10 and 12 m.

3.1 Data collection

The overarching institution related to data collection is the Direction des pêches maritimes et de l'aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation[19]. Its roles are to ensure that France meets its obligation towards EU Common Fisheries Policy (1380/2013)[20], including the data collection framework (Regulation (EU) 2017/1004)[21]

18 As defined in 1224/2009 regulation

19 https://agriculture.gouv.fr/

20 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

21 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

and 2017-2019 EU-MAP[22] and the 2020-2021 EU-MAP (consisting of two Commission Decisions) [23].

In-field data collection involves several national institutions and research institutions:

- Ifremer: organize data collection from samples (biological data) and manage the SIH;
- Institut de Recherche pour le Développement (IRD), the Research Institute for Development: Tuna monitoring; and
- FranceAgrimer: In charge of collecting logsheets from fishers when there is no electronic reporting, with delegation of data entry at the local level.

Other national bodies with local branches have an intermediary role in data collection:

- CRPMEM: can be involved in logsheet data entry for FranceAgrimer.

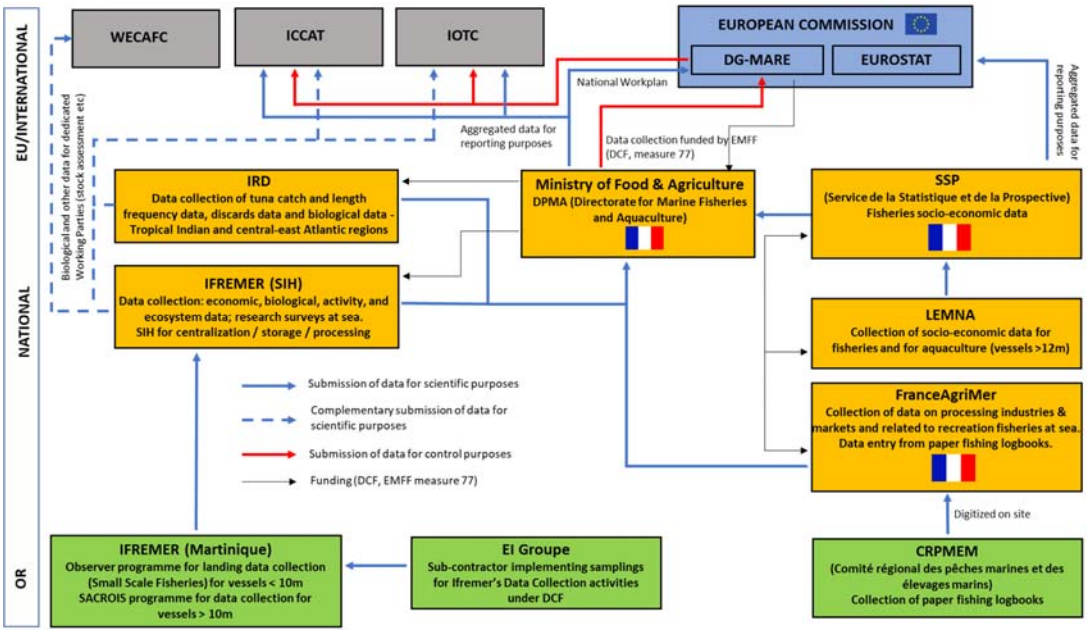

Figure 9: Institutional organization of data collection in France with Guadeloupe level.

3.1.1 Overall workflow of data collection in France and its ORs

While the DCF provides a legal framework, organisation and general obligations, the EU-MAP establishes the (minimum) data requirements to be collected and at what frequency. For example, biological variables associated with a métier[24] include length and discard

22 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

23 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

24 A métier is a group of fishing operations targeting a specific assemblage of species, using a specific vessel and gear type, during a precise period of the year and/or within the specific area.

data for pre-determined species to allow for quarterly evaluation of length distributions and discard volumes. These data must be recorded to "level 6" which includes data for levels 1 to 5, providing background information on the fleets in question.

Since 2014, the European Maritime and Fisheries Fund (EMFF) provides each MS financial support to implement the DCF. Articles 17 to 20 of the EMFF Regulation (EU) 508/2014[25] require participating MS to produce an 'operational programme' for the EMFF. The operational programme sets out how each MS intend to spend their EMFF budget and is subject to approval by the EC. In addition, under the DCF each MS must set out a work plan and submit an annual report describing the implementation of the DCF.

DPMA provides the National programme of work, revised on an annual basis, as needed. This document describes how France is going to comply with the DCF obligations, while each OR organizes its own fisheries monitoring system.

According to DPMA, the following workflow is in place for catch reporting, following the Control Regulation (EC) 1224/2009[26]:

- Vessels below 10 m (paper logsheet) and vessels 10 to 12 m (paper logbook) send their paper-based catch data to the Sea Directorates (DM) for quality control, which then transmits them to FranceAgrimer for data entry in SACAPTE, from where they are integrated into the SIH. In Guadeloupe, CRPMEM digitalizes logsheets for FranceAgrimer
- Vessels above 12 m: e-logbooks are directly feeding into the SIH. VMS data and sales data are also directly fed to SIH, but without data relevant to ORs.

The main actor is Ifremer, who are responsible for 90% of data collection, with IRD focusing on tuna (however, this will be minor for ORs as IRD mainly collect data from high sea fleets).

Ifremer is the *de facto* "manager" of fisheries data collection issues in ORs for DPMA. Ifremer have strived over the past year (2020) to set up a single focal point for all data-related questions, to make things easier when DPMA request information from them. DPMA is also pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools. This will result in one single tool at Ifermer to house all fisheries information and statistics.

FranceAgrimer is in charge of recreational fisheries monitoring and of industries/processing plants monitoring/auction houses in mainland. This is done for them by a private subcontractor (BVA). In Guadeloupe, BVA have implemented one-off surveys on recreational fisheries. They also collect logsheets for vessels below 10m, digitalized by CRPMEM.

Service de statistiques et de la prospective (SSP) and LEMNA implement socio-economic surveys on all French vessels on the fleet register, including in the ORs and report to DMPA.

25 Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund and repealing Council Regulations (EC) No 2328/2003, (EC) No 861/2006, (EC) No 1198/2006 and (EC) No 791/2007 and Regulation (EU) No 1255/2011 of the European Parliament and of the Council (OJ L 149, 20.5.2014, p. 1–66)

26 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

3.1.2 Data collection and other reporting obligations in Guadeloupe

Data collection is under the management and supervision of Ifremer stationed in Martinique, in collaboration with the SIH team in Brest. This data collection follows *Observation des Marées au débarquement* (OBSDEB) methodology (see Weiss, 2017 for a description of this methodology). It implements enumerator-based data collection, according to a sampling scheme produced at the central level by SIH. Landing data are recorded on a daily basis, and average effort is computed from activity interviews conducted during the first three months of the year ("*Calendrier d'activités*").

Fisheries statistics activities are presented and discussed by all fisheries sector stakeholders during yearly SIH steering committees. Issues, problems are raised to Ifremer by stakeholders such CRPMEM.

The actual data collection in Guadeloupe is outsourced to the Groupe EI[27] (GEI) team. Six data collectors, including a supervisor operate on a daily basis in the Archipelago, Basse Terre, Haute Terre and islands "sous le vent" (Les Saintes, Désirade and Marie-Galante). The sampling plan is shared to the GEI team on a quarterly basis, with the GEI supervisor organising daily activities according to Ifremer's plan.

Three types of information are routinely collected:

- Effort information through "*calendrier d'activité*" = activity calendar (last years' activity of all registered fishers collected through interviews);
- Catch data through landing surveys; and
- Length frequency data (OBSVENTE programme).

Data are entered into SIH directly by data collectors. During interviews, GEI raised recurrent issues in connectivity with SIH; Ifremer provides responsive user support but these issues can delay data entry process.

As presented in Section Fleet structure, vessels between 10 and 12m are requested to report fishing activities through logsheets. Of these, 40 to 60% of logsheets for 2020 have been reported according to CRPMEM during January interviews. These data have not yet been formally compared to Ifremer results. CRPMEM highlighted that some species reported in these logsheets (deep shrimp) were not present in Ifremer stocks.

Logsheets are certainly a source of data to be considered for Guadeloupe, with logsheet reporting dramatically increasing in the past year, but such data are not directly used to provide official data. To ensure their use in official statistics, the accuracy and reliability of logsheets still need to be confirmed, while controls of declaration will be required to ensure long term reliability of the source of information. The flow is already entering SIH for ORs. Ifremer acknowledged the need for comparison but no timeline was given for such a key activity.

No information or data are collected from Guadeloupe on recreational fisheries although BVA have implemented one-off surveys on recreational fisheries. There is limited socio-economic data collected by Ifremer (i.e. number of crew, price of fish).

During stakeholder interviews CRPMEM raised concerns about the validity of the Ifremer methodology and coverage of fishers by data collectors during January 2021 meeting. Ifremer in Martinique also stated that there are issues in the quality of collected data, highlighting the need for a dedicated staff to interact with the local team in Guadeloupe,

27 https://www.groupe-ei.fr/

to review more closely results and to provide capacity building when needed. In this respect, a review of the fisheries sector in Guadeloupe and Martinique (Laisne and Viel, 2018) highlighted issues in data collection without quoting sources. What can be summarized from this report was:

1. Ifremer methodology is documented (Weiss et al. 2017)
2. Sampling schemes are provided to Groupe EI on a quarterly basis to collect effort data during the first 3 months of the year ("*Calendrier d'activité*"), catch and biological data through landing sampling;
3. Yearly summary reports are published as well as detailed report per métier: the whole process of data collection, processing and reporting is documented and transparent;
4. A SIH steering committee is meeting on a yearly basis to share concerns and issues among fisheries sector stakeholders and Ifremer
5. There are no Ifremer staff dedicated to Guadeloupe-specific activities, which has a direct impact on communication and monitoring the quality of data. This negative impact is mitigated by regular calls and at least yearly visit to Guadeloupe of Ifremer Martinique.

Outsourcing data collection was a policy decision made by Ifremer. The advantages of this are that there is a dedicated team in place that can conduct daily activity, and this team can be easily mobilized to conduct other studies (socio-economics). The disadvantages are that there is no direct supervision by Ifremer, therefore there is a risk of misunderstanding of some aspects of data collection (methodology for biological sampling or the collection of catch and effort information). In addition, the renewal of the contract can lead to periods without data collection in place (such as 2016 and 2017, see reference in Weiss, 2018), while with staff turnover there is a need to rebuild the trust with fishers.

3.1.3 The Système d'Informations Halieutiques

The Système d'Informations Halieutiques (SIH) was developed under the framework of the ecosystem-based approach to fisheries, to cover both ecosystem resources and uses. The overarching aim of this system is to gather all fisheries information in a single system. This covers collected catch and effort data, as well as existing data. The system was developed to then harmonise the data, store and preserve them, and make the data available to partners.

The SIH was prototyped in 2007 in Martinique. Since 2017, the system has been managed from the Brest office of Ifremer, with regional focal points which serve as a relay for the national SIH people based in Brest.

The SIH is organised in 4 modules, all managed by Ifremer:

Ecosystems: Data collection for this module happens mostly in Metropolitan France (i.e. not in the ORs), and can include abundance indices for stock assessments, campaigns etc.

Exploited resources: This module examines population structure and collects the main biological parameters for stocks. This involves biological observation of landings, including in markets and factories. There is some biological sampling in the ORs, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers. Biological sampling on large pelagics under the mandate of RFMOs (ICCAT, IOTC) is considered as generally good. In 2021, Ifremer plans to do more biological sampling in the ORs, mainly based on buying fish in ports, on a larger range of species, as per STECF recommendations.

Landings & effort: In mainland France, data flow is considered good (e-logbooks etc), though this is not apparent for the ORs. The standard flow of reporting is as follows: fishers send their logbooks or logsheets to the local Direction de la Mer (DMSOI), which sends them after quality control to FranceAgrimer for data entry (in-house or by subcontractors). One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed. The overall reporting rate for the ORs is currently estimated at 50%. In this regard, the role of the local DMs is very important to train fishers, provide support etc. for data reporting. To address this issue of reporting, Ifremer developed OBServatoire des DEBarquements (landings observatory) (OBSDEB), which works by performing sampling at landing sites, to rebuild catches and effort on the last 7 days. For 2021, Ifremer's objective is to improve catch and effort reporting by fishers. The outcome of the development of OBSDEB is that instead of relying on reporting, OSBDEB samples landings to estimate catches etc. thereby complementing existing declarations.

Socio-economic data: Data on activities: month per month reconstitution of activity with métier, species & distance from coast. From there, segmentation of the fleet is derived. This information is used as basis for sampling plans. Availability of such data varies depending on the ORs.

LEMNA collects data from vessels with proper accounting. Iremer tries and collect data from vessels without such information or refusing to provide them.

Database: SIH uses a central database named HARMONIE. It is used for storage, Quality Assurance, validation, aggregation, anonymisation, processing, statistics etc. and also for providing data to end users.

The current objective is to compile all available data from Ifremer, IRD and the National Museum of Natural History (MNHN) in the Ifremer Harmonie database used by the SIH, so that all data is already in a single system and format, ready for data calls. Data would be harmonised using the ICES RDBES data standard, which includes metadata on methodologies, campaigns, processing etc.

There is also work on harmonising sampling plans, data collection protocols, Quality Assurance methods, estimation and processing, etc.

Harmonie and the related software etc are mostly developed and maintained in-house (Direction des services informatiques (DSI)), with software development partly outsourced to external contractors, based on Ifremer specs.

Data calls: Ifremer is usually in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the caller (DPMA, ICES, ICCAT). There is a good collaboration with the Atlas of European Tuna fisheries[28] maintained by IRD to compile all tropical tuna fisheries data (which are not collected by Ifremer). In the case of IOTC, IRD is in charge of compiling requested data.

3.1.4 Reporting to regional/international organizations

DPMA does not report statistics *per se* to the European Commission but provides an Annual Report on the implementation of DCF through the Work Plan (2017-2019, 2020-2021).

28 https://sirs.agrocampus-ouest.fr/atlas_thonV5-DEC/index.php?atl_version=0&idlang=uk

DPMA reports statistics related to data calls from EC, ICES, RFBs (WECAFC, SIOFA) and RFMOs (ICCAT, IOTC, GFCM).

SSP sends statistics to Eurostat and FAO, with disaggregation per OR.

Ifremer and IRD both contribute biological data directly to dedicated regional working groups (e.g. WECAFC shrimp and groundfish working groups) to which the EU is a participant.

3.2 Scientific advice

Ifremer and IRD play a central role in the production of national scientific advice. Such advice is either requested by local authorities such as Direction de la Mer (DM) or by central French authorities such as Direction de la Pêche Marine et de l'Aquaculture (DPMA) under Ministère de l'Agriculture et de l'Alimentation.

As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests. However, access to actual SIH datasets is only granted on request, including for internal users.

- Internal users: if granted, they have access to raw datasets. In some cases, SIH staff prepares datasets for internal users (e.g. users who do not need and/or could not use raw data). VMS data is a specific case where access is given after very careful review of the request.
- External users: if granted, they have only access to prepared datasets, properly aggregated and anonymised.

All requests (including access to data or data calls) are reviewed by a dedicated structured, called CREDO (Cellule de Réponse aux appels de DOnnées).

The review process includes:

- Determining who would prepare/provide the data within Ifremer; and
- Who will use the data and for what.

The review process depends on the dataset:

- Ifremer only for less sensitive datasets; and
- Ifremer plus DPMA for data such as SACROIS and OBSMER which include business-confidential information. For these there is a quarterly steerco meeting to review requests.

Access to data is mostly free, though Ifremer used to charge when data was requested by private for-profit entities such as engineering bureaus for impact studies. But the administrative overhead linked to charging for such information is so high that now they tend to just provide the data for free.

In the context of the French Government's policy on access to public data (open data), there is global review on the access to data in Harmonie, but this is a complex issue. DPMA mentions that in other areas, such as agricultural data, access is done entirely through an online tool (Agreste portal). This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data.

Overall, Ifremer reviews around 200-300 data requests each year. It also publishes fisheries data summaries, in the form of PDF fact sheets on given fisheries, métiers etc.

Those are published on an annual basis and are accessible to everyone on the Ifremer website. The production of those documents is highly automated based on procedures and scripts stored in the SIH.

Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (such as working parties and scientific committee) to which France participates through the EU.

RFMOs (IOTC and ICCAT) share aggregated data with the public and share fine grained data with their Working Parties according to their data confidentiality policy. They can also grant access on request for fine grained data to external scientists etc, subject to approval by the Members.

RFMOs provide scientific advice based on the work of their scientific working groups and through their Scientific Committee. This scientific advice is made available to the general public on the respective RFMO websites.

3.3 Research institutions

There is no research institute in Guadeloupe. Any fishery research in the archipelago is under the management and monitoring of Ifremer station in Martinique. A socio-economic study to collect DCF indicators (revenue, effort, employment, investment and operational costs) was conducted in 2020 by Ifremer, but results of this have not yet been published[29], while a study of recreational fisheries is being conducted in 2021 by Ifremer[30].

3.4 Monitoring, control and surveillance

Regarding monitoring, control and surveillance (MCS), vessel monitoring systems (VMS) are not mandatory as vessels are below 12 m overall length.

Logsheets are required for vessels between 10 to 12 m. Implementation of the Control Regulation (EU) 1224/2009)[31] was low until recent years. Outreach and training efforts have been deployed to encourage fishers to report, in a general effort to better document fishing activities to be eligible for European subsidies, especially in terms of accounting and social contributions to different tax and contribution regime. CRPMEM is in charge of collection of logsheets, and entering this data in the FranceAgrimer System. According to the Committee, 40 to 60% of 2020 logsheets have been reported.

Regular surveillance activities are being conducted by Direction de la Mer (which is the local representative of state for any matter related to the sea, including MCS). This specific activity was not discussed with Direction de la Mer (DM) Guadeloupe. As local implementation of MCS follows national regulations, the setup from Martinique is presented below, but will be mirrored for Guadeloupe.

29 https://archimer.ifremer.fr/doc/00649/76107/77061.pdf

30 https://wwz.ifremer.fr/antilles/Activites-projets/Halieutique/RECREAFISH

31 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

At local level, Prefect ("Préfet") as local representative of French State has the responsibility for MCS and delegates to local DM implementation and enforcement of regulations.

DM issues a 2 year sub-national control at sea plan with priorities identified for MCS activities. Fisheries is one in the Caribbean. The plan defines objectives for controls and enforcement.

Controls are conducted by Unité Littoral de Contrôle Maritime national Navy, maritime police ("Gendarmerie"), and customs. DM has a role of planification and coordination that also centralises reports. The fields units have official mandates to control and issue fines.

After an infringement, DM centralised all reports and its director can issue penalties and request a referral to court. All penalties are defined in Code Rural et de la pêche maritime[32].

DM is supported by Centres régionaux opérationnels de surveillance et de sauvetage-Operational Regional Centers for surveillance and Rescue (CROSS[33]) and the Centre national de surveillance des pêches, National Center for fisheries surveillance (CNSP[34]), regarding any review of legal obligations, with all legal compendium shared with all MCS partners.

Operational Units receive regular training on MCS through Ecole Nationale de la Sécurité et l'Administration de la Mer, National School for Sea Security and Administration (ENSAM[35]). Specific training for Police and Customs officers related to fisheries are also regularly organized.

At the level of RFMOs, control is enforced by Member States, but the RFMO body in charge of compliance can identify Members that are not compliant and ask them to remedy the situation.

3.4.1 MCS data for scientific purposes

Ifremer obtains administrative and control data from DPMA's SIPA (Système d'information de la pêche et de l'aquaculture – Fisheries and aquaculture information system[36] , such as vessel registration and characteristics an VMS data. However, given the average length of vessels in Guadeloupe, VMS is not mandatory for the fleet.

3.5 Institutional capacity

3.5.1 National level

DPMA considers that the major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF.

The objective of DPMA is to include under DCF all activities that should be part of regular data collection. In most cases, Ifremer and IRD implement all activities themselves, but

32 https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006071367/

33 https://www.ecologie.gouv.fr/sites/default/files/17142_CROSS_50ANS_BATweb.pdf

34 https://agriculture.gouv.fr/quest-ce-que-le-centre-national-de-surveillance-des-peches-cnsp

35 https://www.ecole-affaires-maritimes.fr/16-ressources/les-memoires/bt.html

36 http://www.sipa.agriculture.gouv.fr

in specific situations data collection is done by private contractors for Ifremer (Guadeloupe has 100% private contractor).

Regarding IRD, there can be limitations if there are urgent requests done which had not been planned/budgeted, as they are running at full capacity, so unexpected tasks are an issue. Often requests passed by DPMA through an official request to Ifremer, take priority, which can impact routine and project work. Recruitment within Ifremer is an issue, as recruiting someone means training and takes time, so it is often easier to not hire new staff.

Generally speaking, there is very little competition for data collection calls for tenders in the ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, whilst requiring a certain amount of expert knowledge). Contracts are currently on a 3-year basis, but the next ones will be for 4 years.

3.5.2 Guadeloupe

Data collection has been wholly outsourced to an external company for field activities, but remains under full supervision and management of Ifremer Martinique and SIH in Brest. In this respect, the main need expressed by Ifemer staff is the need for an additional staff member in Ifremer Martinique, dedicated to monitoring and coordinating activities in Guadeloupe, including data collection.

SECTION 3 – KEY FINDINGS

- Responsibilities and tasks for French Fisheries sector monitoring are well defined at the national and local level. Several actors are involved depending types of data to be collected.
- In Guadeloupe, Ifremer plays a central role though implementation of sample based surveys collecting catch and effort data (OBSDEB programme) and biological data (OBSVENTE programme).
- Ifremer designs data collection methodology and provides tools for data entry, processing and computation (SIH, managed in Brest, France).
- Ifremer outsources to a private company Groupe EI collection of information in the field.
- Contract renewal can lead to periods without data collection in place (such as 2016 and 2017, see reference in Weiss et al. 2018).
- Implementation of Council Regulation (EC) 1224/2009[37] regarding logsheet self-declaration by fishers has greatly increased and is an opportunity to collect more information, upon validation of the reliability of these declarations.
- Gaps are known related to socio-economic data and recreational fisheries. Studies have been kicked-off in 2020 to improve this knowledge.
- DPMA centralized data from the different partners and disseminates reports according to national (SSP which reports to EUROSTAT then FAO), and regional ICCAT and WECAFC requirements.

37 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

SECTION 3 – KEY FINDINGS

- Ifremer plays a central role for scientific advice in Guadeloupe in support to local regulations (related to chlordecone for instance)
- Ifremer capacity would require to have a dedicated staff in Martinique to coordinate specific activities conducted in Guadeloupe, including data collection

4 Funding and funding structures for data collection

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member State funding

DPMA provided a description of how the EMFF process works in France.

Top-down:

1. The European Union votes a global envelope for EMFF. It is the result of a political consensus.
2. A national envelope is scaled according to complex rules including different criteria
3. A percentage of this envelope is assigned to data collection (Article 77).

Bottom-up:

At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities (such as for recreational fisheries). A draft of the total budget for DCF data collection is made available.

Final negotiation: this draft is confronted to the DCF percentage available in EMFF for France. Discussions starts again to find the correct balance between priorities. It is a complex exercise with no magic recipe.

EMFF funds 80% of the eligible costs (not all data collection activities are eligible). The remaining 20% is supported by the institution's own budget.

DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. It takes usually 4-5 months to complete the process.

DPMA is also a beneficiary of Article 77.

There are some projects related to the collection of data outside Article 77 that refers to DCF:

- Article 28: scientific partnership
- Article 39: improvement of gear selectivity
- Article 40: large marine ecosystem knowledge (to be confirmed), and
- Article 76: MCS funding

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the EMFAF 2021-2027, funding be attributed for the whole cycle to secure data collection over the 6 years period.

Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French Cours Des Comptes[13]. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

France received under the EMFF 2014-2020 EUR 588 million. In this respect, the EMFF Operational Programme for France 2014FR14MFOP001 (DPMA, 2015) described the proposed use of EMFF by France, including OR:

- Union Priority 1 (UP1): EUR 150.9 million (25.7% of total EMFF allocation) will aim at a better balance fisheries activities and environmental protection and sustainability. It will address (among others) fleet capacity by adjusting fleet capacity to resources, modernisation of the fleet, investments in port infrastructures in line with requirements under the discards ban, and improving traceability of fisheries products and processing.
- Union Priority 2 (UP2): EUR 88.8 million (15.1% of EMFF allocation) will go towards meeting the objectives of the French national strategic plan for aquaculture that aims at boosting competitiveness and sustainability of the French aquaculture sector.
- Union Priority 3 (UP3): EUR 122.3 million (20.8% of EMFF allocation) will go towards compliance with CFP rules regarding control and data collection. This include Article 77 of interest to this study: total budget in the programme is EUR 66 146 872. This is the main source of EMFF funding for DCF data collection at the national and OR level.
- Union Priority 4 (UP4): EUR 22.6 million (3.8% of EMFF allocation) will help ensure better territorial cohesion of fisheries and aquaculture. Foreseen activities include maintaining and creating new jobs, reinforcing the position of fisheries and aquaculture within the development of coastal territories, strengthening the FLAGs network, and increasing added value through innovative projects and research.
- Union Priority 5 (UP5): EUR 163.2 million (27.8% of EMFF allocation) will go towards improving the marketing, diversification and valorisation of seafood products. The French OP gives a central role to producer organisations (PO) that currently place almost 50% of the French production on the market, through the implementation of production and marketing plans and the reinforcement of POs across its territory (both mainland and outermost regions). Please note compensation for additional costs for seafood marketing etc in the six French ORs has more than doubled compared to the 2007-2013 period.
- Union Priority 6 (UP6): EUR 5.3 million (0.9% of EMFF allocation) will go towards strengthening the efficiency of maritime surveillance and widening the network of marine protected areas and improving knowledge on the marine environment and interactions with human activities.
- EUR 34.8 million (5.5% of EMFF allocation) are allocated to technical assistance in order to reinforce the implementation system, ensure efficient administration of

the EU funding, including support to reducing burden on beneficiaries, improving administration and publicity and information measures.

Financial information:

- Total OP budget: EUR 774 353 018
- Total EU contribution: EUR 587 980 173, including € 66,146,872 for DCF
- Total national contribution: EUR 186 372 845

EMFF is operationally managed by DPMA. Some of the fund management is delegated to sub-national level (*Régions*).

4.1.2 OR funding

No specific budget has been proposed by the EMFF operational programme for French ORs. However, it has been highlighted within the programme the need to support Guadeloupe fishers to mitigate the impact of chlordecone on fishing activities. Engagement of the budget according to needs within the total envelop (here UP1) is delegated to Guadeloupe *Région*.

Use of EMFF funds in the OR can be extracted from France financial report. (Liste des opérations du programme national FEAMP 2014-2020, 2019). The total use of EMFF funds in Guadeloupe is EUR 3 185 283.19 (at December 2019), with 36% for control and surveillance (Article 76), 39% for seafood transformation (Article 69) and 16% for OR compensation cost (Article 70).

No specific engagement line for Article 77 related to DCF data collection is available for Guadeloupe. This measure, as presented in the next section is engaged at national level.

4.2 Other sources of funding

Ifremer has a total annual budget in 2017 of EUR 194.4 million (Cours des Comptes[38], 2019); with the following breakdown: (i) EUR 154.4 million directly supported by the national budget (subsidies for public services support), and (ii) approximately EUR 40 million from contracts and projects; the EUR 40 million includes support from EMFF.

EMFF reimburses 80% of eligible expense, which usually corresponds to 60% of the expenses. The remaining 40% are covered by Ifremer national budget.

The other source of funding is France's regular national budget, which can provide funds under various mechanisms:

- Grant agreement with Ifremer and IRD;
- "*Convention socle halieutique*" with Ifremer: used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan; and
- Triannual agreement with IRD.

38 *Cours des comptes* = Account court, the French National Institution in charge of controlling National Accounts.

IRD mentioned that funding can be allocated by EU, DG MARE or CINEA (formerly EASME), to specific projects for field data collection or meta-analysis. Several examples in recent years include (though these are not Guadeloupe specific):

- Scientific advice on shark management in RFMOs: data exploration and retrieval and analysis (3 years);
- Shark management in Atlantic about key species (18 month);
- RECOLAP: evaluation of implementation of Electronic Monitoring Systems (EMS) in small longliners (only Réunion); and
- Meta analysis of CMMs in longline fisheries in Atlantic about hook shapes etc.

Pilot study funded by DCF on whitetip ban on retention -> survival rate post release in purse seine and longline fisheries. POREMO

4.3 OR funding for data collection

Given the centralization of the data collection programme in Ifremer with a global support from SIH in Brest (Bretagne, France Metropolitan), funds for Article 77 are managed and engaged at the national level. These are then managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and the ORs, including sub-contracting with external vendors for data collection in some ORs. The already cited "Liste des opérations du programme national FEAMP 2014-2020, 2019" provides the detail for EMFF activities under Article 77 (Table 12).

Table 12: EMFF funds received by the various French institutions under Article 77.

Institution name	Total eligible funds (EUR)	Total funding received (EUR)
Agence Des Aires Marines Protegees	293 416.05	234 732.84
Agence Francaise Pour La Biodiversite	914 730.00	731 784.00
Franceagrimer	44 961.90	35 969.52
Ifremer	41 517 440.00	33 213 492.00
Inra	1 025 238.00	820 190.00
IRD - Institut De Recherche Pour Le Developpement	9 628 639.00	7 702 911.00
Ministere De L'agriculture De L'alimentation Maa	9 670 201.00	7 736 160.00
Museum National D'histoire Naturelle	1 084 263.00	756 113.00
Universite De Nantes	3 049 192.00	2 439 353.00

As indicated in Section Data collection, the institution involved in data collection in Guadeloupe is exclusively Ifremer. However, there is no specific EMFF funding request for Ifremer data collection (Article 77) under DCF for Guadeloupe. Despite this, Ifremer provided a breakdown for expenses engaged specifically in each of the ORs for the period 2017-2019. For Guadeloupe, although there was no funding for data collection in 2017 due to a change in the contractor, this OR has been provided EUR 276 000 and EUR 375 000, in 2018 and 2019, respectively (Table 13). Such funding corresponds to the contract with Groupe EI. Added to this amount, a percentage should be considered of SIH activities related to organization of data collection in Guadeloupe (recruitment of an external company, providing of quarterly sample scheme, technical support to data entry) and the analysis and raising of statistics, and production of statistics.

Table 13: Expenditures incurred by Ifremer for data collection in Guadeloupe.

OR	Data type	Expenditure in 2017 (EUR)	Expenditure in 2018 (EUR)	Expenditure in 2019 (EUR)
Guadeloupe	Biological Data	0.00	23 279.89	33 371.34
	Economic Data	0.00	0.00	11 740.44
	Effort and Landing data	0.00	253 256.65	330 703.67
Total			276 536.54	375 815.45

Section 4 - KEY FINDINGS

- DCF data collection funding comes from two main sources: EMFF and national budget.
- France received for EMFF 2014-2020 EUR 588 million.
- Article 77 for EMFF DCF data collection represents EUR 66 146 872.
- EMFF funds in Guadeloupe: EUR 3 185 283.19, however, there is no specific EMFF funding for Guadeloupe related to Article 77.
- Ifremer indicated that activities related to data collection in Guadeloupe represented a total of EUR 375 815.45 in 2019.
- Overall cost of DCF related activities should also encompass a share of SIH staff activities.

5 Current state of data collection obligations

Ifremer mentioned the convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer beyond the obligations under the EU MAP (i.e. Ifremer proposes actions, DPMA funds them). There are less and less activities under this line, as more and more are being funded within the DCF. For years, the remaining 20% of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining that are not funded by the DCF include SACROIS, data access portal. According to IRD, coverage is relatively good for all DCF obligations.

5.1 DCF data obligations

DCF obligations as per Commission Delegated Decision (EU) 2019/910 (EU, 2019) are detailed in Chapter III Data Requirements: Section III.2. lists requirements related to biological data on stocks caught by Union commercial fisheries in Union and outside Union waters and by recreational fisheries in Union waters :

a) Catch quantities by species and biological data from individual specimens enabling the estimation of:

i. For commercial fisheries, volume and length frequency of all catch fractions (including discards and unwanted catches) for the stocks listed in Tables 1A, 1B Table 14, below) *and 1C* (**Error! Reference source not found.**, below)*, reported at the aggregation level 6 as set out in Table 2. The temporal resolution shall be coordinated at marine region level based on end-user needs;*

ii. *For commercial fisheries, mean-weight and age distribution of catches of the stocks listed in Table 1A, 1B and 1C. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*

iii. *For commercial fisheries, sex-ratio, maturity and fecundity data for stocks listed in Tables 1A, 1B and 1C of catches at frequencies needed for scientific advice. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*

iv. *For recreational fisheries, annual volume (numbers and weights or length) of catches and releases for the species listed in Table 3 and/or the species identified at marine region level as needed for fisheries management purposes End user needs for age or other biological data as specified in paragraphs (i)-(iii) shall be evaluated for recreational fisheries at marine region level.*

Table 14 (listed as Table 1B in the regulation) lists stocks that are specifically to be reported for Guadeloupe.

Table 14: Guadeloupe implementation of DCF species reporting requirement as per Table 1B of 2019/910 decision

List of stocks as per Table 1B	Data available in 2018 (see **Error! Reference source not found.**)
Snappers (*Lutjanidae*)	Yes
Grunters (Haemulidae)	Yes
Groupers (*Serranidae*)	Yes
Lion Fish (Pterois volitans)	Yes
Tuna-like fish (*Scombridae*)	Yes
Blue marlin (Makaira nigricans)	Yes
Dolphinfish (*Coryphaena hippurus*)	Yes

France work plans for data collection in the fisheries and aquaculture sectors for 2017-2019[39] and 2020-2021[40] refer to methods of data collection through sample based surveys (Text Box 4A in 2020-2021 workplan for instance). Species under DCF are not specifically mentioned.

The STECF, in 2020[41], conducted an analysis of the Work Plans and National Reports submitted by all EU Member States with ORs. Regarding France, it concluded that there was a lack of specific mention of the individual ORs in the work plans and national reports. It also noted a number of specific issues identified for some French ORs, including

39 https://datacollection.jrc.ec.europa.eu/documents/10213/1131890/France_WorkPlan_2017-2019.pdf/03a63d30-0e32-4289-a839-47c6b914ae44?version=1.1&download=true

40 https://datacollection.jrc.ec.europa.eu/documents/10213/1283898/FRA_WP_2020-2021_text.pdf/3fcdda81-ae34-4238-a3b3-c9602bb3ae5a?version=1.0&download=true

41 Scientific, Technical and Economic Committee for Fisheries (STECF) – Outermost Regions (OR) (STECF-19-19). Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-20811-2, doi:10.2760/834602, JRC121427

regarding the application of catch thresholds (see complete STCF19-19 report for more details).

However, Table 14 shows that Guadeloupe implements 100% with their DCF requirement for species regarding catch volume for II.2.a.i. Length frequency data are not published but are available under request. Under Table 15 (labelled Table 1C in the regulation) adds to that list the stocks in marine regions under regional fisheries management organisations (RFMOs) and Sustainable Fishing Partnership Agreements (SFPAS), ICCAT and WECAFC in the case of Guadeloupe.

Table 15: Guadeloupe implementation of DCF species reporting requirement as per table 1C of 2019/910 decision for ICCAT

Species Scientific name	Species Common name	Data available in 2018 (see **Error! Reference source not found.**)
Thunnus albacares	Yellowfin tuna	Yes
Thunnus obesus	Bigeye tuna	Not in the list of species caught
Katsuwonus pelamis	Skipjack tuna	Yes
Thunnus alalunga	Albacore tuna	Not in the list of species caught
Thunnus thynnus	Bluefin tuna	Not in the list of species caught
Xiphias gladius	Swordfish	Not in the list of species caught
Makaira nigricans (or mazara)	Blue marlin	Yes
Istiophorus albicans	Sailfish	Yes
Tetrapturus albidus	White marlin	Not in the list of species caught
Prionace glauca	Blue shark	Not in the list of species caught
Auxis rochei	Bullet tuna	Not in the list of species caught
Sarda sarda	Atlantic bonito	Not in the list of species caught
Euthynnus alleteratus	Atlantic back skipjack	Not in the list of species caught
Thunnus atlanticus	Blackfin tuna Atlantic	Yes
Orcynopsis unicolor	Plain bonito Atlantic	Not in the list of species caught
Scomberomorus brasiliensis	Serra Spanish mackerel	Not in the list of species caught
Scomberomorus regalis	Cero	Not in the list of species caught
Auxis thazard	Frigate tuna	Not in the list of species caught
Scomberomorus cavalla	King mackerel	Not in the list of species caught
Scomberomorus tritor	West African Spanish mackerel	Not in the list of species caught

Species Scientific name	Species Common name	Data available in 2018 (see **Error! Reference source not found.**)
Scomberomorus maculatus	Atlantic Spanish mackerel	Not in the list of species caught
Acanthocybium solandri	Wahoo	Yes
Coryphaena hippurus	Dolphinfish	Yes

During ICCAT 26th Regular Meeting of the Commission (Palma de Mallorca, Spain, 18-25 November 2019) EU delegation presented its annual report for biennial period 2018-2019[42]: For French Antilles; it is reported that dolphinfish (*Coryphaena hippurus*), Atlantic blue marlin (*Makaira nigricans*) and yellowfin tuna (*Thunnus albacares*) represents 70% of landings. No issue in the level of implementation of DCF obligations are reported. Data are available for these main 3 species, which indicates high level of implementation of DCF requirements for ICCAT species in Guadeloupe regarding catch volume for II.2.a.i (Table 15; Table 16). Length frequencies are not published are collected and available on request. As indicated in Section Commercial fish stocks, five large pelagic stocks were assessed, and it is assumed that necessary biological data for these assessments were collected and shared for yellowfin tuna, blue marlin, Atlantic sailfish and skipjack tuna.

Table 16: Guadeloupe compliance to DCF species reporting requirement as per table 1C of 2019/910 decision for WECAFC

Scientific name	Common name	Data available in 2018 (see **Error! Reference source not found.**
Panulirus argus	Caribbean Spiny Lobster	Yes
Strombus gigas	Queen Conch	Yes
Shark-like Selachii, Rajidae	Sharks, rays & skates	Yes
Coryphaena hippurus	Dolphin fish	Yes
Acanthocybium solandri	Wahoo	Yes
Epinephelus guttatus	Red Hind	Not in the list of species caught
Lutjanus vivanus	Silk snapper	Not in the list of species caught
Lutjanus buccanella	Blackfin snapper	Not in the list of species caught
Lutjanus campechanus	Red snapper	Not in the list of species caught
Penaeus subtilis	Penaeus shrimp	Not in the list of species caught

Table 16 shows species to be reported for WECAFC for all French ORs in the Caribbean region (including Guadeloupe). The main species with regional management plans are conch[43] and lobster[44], while large pelagics are monitored in Guadeloupe and data is

[42] https://www.iccat.int/Documents/BienRep/REP_TRILINGUAL_18-19_II_3.pdf
[43] http://www.fao.org/documents/card/en/c/b3134e3b-59f6-44dc-a195-aefec1bf33a4/
[44] https://clmeplus.org/doculibrary/marplesca-the-regional-caribbean-spiny-lobster-panulirus-argus-fishery-management-plan/

reported. There is high compliance to DCF WECAFC requirements for these species regarding catch volume (II.2.a.i), though length frequencies are not published.

Regarding chapter III section 2.a.ii and section 2.a.iii on commercial fisheries related to mean-weight and age distribution of catches, limited data are reported. Generally speaking, as confirmed by the recent study conducted on 12 demersal stocks, there is a need for more research on biological parameters to conduct stock assessment except for some large pelagics. No reporting is done for chapter III section 2.a.iv on recreational fisheries.

The STECF in its 2020 report (op. cit.), concluded that:

"Before 2018, no data were provided for fleet segments less than 12 m in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks."

Section III.3. lists requirements for Data to assess the impact of Union fisheries on marine ecosystems in Union waters and outside Union waters:

a) For all types of fisheries, incidental by-catch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, including the species listed in Table 1D, including absence in the catch, during scientific observer trips on fishing ships or by the fishers themselves through logbooks.
b) Data to assist in the assessment of the impact of fisheries in Union waters and outside Union waters on marine habitats.
c) Data for estimating the level of fishing and the impact of fishing activities on marine biological resources and on marine ecosystems, such as effects on non-commercial species, predator-prey relationships and natural mortality of fish species in each marine region.

Many of listed species in Table 1D within the regulations are not relevant to Guadeloupe. This list contains sharks and rays, mammals, molluscs, cnidarians and crustacean species to be reported for certain areas or for all regions / oceans. Due to the nature of artisanal fisheries in Guadeloupe, the impacts listed in Section III.3 are considered a non-issue.

Section III.4. lists requirements for detailed data on the activity of Union fishing vessels (9) in Union waters and outside Union waters as recorded under Regulation (EC) No 1224/2009. Data to assess the activity of Union fishing vessels in Union waters and outside Union waters consist of the variables as indicated in Table 4.

SIH provides information per métier on vessel activity, such as average vessel size, GT and power, as well as total landing and value. Average number of crew is also mentioned. High level information on effort (days at sea for instance) but not detailed information. Compliance to III.4 is considered good.

Section III.5. lists requirements for Social and economic data on fisheries to enable the assessment of the social and economic performance of the Union fisheries sector.

a) Economic variables as indicated in Table 5A according to the sector segmentation of Table 5B and according to the supraregions as defined in Table 5C, and for entreprises making profit; and
b) Social variables as indicated in Table 6. Social data shall be collected every three years starting in 2018.

The STECF in its 2020 report (op. cit.), mentioned that:

"*Before 2018, no data was provided for fleet segments less than 12 meters in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks*."

5.1.1 Implementation of DCF data collection obligations and potential issues

Regarding biological data: catch and effort information are collected by Ifremer with the support of a local vendor (Groupe EI). The main issue identified is the need for better liaison between Martinique Ifremer office and the local vendor.

There is a lack of information on biological parameters to conduct stock assessment of the main commercial species. A new campaign with the financial support of Agence Française de Développement has been implemented with buying of fish from fishers to increase samples to be analyse.

There is also a lack of socio-economic data. However, as previously mentioned, a survey has been conducted in 2020 and results are being assessed.

At last, the impact of recreational fisheries on the ecosystem is largely unknown. Here again, as previously mentioned, a survey has been implemented to better assess the recreational fisheries sector in Guadeloupe.

Regarding the new EU-MAP, Ifremer and IRD were consulted on the new DCF species list and mentioned the need to add species from the ORs. In this respect, Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be extended (see similar recommendation in January 2020 STECF report[45]), so that species important for the ORs can be covered by the EMFF.

5.1.2 Additional data collected

n/a

SECTION 5 – KEY FINDINGS

- Implementation of DCF obligations related to volume is good for all species.
- Implementation of DCF obligations related to other biological data and parameters (length frequencies, sex-ratio, maturity etc) is known to be low, except for certain large pelagic species for which stock assessment has been conducted. A programme started in 2021 is designed to collect more data on such biological parameters.
- There are no data from recreational fisheries. A study is on-going to address this lack of data.
- Implementation of DCF socio-economic data needs is very low. A study has been initiated to collect more data (DCF data on revenue, effort, employment, operational and investment costs).

45 STECF EWG1919, 'REPORT TO THE STECF - EXPERT WORKING GROUP ON Outermost Regions (OR) (EWG-19-19), Brussels, 13-17 January 2020'. 2020.

6 Fisheries management and conservation measures

6.1 Management and conservation measures

6.1.1 National

At the national level, management and conservation measures are imposed through local regulations. Legal texts in Guadeloupe encompass regulations for professional fishers, recreational fishers, as well as restrictions in fishing activities due to chlordecone and area protected under marine protected areas. In this respect, Table 17 below lists the conservation management measures from Decree number # 2002 / 1249 / PREF / SGAR / MAP[46] regulating Coastal maritime fishing in department of Guadeloupe.

Table 17: list of management and conservation measures Decree number n ° 2002 / 1249 / PREF / SGAR / MAP regulating professional and recreational fishing in Guadeloupe

Type of measure	Measure	Description	Applied ICCAT?
Gear restriction	Dragging gear	Dragging gears is prohibited	No
	Straight net	Straight netting of which the mesh does not have, when wet, at least 35 mm across (70 mm stretched), is prohibited	Yes
	Trammel net mesh	Any trammel net of which the mesh of the central layer does not have, in the wet state, at least 40 mm of side (80 mm stretched), and of which the mesh of the outer layers does not have, to the wet state, at least 200 mm per side (400 mm stretched), is prohibited	No
	Gillnet operation	Gillnets at depths of more than 200 m is prohibited	Yes
	Gillnet mesh	Mesh of the nets must be equal to or greater than 60mm on a side	Yes
	Gillnet size	Maximum of 4 m high. Limited to 2 nets of 400 m	Yes
	Traps and pots size limitation	Mesh size smaller than 38 mm are prohibited at any time, any place	No
	Purse seine size	- cola seines * minimum length: 200 m	Yes

46 http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/arrete_peche.pdf

Type of measure	Measure	Description	Applied ICCAT?
		* minimum drop: 10 m (maximum 16 m) - Coulirous seine * minimum mesh size: 20 mm (40 mm stretched). - Balaous nets, huts, garfish, quiaquias * Minimum mesh: 14 mm (28 mm stretched	
	Explosives, firearms, soporific or toxic substances forbidden		Kind of Yes
	Respiratory equipment allowing to remain submerged is prohibited		No
Species	Species size limitation	Fishing under 10 cm in size is prohibited with exception	No
	Lobster size limitation	Common lobsters known locally as "royal" (*Panulirus argus*) and those locally called "Brazilian" (*Panulirus guttatus*) limit in size	No
	Ban on breeding lobster		No
	Shellfish size limitation	Helmet sails / Queen conch	No
	Sea turtles	All species banned from fishing and sales	No
	Corals, sea fans, sponges, and marine plants	All species banned from fishing and sales	No
	Bull's eye" (*Etulis oculatus*)	Above 42 cm	No
	All species of cetaceans or sirenians	All banned from fishing	No
	Fish considered poisonous or	All banned	No

Type of measure	Measure	Description	Applied ICCAT?
	harmful to human health		
Fishing period and conservation	Shellfish fishing depth	All fishing for this gastropod is prohibited from the shore to 25 m depth from January 1 to September 30 inclusive. Any fishing of this gastropod is prohibited beyond 25 m depth from February 1 to September 30 inclusive	No
	Queen conch closed period		No
	White sea urchins (*Tripnenstes ventricosus*)	Prohibited during each annual period from January 15 to December 15	No
Recreational fisheries	Additional limitation on gears		No
	Additional limitation on species	Spanish mackerel, tuna, dolphinfish, colas, swordfish, marlin and sailfish = max catch of 3 fish	Yes

Regarding recreational fisheries, a new decree has been published in Jan 2019, modified in April 2021: 971-2019-08-20-003 S25C-919082015150[47]. This decree enforces more restriction on catch of fish, with a focus on juveniles conservation. Additional regulations are in place to ban or limit fishing in Basse Terre. The last is Prefectural decree 2014059-004 28/02/2014[48], which defines areas where fishing is banned and other areas where fishing is limited to certain species. Lastly, a number of regulations regarding chlordecone exist for Guadeloupe[49].

[47] http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/arrete_dm_peche_de_loisir_20-08-2019.pdf

[48] http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/carte_zones_chlordecone_annexe_arrete_prefectoral_chlordecone_consolide_du_28_fevrier_2014.pdf

[49] http://guadeloupe-peches.org/reglementation-chlordecone/

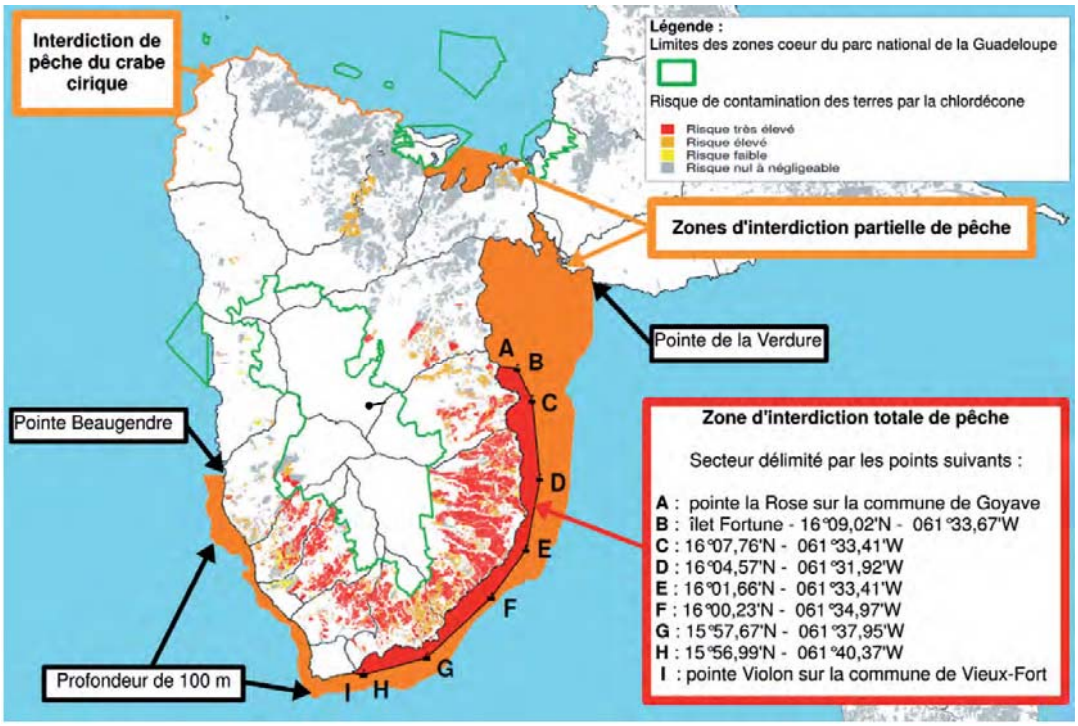

Figure 10 : Distribution of fishing ban in Guadeloupe as a result of chlordecone pollution. Legend: Strict ban on fisheries (red), partial ban on fisheries (orange).

6.1.2 International

Being an Outermost region of the EU, all EU regulations apply to Guadeloupe, through their implementation in the French national regulations.

SECTION 6 - KEY FINDINGS

- Guadeloupe has a complete legal framework related to management of fisheries supported by scientific advice coming from Ifremer and recommendations from the fishers associations
- These measures have a direct impact on the small scale fisheries sector to go fishing farer and deeper, which will require to adapt some regional and national legislation to recognize the archipelago specificity (farer means quickly to go really deep)

7 Shortcomings or obstacles to fisheries management

The table below provides a potential framework to structure information obtained from literature review and stakeholder consultation for the analysis, which may be specific to the metier (gear/vessel) or at a higher level, such as “domestic commercial fisheries”. Given the predominance of small scale multi-gear fisheries in Guadeloupe, Table 18 concerns all metiers.

Table 18: Summary of shortcomings or obstacles to fisheries management within each fishery

Category	Shortcoming or obstacle
Stocks	Impact of chlordecone hampers the potential development of the sector and will certainly encourage emergence of new stocks exploitation (e.g. the deep water diamond squid, *Thysanoteuthis rhombus*).
Data collection	Ifremer outsources to a private company Groupe EI collection of information in the field. Renewal of contract can lead to period without data collection in place
	Ifremer capacity would require to have a dedicated staff in Martinique to coordinate specific activities conducted in Guadeloupe, including data collection.
	Gaps are known related to socio-economic data and recreational fisheries. Studies have been kicked-off in 2020 to improve this knowledge.
Funding and resources	N/A
DCF Obligation	Compliance to DCF obligation related to other biological data and parameters (length frequencies, sex-ratio, maturity etc) is known to be low, except for certain large pelagic for which stock assessment has been conducted. A programme is planned for 2021 and onwards to collect more data.
	No data from recreational fisheries. A study is on-going to address this lack of data
	Compliance to DCF socio-economic is very low. A study has been initiated to collect more data
Resource monitoring and assessment	Guadeloupe fisheries are artisanal, opportunistic, and catch a wide range of species.
	The composition of catches is largely dominated by a "marine fishes nei" group, followed by "other species nei".
	Only some large pelagic stocks are assessed, because they are under ICCAT mandate.
MCS and IUU	MCS operations are conducted according to a bi-annual plan with clear objectives related to fisheries (fight against IUU fishing and respect of

8 Recommendations

- Data collection: better coordination of Guadeloupe external company activities by Ifremer with the recruitment of a dedicated staff
- Strengthen implementation of DCF:
    - improve biological data collection : one of the main issues faced is getting data from fishers' catches (time consuming to measure fish) while they are selling to customers, a typical issue with small scale fishers. This issue is known to Ifremer and they initiated a new program to buy the whole landings from fishers to study it in lab. The purpose of this study is to support justification of inclusion of this new approach as biological routine data collection with support from EMFF. This is a particularly important activity which will provide additional information to support stock assessment. It is recommended that this approach to data collection for biological data is considered for EMFF support.
    - knowledge on recreational fisheries, and socio-economic data collection: in both cases, Ifremer is aware of the issue and actions have been taken to address both: a socio-economic study has been conducted in 2019-2020 and results are pending; a recreational fisheries study has been initiated in 2020 for residents in Guadeloupe. A recommendation would be to extend it to tourists (with a different methodology)
    - Limited knowledge on ETPs: it is recommended to conduct an ad-hoc study to measure impact of current fisheries on ETP species for the main gears with recommendations on mitigation measures if needed.

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Recreative fisheries: decree 971-2019-08-20-003 S25C-919082015150 19 Jan 2019 modified 1st April 2021 (http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/arrete_dm_peche_de_loisir_20-08-2019.pdf)

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Saint Martin

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

St Martin Profile Report

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Acronyms

Term	Description
AFD	Agence Francaise De Developpement
ASFIS	Aquatic And Science Fisheries Information System
CNSP	Centre National De Surveillance Des Pêches
CROSS	Centres Régionaux Opérationnels De Surveillance Et De Sauvetage
CRPMEM	Comité Regional Des Pêches Marines Et Des Elevages Marins
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DM	Direction De La Mer
DPMA	Direction des pêches maritimes et de l'aquaculture
EASME	Executive Agency for Small and Medium Sized Enterprises
EMFF	European Maritime and Fisheries Fund
ETP	Endangered, Threatened and Protected
EU	European Union
GEI	Groupe EI
ICCAT	International Commission for the Conservation of Atlantic Tuna
Ifremer	Institut Francais de Recherche pour l'Exploitation de la MER
IRD	Institut De Recherche Pour Le Développement
LEMNA	Laboratoire D'économie et De Management De Nantes-Atlantique
MCS	Monitoring, Control and Surveillance
NGO	Non-Governmental Organisation
OBSDEB	Observation Des Marées Au Débarquement
OFB	Office Français Pour La Biodiversité
OR	Outermost Region
SIH	Système D'information Halieutique
SIPA	Système d'information de la pêche et de l'aquaculture
SSP	Service de statistiques et de la prospective
VMS	Vessel monitoring system
WECAFC	Western Central Atlantic Fisheries Commission

1 Introduction

1.1 Geographic and economic characteristics

Administrative status: St Martin is an overseas collectivity (*collectivité d'outre-mer*[1]). It is an Outermost Region (OR) of the European Union (EU). Until 2007, St Martin was administratively attached to Guadeloupe[2] (Figure 1).

Geography: St Martin is an island separated in two states, a French part (St Martin) and a Dutch part (St Maarten), with a border of 10 km in between (Figure 2).

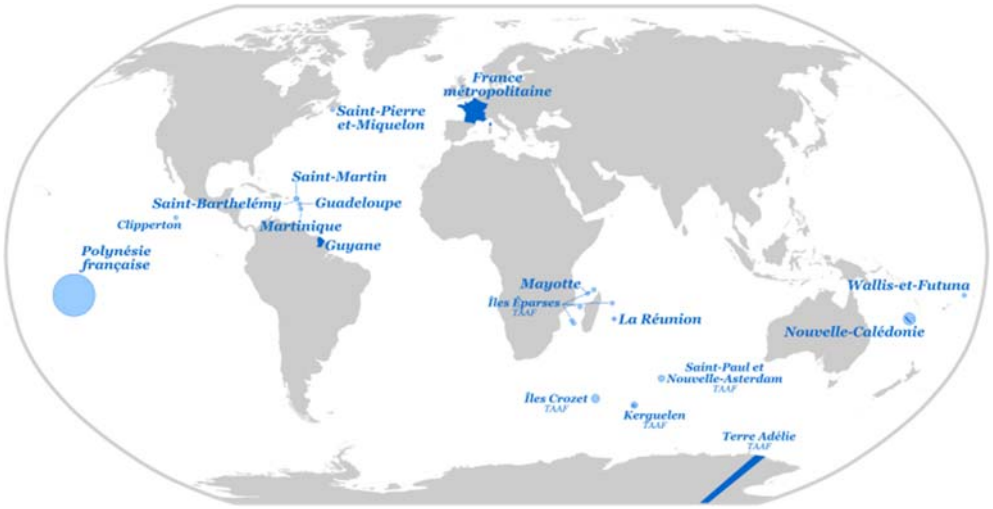

Figure 1: France Metropolitan vs Outermost Regions and French Territories[3] (source: Wikipedia)

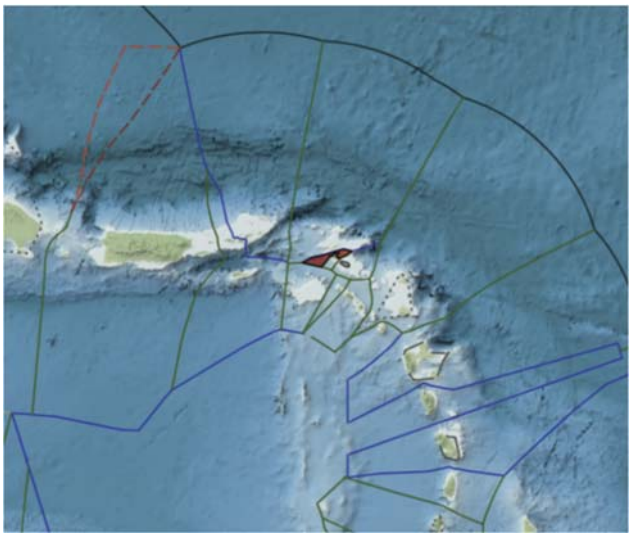

Figure 2: Map of St Martin and its EEZ (source: www.marineregions.org)

1 https://en.wikipedia.org/wiki/Overseas_collectivity

2 https://www.iedom.fr/IMG/pdf/panorama_2017_-_edition_2019_-_saint-martin.pdf

3 Note: in this document, the term Metropolitan France ("*France métropolitaine*") will be used to differentiate the French territory in Europe from the Outermost Regions (Guadeloupe, Martinique, St Martin, French Guiana, La Réunion and Mayotte).

Figure 2 presents the position of St Martin in the lesser Antilles arc, between 240km east of Puerto Rico and Guadeloupe 250 km south. It is situated 6716 km from Paris, capital of Republic of France in Europe.

Table 1 presents the context of St Martin, a very small island with a limited population, one tenth of Martinique.

Table 1: General geographic indicators

Description	Unit	Source
Country area	53 km^2	Senat[4]
Land area	53 km^2	Senat[2]
Coastal Line	50 km	Senat[2]
Population size	35 594	INSEE, 2013[5]
Exclusive Economic Zone (EEZ) area	1 000 km^2	Senat[6] / VLIZ[7]

1.2 Fisheries statistics

Figure 3 shows FAO statistics for St Martin. The value is constant over the year, and is an estimate of 90 tonnes of marine fish (not elsewhere included - nei). No official data have been reported to FAO for the last 10 years. If compared to fisheries statistics in Martinique and Guadeloupe (see country profiles for the two ORs), a break has been identified in the FAO time series which corresponds to SIH operationalization. As St Martin is not integrated in the SIH (see section 3.1.3), data are still estimated by FAO.

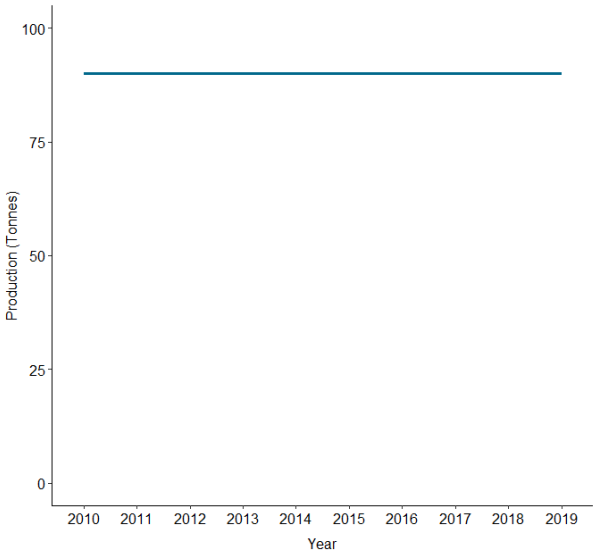

Figure 3: Total capture production (source: FAO FishStat)

4 https://www.senat.fr/rap/r13-430/r13-43012.html

5 https://www.insee.fr/fr/statistiques/2119468?sommaire=2119504

6 https://www.senat.fr/rap/r13-430/r13-43012.html

7 http://www.marineregions.org/

Regarding seafood product trade (import / export), very disaggregated data are available in the French customs website[8] but would require in depth extraction and compilation of data which is not relevant to this study.

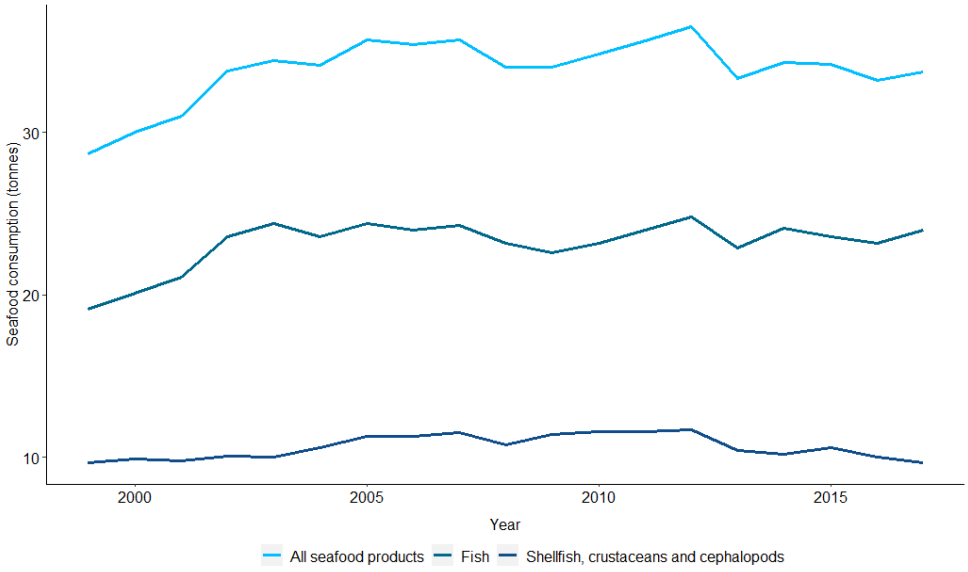

Figure 4: Composition of per capita fish supply for France, including OR (source: FranceAgrimer).

Regarding consumption of fish per capita, specific time series for St Martin were not available. The national value of seafood consumption is 24.2 kg/capita/year for fish, and 35.6 kg/capita/year for fish[9] for all seafood products. Only 13 fishers[10] have been registered in 2015 for St Martin.

1.3 Regional fisheries management

EU-France is a contracting party of the International Commission for the Conservation of the Atlantic tunas (ICCAT[11]). ICCAT is a tuna Regional Fisheries Management Organization (t-RFMO). ICCAT recommendations are binding to Contracting and Cooperating Parties (CPC).

EU-France is also a member of Western Central Atlantic Fisheries Commission (WECAFC). WECAFC is a Regional Fishery Body established under article VI of FAO, though its recommendations are not binding to France.

[8] https://www.douane.gouv.fr/la-douane/opendata?f%5B0%5D=categorie_opendata_facet%3A459

[9] https://www.umr-amure.fr/wp-content/uploads/2018/08/situation-peche.pdf

[10] http://www.soualigapost.com/fr/actualite/517/economie/la-p%C3%AAche-une-fili%C3%A8re-r%C3%A9glement%C3%A9e

[11] https://www.iccat.int/en/index.asp

2 Fish stocks and other marine organisms and associated fishing activities

2.1 Commercial fish stocks

No literature could be found precisely describing the different stocks / métiers operating in St Martin. Discussions with a fisheries expert having worked in St Martin from Comité de la Pêche Maritime et des Elevages Marins (CRPMEM) in Guadeloupe indicated that same métiers as in Guadeloupe are operated with the same species caught. Therefore, below we provide the full list of species caught in Guadeloupe.

Table 2: Fishes landed within Guadeloupe waters, which are an indication of the fishes landed within St Martin (source: Weiss et al. 2020)

ASFIS code	French name	Scientific name	ASFIS en Name
Small pelagic fishes			
BEN	Orphies, aiguilles (divers)	*Belonidae*	Needlefishes, etc. nei
CGX	Carangidés nca	*Carangidae*	Carangids nei
CLU	Clupéidés nca (Harengs, sardines, anchois, etc. divers)	*Clupeoidei*	Clupeoids nei
FLY	Exocets nca	*Exocoetidae*	Flyingfishes nei
HAX	Demi-becs nca	*Hemiramphus spp*	Halfbeak
SDX	Comètes nca	*Decapterus spp*	Scads nei
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad
Medium pelagic fishes			
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei (Spanish mackerel)
RRU	Comète saumon	*Elagatis bipinnulata*	Rainbow runner
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei
Large pelagics			
BIL	Makaires,marlins,voiliers nca	*Istiophoridae*	Marlins, sailfishes, etc. nei
BLF	Thon à nageoires noires	*Thunnus atlanticus*	Blackfin tuna
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
SAI	Voilier de l'Atlantique	*Istiophorus albicans*	Atlantic sailfish
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna
TUN	Thonidés nca	*Thunnini*	Tunas nei
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna
Demersal fishes			
ANW	Demoiselles	*Pomacanthidae*	Angelfishes nei

ASFIS code	French name	Scientific name	ASFIS en Name
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei
BXF	Coffres nca	*Ostraciidae*	Boxfishes nei
CON	Strombes nca	*Strombus spp*	Stromboid conchs nei
CRA	Crabes de mer nca	*Brachyura*	Marine crabs nei
DCP	Décapodes natantia nca	*Natantia*	Natantian decapods nei
DIO	Porcs-épics	*Diodontidae*	Globefish, porcupine fish
EEO	Vivaneau royal	*Etelis oculatus*	Queen snapper
FFX	Poissons-bourses nca	*Monacanthidae*	Filefishes, leatherjackets nei
GDJ	Blanches nca	*Gerreidae*	Mojarras, etc. nei
GPX	Mérous nca	*Epinephelus spp*	Groupers nei
GRX	Grondeurs, diagrammes nca	*Haemulidae (=Pomadasyidae)*	Grunts, sweetlips nei
GUX	Grondins, cavillones nca	*Triglidae*	Gurnards, searobins nei
HAX	Demi-becs nca	*Hemiramphus spp*	N/A (should be halfbeaks nei)
HCZ	Marignans nca	*Holocentridae*	Squirrelfishes nei
KPC	Crabe moro	*Carpilius corallinus*	Batwing coral crab
KUI	Troque des Antilles	*Cittarium pica*	West Indian top shell
LCX	Labre capitaine	*Lachnolaimus maximus*	Hogfish
LOS	Cigales nca	*Scyllaridae*	Slipper lobsters nei
MGS	Mulets	*Mugil spp*	N/A (should be Mullets nei)
MUI	Murènes nca	*Muraenidae*	Morays nei
MUX	Rougets nca	*Mullus spp*	Surmullets(=Red mullets) nei
MXI	Crabe royal des Caraïbes	*Mithrax spinosissimus*	Channel-clinging crab
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei
OCT	Pieuvres, poulpes nca	*Octopodidae*	Octopuses, etc. nei
PWT	Perroquets nca	*Scaridae*	Parrotfishes nei
PZO	Poisson lion	*Pterois volitans*	Red lionfish
RAJ	Rajidés nca	*Rajidae*	Rays and skates nei
ROB	Crossies nca	*Centropomus spp*	Snooks(=Robalos) nei
RSQ	Crabe cyrique	*Arenaeus cribrarius*	Speckled swimcrab
SBX	Dentés, spares nca	*Sparidae*	Porgies, seabreams nei
SCS	Rascasses nca	*Scorpaena spp*	Scorpionfishes, rockfishes nei
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei
SNY	Vivaneau queue jaune	*Ocyurus chrysurus*	Yellowtail snapper
SOX	Soles nca	*Soleidae*	Soles nei
SUR	Chirurgiens nca	*Acanthuridae*	Surgeonfishes nei
TWV	Oursin blanc	*Tripneustes ventricosus*	Sea egg
UPC	Langoustine sculptée	*Eunephrops cadenasi*	Sculptured lobster

ASFIS code	French name	Scientific name	ASFIS en Name
VLO	Langoustes	*Palinuridae*	Spiny lobsters nei
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei

2.2 Fleet structure

2.2.1 Domestic fisheries

2.2.1.1 Artisanal fishery

No literature could be found describing the vessels operating in St Martin. However, in discussion with a fisheries expert who has worked in St Martin (worked within Comité de la Pêche Maritime et des Elevages Marins (CRPMEM) in Guadeloupe) indicated that fisheries in St Martin have similar topology as in Guadeloupe, with a predominance of multigear vessels, operating a variety of gears with a shift of gear every day (Table 3).

There are 15 to 20 vessels which are registered in St Martin on a yearly basis.

Table 3: Main gears / fishing technique in Guadeloupe in 2018, which is indicative of the gears / fishing technique in St Martin (source: Weiss et al. 2020)

French Name	English Name
Casier	Pots
Ligne trainante	trolling line
Filet maillant fixe	fixed driftnet
Tramail	Trammel
Palangre de fond	bottom longline
Filet maillant encerclant	circling driftnet
Ligne a main (a main ou avec canne)	hand line (with or without pole)
Plongee en apnee	free diving
Sennes	seines
Divers filets	nets nei
Charter de pêche récréative	Recreational fishing, charter boat

Source: Weiss et al., 2020

2.2.1.2 Industrial fishery

There are no industrial vessels registered in St Martin

2.2.1.3 Sports/recreational fishery

No information is available on recreational fishery within the St Martin. Given that the island is highly touristic, the impacts of sport fishing on stocks is expected to be important.

2.2.2 Foreign fisheries

No foreign vessel fish in St Martin waters.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

This fleet do not target a specific species, therefore there is little (if any) evidence to show that bycatch is prevalent in this fishery.

2.3.2 Endangered, threatened and protected species

No information is available on ETP species catches.

2.4 Summary of fisheries

Commercial fisheries in St Martin are very limited, with less than 20 fishers operating on a regular basis.

3 Institutional structures

Data collection in France is well coordinated (**Error! Reference source not found.**). In St Martin data collection is directly managed by Ifremer (and utilized within the national Fisheries Information System (SIH), of which the team that runs the SIH is situated within Brest and Martinique), and outsourced to a private company.

Data collection is based on samples collected by data enumerators, in accordance with a quarterly sample scheme provided by SIH. Catch information and length frequency data are collected throughout the year. Effort information related to the previous year of fishing is collected during the first three months of the current year. Raising of data and development of statistics and reporting is undertaken by the SIH. In parallel, EC Common Fisheries Policy (CFP) reporting obligations[12] are being implemented in the archipelago, with self-reporting logsheets for all vessels between 10 and 12 m.

3.1 Data collection

The overarching institution related to data collection is the Directorate for Marine Fisheries and Aquaculture (DPMA) under the Ministry of Agriculture and Food[13]. Its roles are to ensure that France meets its obligation towards EU Common Fisheries Policy (1380/2013)[14], including the data collection framework (Regulation (EU) 2017/1004)[15] and 2017-2019 EU-MAP[16] and the 2020-2021 EU-MAP (consisting of two Commission Decisions) [17].

In-field data collection involves several national institutions and research institutions:

- Ifremer: organize data collection from samples (biological data) and manage the SIH;
- Institut de Recherche pour le Développement (IRD), the Research Institute for Development: Tuna monitoring; and
- FranceAgrimer: In charge of collecting logsheets from fishers when there is no electronic reporting, with delegation of data entry at the local level.

12 As defined in 1224/2009 regulation

13 https://agriculture.gouv.fr/

14 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

15 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

16 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

17 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

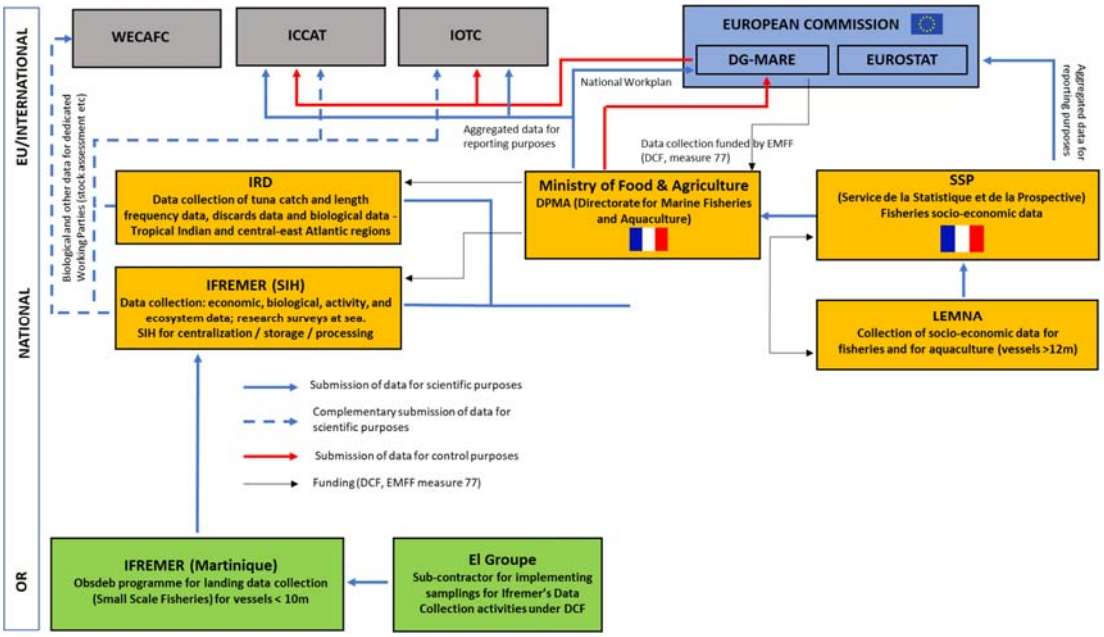

Figure 5: Institutional organization of data collection in France with St Martin level

3.1.1 Overall workflow of data collection in France and its ORs

While the DCF provides a legal framework, organisation and general obligations, the EU-MAP establishes the (minimum) data requirements to be collected and at what frequency. For example, biological variables associated with a métier[18] include length and discard data for pre-determined species to allow for quarterly evaluation of length distributions and discard volumes. These data must be recorded to "level 6" which includes data for levels 1 to 5, providing background information on the fleets in question.

Since 2014, the European Maritime and Fisheries Fund (EMFF) provides each MS financial support to implement the DCF. Articles 17 to 20 of the EMFF Regulation (EU) 508/2014[19] require participating MS to produce an 'operational programme' for the EMFF. The operational programme sets out how each MS intend to spend their EMFF budget and is subject to approval by the EC. In addition, under the DCF each MS must set out a work plan and submit an annual report describing the implementation of the DCF.

DPMA provides the National work plan, revised on an annual basis, as needed. This document describes how France is going to comply with the DCF obligations, while each OR organizes its own fisheries monitoring system.

According to DPMA, the following workflow is in place for catch reporting, following the Control Regulation (EC) 1224/2009[20]:

[18] A métier is a group of fishing operations targeting a specific assemblage of species, using a specific vessel and gear type, during a precise period of the year and/or within the specific area.

19 Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund and repealing Council Regulations (EC) No 2328/2003, (EC) No 861/2006, (EC) No 1198/2006 and (EC) No 791/2007 and Regulation (EU) No 1255/2011 of the European Parliament and of the Council (OJ L 149, 20.5.2014, p. 1–66)

20 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No

- Vessels below 10 m (paper logsheets) and vessels 10 to 12m (paper logbooks) send their paper-based catch data to the local Sea Directorates for quality control, which then transmit them to FranceAgrimer for data entry in the SACAPTE system, from where they are integrated into the SIH.
- Vessels above 12 m: e-logbooks are directly uploaded into the SIH. VMS data and sales data are also directly uploaded to SIH, but without data relevant to ORs, as there is no sales house or any vessel above 12m.

Ifremer is responsible for 90% of data collection with IRD responsible for collecting data on tuna fisheries (though this is minor for ORs, as IRD is mainly involved with collecting data from high sea fleets).

Ifremer is *de facto* "managing" fisheries data collection issues in ORs for DPMA. Ifremer has strived over the past year (2020) to set up a single focal point for all data-related questions, to make things easier when DPMA requests information from them. DPMA is also pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools. The ultimate goal being one single tool at IFREMER to get all information and statistics on fisheries.

Service de statistiques et de la prospective (SSP) and LEMNA implement socio-economic surveys on all French vessels on the fleet register, including in the ORs and report to DMPA.

3.1.2 Data collection and other reporting obligations in St Martin

Data collection is under the management and supervision of Ifremer stationed in Martinique, in collaboration with the SIH team in Brest. The actual data collection for St Martin is outsourced to the Groupe EI[21] (GEI) team. It consists only of telephone interviews of the active fishers registered in St Martin to collect effort information throughout the "*calendrier d'activité*" (activity calendar), which collected the last years activity of all registered fishers. Importantly, no data are collected on catch within St Martin, or other information associated with fisheries (i.e., length frequencies).

All data collected are entered directly into SIH by data collectors. During interviews, GEI raised recurrent issues in connectivity with SIH; Ifremer provides responsive user support but these issues can delay data entry process.

As presented regarding MSC in section 3.4, vessels between 10 and 12m are requested according to Regulation to report fishing activities through logsheet. However, it is unknown whether this is done in St Martin.

Logsheets are certainly a source of data to be considered for St Martin. However, there is a need to ensure (to allow their use in official statistics), the accuracy and reliability of such logsheets, while controls of declaration will be required to ensure long term reliability of the source of information. The flow is already entering SIH for ORs. Ifremer acknowledged the need for comparison but no timeline was given for such a key activity.

811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

21 https://www.groupe-ei.fr/

3.1.3 The SIH

The SIH (Système d'Informations Halieutiques or Fisheries Information System) was developed under the framework of the ecosystem-based approach to fisheries, to cover both ecosystem resources and uses. The overarching aim of this system is to gather all fisheries information in a single system. This covers collected catch and effort data, as well as existing data. The system was developed to then harmonise the data, store and preserve them, and make the data available to partners.

The SIH was prototyped in 2007 in Martinique. Since 2017, the system has been managed from the Brest office of Ifremer, with regional focal points which serve as a relay for the national SIH people based in Brest.

The SIH is organised in 4 modules, all managed by Ifremer:

Ecosystems: Data collection for this module happens mostly in Metropolitan France (i.e., not in the ORs), and can include abundance indices for stock assessments, campaigns etc.

Exploited resources: This module examines population structure and collects the main biological parameters for stocks. This involves biological observation of landings, including in markets and factories. There is some biological sampling in the ORs, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers. Biological sampling on large pelagics under the mandate of RFMOs (ICCAT, IOTC) is considered as generally good. In 2021, Ifremer plans to do more biological sampling in the ORs, mainly based on buying fish in ports, on a larger range of species, as per STECF recommendations.

Landings and effort: In Mainland France, data flow is considered good (e-logbooks etc), but not in ORs. The standard flow of reporting is as follows: fishers send their logbooks or logsheets to the local Direction de la Mer, which sends them after quality control to FranceAgrimer for data entry (in-house or by subcontractors). One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed. The overall reporting rate for the ORs is currently estimated at 50%. In this regard, the role of the local DMs is very important to train fishers, support them etc. for data reporting. To address this issue of reporting, Ifremer developed OBSDED, which works by performing sampling at landing sites, to rebuild catches and effort on the last 7 days. For 2021, Ifremer's objective is to improve catch and effort reporting by fishers.

Socio-economic data: Data on activities: month per month reconstitution of activity with métier, species & distance from coast. From there, segmentation of the fleet is derived. This information is used as basis for sampling plans. Availability of such data varies depending on the ORs. So far no socio economic data has been published for St Martin.

Database: SIH uses a central database named HARMONIE. It is used for storage, Quality Assurance, validation, aggregation, anonymisation, processing, statistics, and also for providing data to end users.

The current objective is to compile all available data from Ifremer, IRD and the National Museum of Natural History (MNHN) in the Ifremer Harmonie database used by the SIH, so that all data is already in a single system and format, ready for data calls. Data would be

harmonised using the ICES RDBES data standard, which includes metadata on methodologies, campaigns, processing etc.

There is also work on harmonising sampling plans, data collection protocols, Quality Assurance methods, estimation and processing etc.

Harmonie and the related software etc are mostly developed and maintained in-house (DSI, Direction des services informatiques), with software development partly outsourced to external contractors, based on Ifremer specs.

Data calls: Ifremer is usually in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the caller (DPMA, ICES, ICCAT). There is a good collaboration with the Atlas of European Tuna fisheries[22] maintained by IRD to compile all tropical tuna fisheries data (which are not collected by Ifremer). In the case of IOTC, IRD is in charge of compiling requested data.

3.1.4 Reporting to regional/international organizations

DPMA does not report statistics *per se* to the European Commission but reports on its work plan and on the status of implementation of the work plan annually.

DPMA reports statistics related to data calls from EC, ICES, RFBs (WECAFC, SIOFA) and RFMOs (ICCAT, IOTC, GFCM). SSP sends statistics to Eurostat and FAO, with disaggregation per OR.

IFREMER and IRD both contribute biological data directly to dedicated regional working groups (e.g., WECAFC shrimp and groundfish working groups) to which the EU is a participant. No catch being published for St Martin, no reporting to regional or international organization is being done.

3.2 Scientific advice

As legislation is shared between St Martin and Guadeloupe, Ifremer plays a central role to provide scientific advice in support to management and conservation measures implementation. See Guadeloupe profile for more detailed information.

3.3 Research institutions

There is no research institute in St Martin. Any fishery research in the island is under the management and monitoring of Ifremer station in Martinique. A study of recreational fisheries is being conducted in 2021 by Ifremer[23] which includes St Martin.

3.4 Monitoring, control and surveillance (MCS)

Regarding MCS, VMS is not mandatory within St Martin, as all of the vessels are below 12 m. However, logsheets are required for vessels between 10 to 12 m. Implementation of the Council Regulation (EC) 1224/2009[24] was low until recent years, with increased

22 https://sirs.agrocampus-ouest.fr/atlas_thonV5-DEC/index.php?atl_version=0&idlang=uk

23 https://wwz.IfremerIfremer.fr/antilles/Activites-projets/Halieutique/RECREAFISH

24 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

outreach and training efforts deployed to encourage fishers to report and document fishing activities. Such a change is associated with fishers' eligibility for European subsidies, especially in terms of accounting and social contributions to different tax and contribution regime.

Although regular surveillance activities on both local vessels and vessels coming from outside the country are being conducted by Direction de la Mer with the other French ORs, this specific activity was not discussed for St Martin. However, as the local implementation of MCS within St Martin follows national regulations, the below framework of such activities is provided:

- At the local level, Prefect ("Préfet") as the local representative of French State has the responsibility for MCS and delegates to local DM implementation and enforcement of regulations.
- DM issues a 2 year sub-national control at-sea plan, with priorities identified for MCS activities (of which fisheries is one of such priorities in the Caribbean). The plan defines objectives for control and enforcement.
- Controls are conducted by Unité Littoral de Contrôle Maritime national Navy, maritime police ("Gendarmerie") and customs. DM has a role of planification and coordination, with reports centralized by DM, though the local fields units have official mandates to control and issue fines.
- After infringement, DM centralises all reports and its director can issue penalties and request a referral to court. All penalties are defined in Code Rural et de la pêche maritime[25].

DM is supported by CROSS[26] (Centres régionaux opérationnels de surveillance et de sauvetage- Operational Regional Centers for surveillance and Rescue) and CNSP[27] (centre national de surveillance des pêches, National Center for fisheries surveillance) regarding legal obligations review with sharing of legal compendium to all MCS partners.

Operational Units receive regular training on MCS through ENSAM[28] (Ecole Nationale de la Sécurité et l'Administration de la Mer, National School for Sea Security and Administration). Specific training for police and customs officers related to fisheries are also regularly organized.

At the level of RFMOs, control is enforced by Member States but the RFMO body in charge of Compliance can identify Members that are not compliant and ask them to remedy the situation. In extreme cases, the RFMOs can apply market measures to non-compliant states, but IOTC indicates that this has never happened.

3.4.1 MCS data for scientific purposes

Ifremer obtains administrative and control data from DPMA's SIPA (Système d'information de la pêche et de l'aquaculture)[29], such as vessel registration and characteristics and VMS

[25] https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006071367

26 https://www.ecologie.gouv.fr/sites/default/files/17142_CROSS_50ANS_BATweb.pdf

27 https://agriculture.gouv.fr/quest-ce-que-le-centre-national-de-surveillance-des-peches-cnsp

28 https://www.ecole-affaires-maritimes.fr/16-ressources/les-memoires/bt.html

29 http://www.sipa.agriculture.gouv.fr

data. However, given the small size of vessels in St Martin, VMS is not mandatory for the island's fleet.

3.5 Institutional capacity

3.5.1 National level

DPMA considers that the major factor hampering work of Ifremer is a lack of human resources. In particular are the lack of local staff in the ORs, including fisheries experts in the field. Although monies can be obtained through EMFF, this does not cover hiring long term staff.

The objective of DPMA is to include under DCF all activities that should be part of regular data collection. In most cases, Ifremer and IRD implement all the activities themselves, but in St Martin 100 % of data collection is done by a private contractor.

Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which had not been planned/budgeted. Often requests passed by DPMA through an official request to Ifremer, take priority, which can impact routine and project work (IRD personal communication, 2020). Recruitment within IRD is an issue too, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed (IRD personal communication, 2020).

There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge). Contracts are currently on a 3-year basis, but the next ones will be for 4 years.

3.5.2 St Martin

Data collection is outsourced to an external company for field activities but remains under full supervision and management of Ifremer Martinique and SIH in Brest. The main need expressed during field visit is the need for an additional staff in Ifremer Martinique dedicated to monitoring and coordinating activities in Guadeloupe, including data collection for Guadeloupe, and the limited ones for St Martin (calling fishers to get activity information).

SECTION 3 - KEY FINDINGS

- Responsibilities and tasks for French fisheries sector monitoring are well defined at national and local level. Several actors are involved depending types of data to be collected
- In St Martin, data collection is limited and supervised by Ifremer
- Ifremer designs data collection methodology and provides tools for data entry, processing and computation (SIH, managed in Brest, France).
- Ifremer outsources to a private company Groupe EI collection of information in the field by telephone for the few fishers in St Martin.
- Renewal of the contract can lead to periods without data collection in place (such as 2016 and 2017, see reference in Weiss et Al. 2018)
- Compliance to Control Regulation (EC) 1224/2009[30] regarding logsheet self-declaration by fishers could be an opportunity to collect more information,

30 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

4 Funding and funding structures for data collection

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member State funding

DPMA provided a description of how the EMFF process works in France.

Top-down:

1. The European Union votes a global envelope for EMFF. It is the result of a political consensus;
2. A national envelope is scaled according to complex rules including different criteria; and
3. A percentage of this envelope is assigned to data collection (Article 77).

Bottom-up:

At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities (such as for recreational fisheries). A draft of the total budget for DCF data collection is made available.

Final negotiation: this draft is confronted to the DCF percentage available in EMFF for France. Discussions starts again to find the correct balance between priorities. It is a complex exercise with no magic recipe.

EMFF funds 80% of the eligible costs (not all data collection activities are eligible). The remaining 20% is supported by the institution's own budget.

DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. It takes usually 4-5 months to complete the process.

DPMA is also a beneficiary of Article 77.

There are some projects related to data collection outside Article 77:

- Article 28: scientific partnership
- Article 39: improvement of gear selectivity
- Article 40: large marine ecosystem knowledge (to be confirmed), and
- Article 76: MCS funding

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.

Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French Cours Des Comptes[13]. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

France received under the EMFF 2014-2020 EUR 588 million. In this respect, the EMFF Operational Programme for France 2014FR14MFOP001 (DPMA, 2015) described the proposed use of EMFF by France, including OR:

- Union Priority 1 (UP1): EUR 150.9 million (25.7% of total EMFF allocation) will aim at a better balance fisheries activities and environmental protection and sustainability. It will address (among others) fleet capacity by adjusting fleet capacity to resources, modernisation of the fleet, investments in port infrastructures in line with requirements under the discards ban, and improving traceability of fisheries products and processing.
- Union Priority 2 (UP2): EUR 88.8 million (15.1% of EMFF allocation) will go towards meeting the objectives of the French national strategic plan for aquaculture that aims at boosting competitiveness and sustainability of the French aquaculture sector.
- Union Priority 3 (UP3): EUR 122.3 million (20.8% of EMFF allocation) will go towards compliance with CFP rules regarding control and data collection. This include Article 77 of interest to this study: total budget in the programme is EUR 66 146 872. This is the main source of EMFF funding for DCF data collection at the national and OR level.
- Union Priority 4 (UP4): EUR 22.6 million (3.8% of EMFF allocation) will help ensure better territorial cohesion of fisheries and aquaculture. Foreseen activities include maintaining and creating new jobs, reinforcing the position of fisheries and aquaculture within the development of coastal territories, strengthening the FLAGs network, and increasing added value through innovative projects and research.
- Union Priority 5 (UP5): EUR 163.2 million (27.8% of EMFF allocation) will go towards improving the marketing, diversification and valorisation of seafood products. The French OP gives a central role to producer organisations (PO) that currently place almost 50% of the French production on the market, through the implementation of production and marketing plans and the reinforcement of POs across its territory (both mainland and outermost regions). Please note compensation for additional costs for seafood marketing etc in the six French ORs has more than doubled compared to the 2007-2013 period.
- Union Priority 6 (UP6): EUR 5.3 million (0.9% of EMFF allocation) will go towards strengthening the efficiency of maritime surveillance and widening the network of marine protected areas and improving knowledge on the marine environment and interactions with human activities.
- EUR 34.8 million (5.5% of EMFF allocation) are allocated to technical assistance in order to reinforce the implementation system, ensure efficient administration of the EU funding, including support to reducing burden on beneficiaries, improving administration and publicity and information measures.

Financial information:

- Total OP budget: EUR 774 353 018.
- Total EU contribution: EUR 587 980 173, including EUR 66 146 872 for DCF
- Total national contribution: EUR 186 372 845

EMFF is operationally managed by DPMA. Some of the fund management is delegated to sub-national level (*Régions*).

4.1.2 OR funding

No specific budget has been proposed by the EMFF operational programme for French ORs. Nonetheless, use of EMFF funds in the OR can be extracted from France's financial report (Liste des opérations du programme national FEAMP 2014-2020, 2019). Total use of EMFF funds in St Martin: EUR 80 412,55 (at December 2019), with 100% for OR compensation cost (Article 70). It represents 11 requests for 11 fishers. It is an indirect way of confirming the limited number of fishers in the OR. No specific engagement line for measures under Article 77 related to DCF data collection is available for St Martin. This Article is engaged at national level (discussed in Section 4.2).

4.2 Other sources of funding

Ifremer has a total annual budget in 2017 of EUR 194.4 million (Cours des Comptes[31], 2019); with the following breakdown: (i) EUR 154.4 million directly supported by the national budget (subsidies for public services support), and (ii) approximately EUR 40 million from contracts and projects; the EUR 40 million includes support from EMFF.

EMFF reimburses 80% of eligible expense, which usually corresponds to 60% of the expenses. The remaining 40% are covered by Ifremer national budget. The other source of funding is France's regular national budget, which can provide funds under various mechanisms:

- Grant agreement with IFREMER and IRD;
- "*Convention socle halieutique*" with IFREMER: used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan; and
- Triannual agreement with IRD.

IRD mentioned that funding can be allocated by DG MARE or CINEA (formerly EASME) to specific projects for field data collection or meta-analysis. Several examples in recent years include (though these are not Mayotte specific):

- Scientific advice on shark management in RFMOs: data exploration and retrieval and analysis (3 years)
- Shark management in Atlantic about key species (18 month)
- RECOLAP: evaluation of implementation of Electronic Monitoring Systems (EMS) in small longliners (only Réunion)
- Meta analysis of CMMs in longline fisheries in Atlantic about hook shapes etc., and
- Pilot study funded by DCF on whitetip ban on retention -> survival rate post release in purse seine and longline fisheries (POREMO).

4.3 OR funding for data collection

Given the centralization of data collection programme in Ifremer with a global support from SIH in Brest (Bretagne, France Metropolitan), funds for Article 77 are managed and engaged at central level: managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and OR, including sub-contracting with external vendors for the few

31 *Cours des comptes* = Account court, the French National Institution in charge of controlling National Accounts.

data collection activities done remotely in St Martin from Guadeloupe and Mediterranean sea, and by other institutions (not relevant to St Martin).

The already cited Liste des opérations du programme national FEAMP 2014-2020, 2019 provides the detail for FEAMP activities under Article 77.

Table 4: EMFF funds received by the various French institutions under Article 77.

Institution name	Total eligible funds (EUR)	Total funding received (EUR)
Agence Des Aires Marines Protegees	293 416.05	234 732.84
Agence Francaise Pour La Biodiversite	914 730.00	731 784.00
Franceagrimer	44 961.90	35 969.52
Ifremer	41 517 440.00	33 213 492.00
Inra	1 025 238.00	820 190.00
IRD - Institut De Recherche Pour Le Developpement	9 628 639.00	7 702 911.00
Ministere De L'agriculture De L'alimentation Maa	9 670 201.00	7 736 160.00
Museum National D'histoire Naturelle	1 084 263.00	756 113.00
Universite De Nantes	3 049 192.00	2 439 353.00

SECTION 4 - KEY FINDINGS

- DCF data collection funding comes from two main sources: EMFF and national budget
- France received for EMFF 2014-2020 EUR 588 million
- EMFF funds in St Martin: EUR 80 412.55
- Article 77 for EMFF DCF data collection represents EUR 66 146 872.
- No specific EMFF funding for St Martin related to Article 77 is identified.

5 Current state of data collection obligations

There is no data available for St Martin.

France doesn't comply for St Martin regarding its obligation to monitor fisheries (article 16 under Control Regulation (No 1224/2009). In addition, it is to be noted that Commission Delegated Decision (EU) 2019/910 (EU, 2019) doesn't list any stock for St Martin.

6 Fisheries management and conservation measures

6.1.1 National

The same regulations apparent in Guadeloupe apply in St Martin for professional fishers (decree 2002 / 1249 / PREF / SGAR / MAP) and recreational fisheries (decree 971-2019-08-20-003 S25C-919082015150). Regarding professional fisheries, Table 5 lists conservation management measures from Decree number # 2002 / 1249 / PREF / SGAR / MAP[32] regulating the coastal maritime fishing in St Martin.

Table 5: List of management and conservation measures Decree number n ° 2002 / 1249 / PREF / SGAR / MAP regulating professional fishing in Guadeloupe (which can be taken as applying to St Martin)

Type of measure	Measure	Description	Apply to ICCAT
Fishing zones ban			
Gear restriction	Dragging gear	Dragging gears is prohibited	No
	Straight net	Straight netting of which the mesh does not have, when wet, at least 35 mm across (70 mm stretched), is prohibited	Yes
	trammel net mesh	Any trammel net of which the mesh of the central layer does not have, in the wet state, at least 40 mm of side (80 mm stretched), and of which the mesh of the outer layers does not have, to the wet state, at least 200 mm per side (400 mm stretched), is prohibited	No
	Gillnet operation	Gillnets at depths of more than 200 m is prohibited	Yes
	Gillnet mesh	Mesh of the nets must be equal to or greater than 60 mm on a side	Yes
	Gillnet size	Maximum of 4 m high Limited to 2 nets of 400 m	Yes
	Traps and pots size limitation	Mesh size is smaller at 38 mm are prohibited at any time, any place	No
	Purse seine size	- Cola seines * minimum length: 200 m * minimum drop: 10 m (maximum 16 m) - Coulirous seine * minimum mesh size: 20 mm (40 mm stretched). - Balaous nets, huts, garfish, quiaquias * Minimum mesh: 14 mm (28 mm stretched).	Yes

[32] http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/arrete_peche.pdf

Type of measure	Measure	Description	Apply to ICCAT
	Explosives, firearms, soporific or toxic substances forbidden		Yes
	Respiratory equipment allowing to remain submerged is prohibited		No
Species	Species size limitation	Fishing under 10 cm in size is prohibited with exception	No
	Lobster size limitation	common lobsters known locally as "royal" (*Panulirus argus*) and those locally called "Brazilian" (*Panulirus guttatus*) limit in size	No
	Ban on breeding lobster		No
	Shellfish size limitation	Helmet sails / Queen conch	No
	Sea turtles	All species banned from fishing and sales	No
	Corals, sea fans, sponges, and marine plants	All species banned from fishing and sales	No
	Bull's eye" (*Etulis oculatus*)	Above 42 cm	No
	All species of cetaceans or sirenians	All banned from fishing	No
	Fish considered poisonous or harmful to human health	All banned	No
Fishing period and conservation	Shellfish fishing depth	All fishing for this gastropod is prohibited from the shore to 25 m depth from January 1 to September 30 inclusive. Any fishing of this gastropod is prohibited beyond 25 m depth from February 1 to September 30 inclusive	No
	Queen conch closed period		No
	White sea urchins (*Tripnenstes ventricosus*)	prohibited during each annual period from January 15 to December 15	No
Recreational fisheries	Additional limitation on gears		No
	Additional limitation on species	Spanish mackerel, tuna, dolphinfish, colas, swordfish, marlin and sailfish = max catch of 3 fish	Yes

Regarding recreational fisheries, a new decree has been published in Jan 2019, modified in April 2021:971-2019-08-20-003 S25C-919082015150[33]. This enforces more restriction on the catch of fish, with reduced catch on juveniles especially on Yellowfin tuna (see answers to public consultation[34], regarding limits on size for this species).

In addition, a natural reserve ("Réserve Naturelle") has been created in St Martin according to decree 98-802 of 3 September 1998[35]. Fishing is strictly banned within the reserve (article 5 of decree 98-802). This area was first put in to preserve the terrestrial ecosystem from urban expansion, with an extension into the sea. One third of the protected area covers water, which is the same proportion as closed areas in Martinique because of Chlordecone.

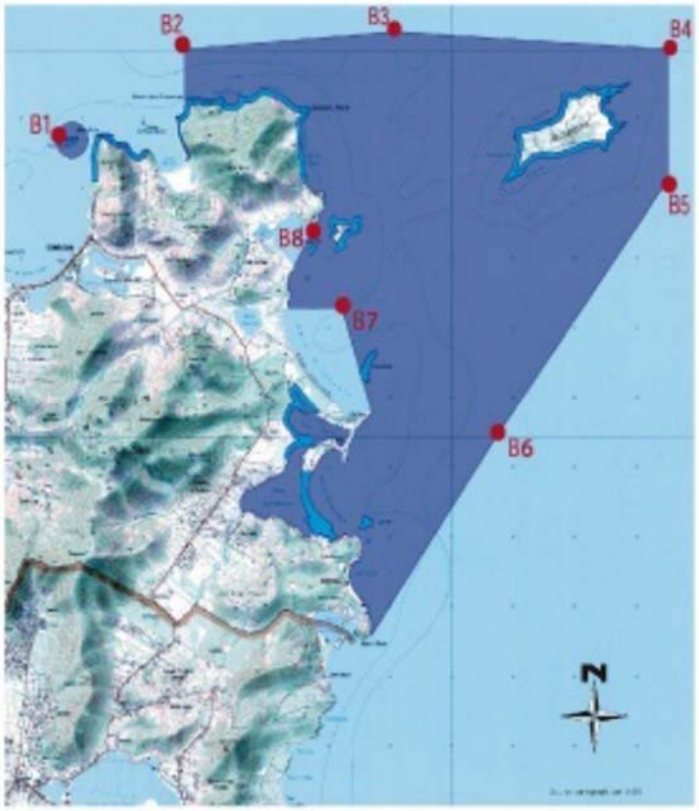

Figure 6: Delineation of St Martin Natural Reserve

6.1.2 International

Being an Outermost region of the EU, all EU regulations apply to St Martin, through their implementation in the French national regulations.

[33] http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/arrete_dm_peche_de_loisir_20-08-2019.pdf
[34] http://www.dm.guadeloupe.developpement-durable.gouv.fr/IMG/pdf/synthese_avis_du_public_-_projet_d_arrete_sur_la_reglementation_de_l_exercice_de_la_peche_maritime_de_loisir_en_guadeloupe_et_a_saint-martin.pdf

[35] https://reservenaturelle-saint-martin.com/sites/default/files/telechargements/decret_ndeg98-802_du_3_septembre_1998_version_consolidee_au_20120425.pdf

SECTION 6 – KEY FINDINGS

- St Martin has a complete legal framework related to management of fisheries supported by scientific advices coming from Ifremer and recommendations from fishers associations.
- A third of the Island is a Natural Reserve, where no fishing is permitted.

7 Shortcomings or obstacles to fisheries management

There is no routine data collection organized in St Martin except for the effort “Calendrier d’activité”. These data are not published by SIH.

There are a limited number of professional fishers (10-20) which does not justify the setup an OSBDEB (Observation Débarquement or landing sampling site) programme (as in Guadeloupe), in terms of financial investment and in terms in methodology (i.e., a sample based approach for 20 fishers is not the adequate method, with complete enumeration warranted).

More regular telephone interviews could be one immediate solution even with the uncertainty on quality of data.

Collecting and using loghsheet data could be an alternative solution to regular phone interviews, assuming a good quality of data reported by fishers, with random controls being implemented. A global programme to assess the quality of logsheets should be implemented.

8 Information sources

8.1 References

Weiss, J., Demaneche, S., Evano, H., Guyader, O., Bourjea, J., Derridj, O., Reynal, L., Mansuy, E., Berthou, P., Leonardi, S., Rostiaux, E., Leblond, E., Le Blond, S., 2018. Synthèse 2017 de l'observation des efforts et débarquements des pêcheries côtières. Estimation des efforts de pêche et des productions dans les régions Méditerranée continentale, La Réunion, Martinique, Guadeloupe et Guyane pour les navires de moins de 12 m. https://archimer.ifremer.fr/doc/00478/58970/

Weiss Jérôme, Duchêne Julie, Le Blond Samuel, Guyader Olivier, Demanèche Sébastien, Berthou Patrick, Le Roy Emilie, Leblond Emilie, 2020. Synthèse des pêcheries de Guadeloupe 2018. Ifremer-sih-2020.01, 19 pp.

8.2 EU Legislation

Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22).

Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory research surveys and thresholds for the purposes of the Multi-Annual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001 (OJ L 145, 4.6.2019, p. 21–26).

Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the Multi-Annual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

French Guiana

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

French Guiana Profile Report

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Acronyms

Term	Description
AFD	Agence française pour le développement
CREDO	Cellule de Réponse aux appels de Données
CRPMEM	Comité regional des pêches marines et des élevages marins
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DM	Direction de la Mer
DPMA	Direction des pêches maritimes et de l'aquaculture
EASME	Executive Agency for Small and Medium Sized Enterprises
EMFF	European Maritime and Fisheries Fund
EMS	Electronic Monitoring System
EU	European Union
ICCAT	International Commission for the Conservation of Atlantic Tuna
ifremer	Institut Francais de Recherche pour l'Exploitation de la MER
IRD	Institut de Recherche pour le Développement
LEMNA	Laboratoire d'économie et de management de Nantes-Atlantique
MCS	Monitoring, control and surveillance
MNHN	Muséum national d'Histoire naturelle
NEI	Not elsewhere included
NGO	Non-governmental organisation
OBSDEB	Observation des Marées au débarquement
OFB	Office Français pour la Biodiversité
OR	Outermost Region
RDBES	Regional Database and Estimation System
RFB	Regional Fishery Body
SIH	Système d'Informations Halieutiques
SIPA	Système d'information de la pêche et de l'aquaculture
SMEFF	Sustainable management of external fishing fleets
SSF	Small scale fisheries
SSP	Service de la statistique et de la prospective
VMS	Vessel monitoring system
WECAFC	Western Central Atlantic Fishery Commission

1 Introduction

1.1 Geographic and economic characteristics

Administrative status: French Guiana is a region ("Région", Administrative level 1) of the Republic of France, a department ("Département", Administrative level 2), as well as a single territorial collectivity. This entity is an Outermost Region (OR) of the European Union1 (EU) (Figure 1).

Geography: French Guiana is located in the Atlantic Ocean, on the northern Atlantic coast of South America, between Brazil to the east and south, and Suriname to the west (Figure 3). The land area of French Guiana is 83,534 km^2. French Guiana is the only EU OR that is not an island or archipelago (Figure 2).

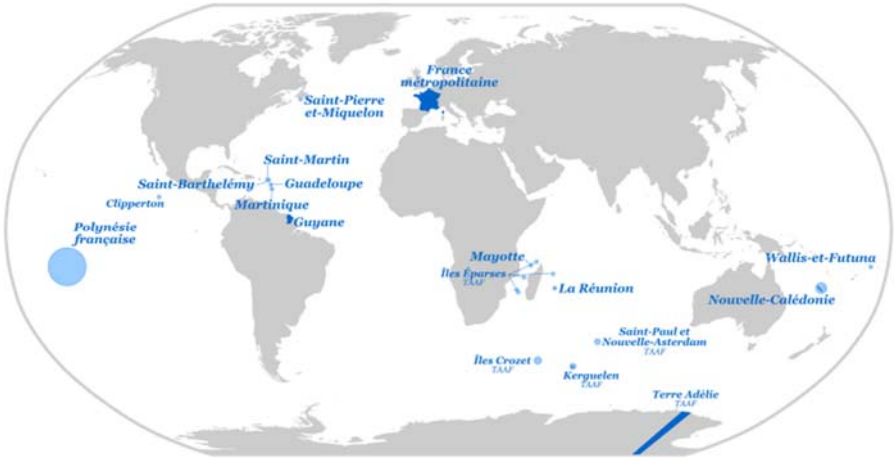


Figure 1: France Metropolitan vs Outermost Regions and French Territories
Source: https://fr.wikipedia.org/wiki/Fichier:France_Overseas.svg

The EEZ of French Guiana covers 121 746 km^2, or approximately 1.3% of the overall French total EEZ of 9 638 369 km^2 (see Table 1)

Table 1: Surface area of the French ORs.

Outermost Region	Area of EEZ
Guadeloupe/Martinique	123 483 km^2
Saint Martin	2 665 km^2
French Guiana	**121 746 km^2**
Réunion	311 426 km^2
Mayotte	6 6176 km^2
Rest of French EEZ	9 015 873 km^2
TOTAL	9 638 369 km^2

Source : https ://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies

1 Note: in this document, the term Metropolitan France ("France métropolitaine") will be used to differentiate the mainland French territory in Europe from the Outermost Regions (Guadeloupe, Martinique, St Martin, French Guiana, La Réunion and Mayotte).

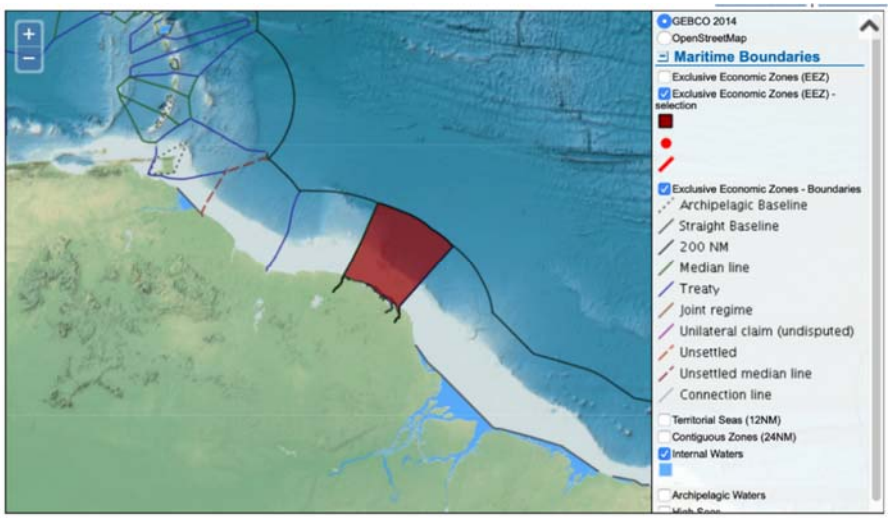


Figure 2: Map of French Guiana and its EEZ
Source: www.marineregions.org

Figure 3: Map of French Guiana
Source: Sémhur, RaviC (translation), CC BY-SA 3.0
https://creativecommons.org/licenses/by-sa/3.0, via Wikimedia Commons

There are seven main fishing ports in French Guiana (Cayenne, Sinnamary, Rémire Montjoly, Saint Georges, Le Larivot-Matoury, Kourou and Iracoubo-Organabo), but landings occur on beaches all along the coastline. A regulation from 2010 (arrêté préfectoral 1157/2010 dated 06 July 2010) lists the two official landing sites and another 12 provisional.

Table 2: General geographic indicators

Description	Unit	Source
OR area	83 534 km^2	Wikipedia
Population size	276 128	INSEE, 20182
Exclusive Economic Zone (EEZ) area	121 746 km^2	Portail national des limites maritimes[3]

1.2 Fisheries statistics

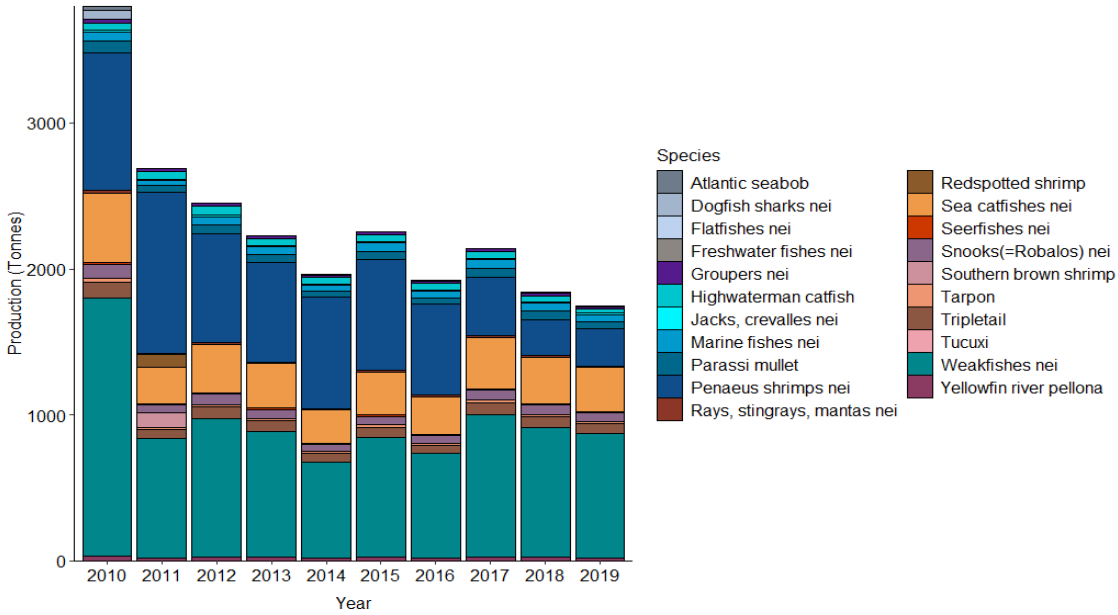


Figure 4: Total capture production for the periods 2010-2019 (source: FAO FishStat[4])

Catches are dominated by weakfishes, Penaeid shrimps until 2015 (after which stocks rapidly collapsed), as well as sea catfishes.

Regarding seafood products trade (import / export), there is extremely disaggregated data available from the French Customs website[5], but analysis of this data would require in-depth extraction and compilation, which is out of the scope of this study.

2 https://www.insee.fr/fr/statistiques/4313999

3 https://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies

4 FAO. 2021. Fishery and Aquaculture Statistics. Global capture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021. www.fao.org/fishery/statistics/software/fishstatj/en

5 https://www.douane.gouv.fr/la-douane/opendata?f%5B0%5D=categorie_opendata_facet%3A459

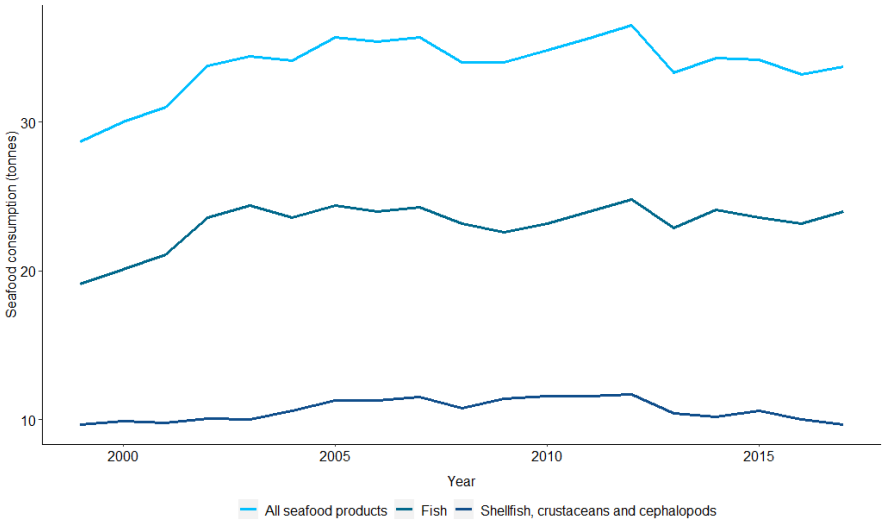


Figure 5: Composition of per capita fish supply for France, including OR (source: FranceAgrimer).

Regarding consumption of fish per capita, specific time series for French Guiana couldn't be found. National average value is 24.2 kg per person per year for fish and 35.6 kg per person per year for all seafood products[6].

1.3 Regional fisheries management

The EU is a contracting party of the International Commission for the Conservation of Atlantic Tuna (ICCAT[7]) and, as such, represents France (and therefore French Guiana) at ICCAT. ICCAT is a tuna Regional Fisheries Management Organization (t-RFMO), with a mandate on tuna and tuna-like species fisheries in the whole Atlantic Ocean, including French Guiana. ICCAT Management and Conservation Measures (more specifically its Recommendations) are binding on its Members.

The EU is a contracting party of the Western Central Atlantic Fishery Commission (WECAFC[8]) and, as such, represents France (including French Guiana) at WECAFC. WECAFC is a Regional Fishery Body (RFB) (established under article VI of FAO), with a mandate on all living marine resources, without prejudice to the management responsibilities and authority of other competent fisheries and other living marine resources management organizations or arrangements in the area. WECAFC Conservation and Management Measures are not legally binding on its Members.

6 https://www.umr-amure.fr/wp-content/uploads/2018/08/situation-peche.pdf

7 https://www.iccat.int/en/

8 http://www.fao.org/fishery/rfb/wecafc/en

SECTION 1 – KEY FINDINGS

- French Guiana is the only EU OR that is not an island, and is located on the Northern Atlantic coast of South America, between Suriname and Brazil.
- French Guiana EEZ is fairly small at 121,746 km^2 about 1.3% of the total French EEZ.
- The absence of lagoons and the hydrography of French Guiana impact the types of fisheries that dominates the waters in this OR.
- The vast majority of catches in quantity is weakfishes and sea catfishes, with the penaeid shrimp fisheries having almost collapsed since 2015.
- French Guiana is covered by two RFBs: ICCAT and WECAFC.

2 Fish stocks and other marine organisms and associated fishing activities

2.1 Commercial fish stocks

Exploited stocks in French Guiana are coastal species, usually in groups of related species (e.g. weakfishes or sea catfishes).

All reported stocks below are extracted from Blanchard et al. (2018), which compiles all stocks for the French ORs. Some information was also taken from Weiss et al., 2019 which provides a summary of catches in French Guiana for 2018. Data for 2019 was not yet published at the time of writing this report.

Fisheries in French Guiana catch a large variety of fish. There are 43 species or groups of species captured in French Guiana that are formally monitored (at least in terms of landing data). Operations are split between small artisanal fisheries (see section 2.2.1 for more details) operating in the coastal areas that do not target specific species, and commercial vessels from Venezuela targeting red snapper, as well as a small number of commercial shrimp trawlers. The list of main stocks monitored (43 species or groups of species) below reflects this variety of catches (Table 3), which results from the nature of artisanal fisheries in French Guiana. Importantly, there is only a small number of species with a formal stock assessment. On the 43 monitored species, only 2 (5% of total species caught) are formally assessed. These are the penaeid shrimp and red snapper, which are both assessed by Ifremer (Table 4).

Table 3: Species and stocks monitored in French Guiana (source: Blanchard et al. 2018 (part II))

Description	Unit
Species monitored	43
Stocks assessed	2
Stocks not assessed	95%
Landings (tonnes)	1,912
Stock assessed by landed weight	47%
Value of landings (EUR million)	14.6
Stock assessed by value	55%

Table 4: Stocks assessed in French Guiana (source: Blanchard et al. 2018 (part I))

Species code	Common name	Scientific name	Assessment	Year	Status
PEN	Penaeid shrimps	*Farfantepenaeus subtilis* (mainly)	Ifremer	2018	Slight Overfishing/ Slightly Overfished
SNC	Red snapper	*Lutjanus purpureus*	Ifremer	2019 2020	Overfishing/ Overfished Uncertain

NB. This data has been updated with the most recent Ifremer stock assessment results available.

2.1.1 Species and groups captured by French Guiana fisheries

There are a diverse range of fishes captured within French Guiana, including a range of demersal fin fish species, sharks and rays (Table 5).

Table 5: Species captured by French Guiana fisheries

ASFIS code	French name	Scientific name	ASFIS English name
SNC	Vivaneau rouge	*Lutjanus purpureus*	Southern red snapper
YNA	Acoupa toeroe	*Cynoscion acoupa*	Acoupa weakfish
YNV	Acoupa cambucu	*Cynoscion virescens*	Green weakfish
PEN	Crevettes 7verall nca	*Penaeus* spp	Penaeus shrimps nei
AXP	Mâchoiron crucifix	*Arius proops*	Crucifix sea catfish
LOB	Croupia roche	*Lobotes surinamensis*	Tripletail
SKH	Requins divers nca	Selachimorpha (Pleurotremata)	Various sharks nei
WKB	Acoupa tident	*Cynoscion steindachneri*	Smalltooth weakfish
ROB	Crossies nca	*Centropomus* spp	Snooks(=Robalos) nei
TAR	Tarpon argenté	*Megalops atlanticus*	Tarpon
ONJ	Crevette orange	*Solenocera acuminata*	
WKX	Acoupas nca	*Cynoscion* spp	Weakfishes nei
MZ1	Bagres nca		Sea catfishes nei
EET	Mérou géant	*Epinephelus itajara*	Atlantic goliath grouper
MGS	Mulets	*Mugil* spp	Mulets
CVJ	Carangue crevalle	*Caranx hippos*	Crevalle jack
SNA	Vivaneaux nca	*Lutjanus* spp	Snappers nei
AWR	Mâchoiron petite-gueule	*Amphiarius rugispinis*	Softhead sea catfish
KGX	Thazards nca	*Scomberomorus* spp	Seerfishes nei
WKK	Acoupa chasseur	*Macrodon ancylodon*	King weakfish
BPF	Brachyplatystoma filamentosum	*Brachyplatystoma filamentosum*	Kumakuma
GEU	Genyatremus luteus	*Genyatremus luteus*	Torroto grunt
BEB	Bagre bagre	*Bagre bagre*	Coco sea catfish
MGI	Mulet parassi	*Mugil incilis*	Parassi mullet
LGQ	Acoupa rivière	*Plagioscion squamosissimus*	South American silver croaker
MZZ	Poissons marins nca	Osteichthyes	Marine fishes nei
CAX	Mâchoirons nca	Ariidae	Sea catfishes nei
PEQ	Alose-écaille fluviale	*Pellona flavipinnis*	Yellowfin river pellona
STT	Pastenagues, etc. nca	Dasyatidae	Stingrays, butterfly rays nei
AWP	Mâchoiron jaune	*Aspistor parkeri*	Gillbacker sea catfish
NBM	Acoupa céleste	*Nebris microps*	Smalleye croaker
FLX	Poissons plats nca	Pleuronectiformes	Flatfishes nei
HPN	Bagre paysan	*Hypophthalmus edentatus*	Highwaterman catfish
BPT	Bagre vaillant	*Brachyplatystoma vaillanti*	Laulao catfish

ASFIS code	French name	Scientific name	ASFIS English name
BOB	Crevette seabob atlantique	*Xiphopenaeus kroyeri*	Atlantic seabob
OCT	Pieuvres, poulpes nca	Octopodidae	Octopuses, etc. nei
YNM	Acoupa doré	*Cynoscion microlepidotus*	Smallscale weakfish
CKM	Tambour rayé	*Micropogonias furnieri*	Whitemouth croaker
TFB	Crapaud guyanais	*Batrachoides surinamensis*	Pacuma toadfish
KPF	Migraine flamboyante	*Calappa flammea*	Flame box crab
CGX	Carangidés nca	Carangidae	Carangids nei
NGZ	Mâchoiron grondé	*Notarius grandicassis*	Thomas sea catfish
DCP	Décapodesnatantia nca	Natantia	Natantian decapods nei

Notes: Species are ordered by highest to lowest catches.

2.1.2 Species and groups captured by French Guiana fisheries and covered by an RFMO

The EU being a Contracting Party to ICCAT and WECAFC, France has to comply with the RFB's Conservation and management Measures and report on fisheries catching species under their respective mandates. As there are almost no large pelagic species fisheries in French Guiana, coverage by ICCAT is very limited. Regarding WECAFC, though its mandate covers all species, only red snapper and penaeid shrimps are effectively monitored (see Table 6).

Table 6: Species captured by French Guiana fisheries, covered by an RFMO

ASFIS code	French name	Scientific name	ASFIS en Name	RFMO
KGX	Thazards nca	*Scomberomorus* spp	Seerfishes nei	ICCAT
PEN	Crevettes 8verall nca	*Penaeus* spp	Penaeus shrimps nei	WECAFC
SNC	Vivaneau rouge	*Lutjanus purpureus*	Southern red snapper	WECAFC
All			All other marine species	WECAFC

2.1.3 Catch composition

The composition of catches is largely dominated by coastal species, with weakfishes (acoupa weakfish and green weakfish) representing more than 65% of landings, followed by tripletail and crucifix sea catfish.

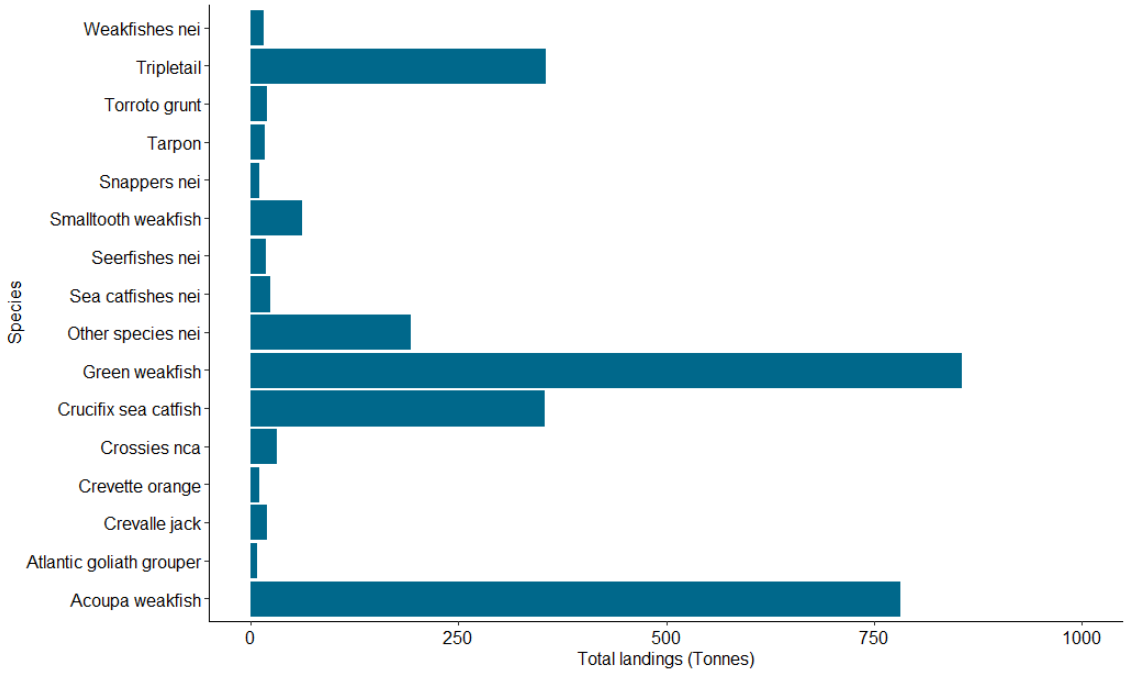


Figure 6: French Guiana catch composition in 2018 (metric tonnes).
Source: Ifremer, 2019 (raw data).

The main issue with catch composition in French Guiana is that only a small number of species are actually identified in catches, with a lot of them being landed as species groups by multi-specific fisheries.

2.1.4 Declining and emerging stocks

Declining stocks

The penaeid shrimp fishery has experienced a strong decline since 2007, due to a combination of diminishing stocks and a strong decrease in the number of boats in the fishery for a range of commercial reasons (Baulier et al., 2017).

Emerging stocks

According to Direction des pêches maritimes et de l'aquaculture (DPMA) and French Guiana Sea Directorate, the local industry (fish processors and vessel owners) has expressed interest in developing a high seas fishery, targeting tuna and tuna-like species. This would use similar techniques and patterns as in nearby Suriname and Guyana. One of the reasons for promoting such an evolution would be to alleviate fishing pressure on coastal resources. However, there are several issues related to the development of such a fishery, including scientific, technical and management-related:

- There are no data on the potential target resources in the French Guiana region.
- There are no boats suited to offshore fisheries in French Guiana, nor are fishermen skilled in the required fishing techniques.
- There is no way to deploy anchored FADs, which are often used when developing this sort of small offshore fisheries, because of strong marine currents.
- There is a risk of competition with tuna caught by other French ORs in the region, especially as these pelagic species are shared stocks under management of ICCAT.

The French Guiana Sea Directorate asked advice from Ifremer on how to explore the development of such a fishery, and Ifremer recommended that IRD be involved. A pilot project will be implemented in 2021/2022 by IRD to explore longline fishing for large pelagic species (yellowfin, bigeye, swordfish, with marlin as bycatch) in French Guiana. This would require adequate boats and training local fishermen who are not used to this fishing technique.

According to DPMA, in French Guiana the various weakfish species are subject to increased IUU fishing in relation to a high demand from Asian markets for their swim bladders, which have value in traditional medicine.

2.2 Fleet structure

2.2.1 Domestic fisheries

The technical characteristics of the average vessel by length category are shown in Table 7 below. In 2018, there were a total 153 boats registered with the Community Fleet Register, with 120 vessels actually active. The fleet holds two major segments: boats less than 12 m in length, and those larger than 20 m in length. The first segment is composed of the artisanal fleet operating in French Guiana, in coastal areas, with a vast majority of boats between 9 to 12 m in length (Table 8). The boats used in this fishery are the "pirogue" (undecked, used in estuaries), the "canot créole" and an 'improved' version with decking. Both the canot creole and a decked canot creole have evolved from the pirogue, and are able to fish at sea, and the "tapouille" (a typical boat from the Amazonian region of Brazil, fully decked with an inboard engine). The second segment is composed of commercial shrimp trawlers. Also, note that there is a fleet of approximately 45 Venezuelan longliners operating in French Guiana waters and fishing for red snapper. These foreign vessels have not been included in Table 7.

Table 7: Technical characteristics of the average vessel by length category (source: Weiss et al. 2019)

Length class	Number of boats	Average length (m)	Average power (kW)	Average age (years)	Average crew (persons)
<7 m	6	6.1	38	18	1.7
7-9 m	22	8.2	55	16	2.2
9-12 m	105	10.7	79	13	3
20-24 m	20	22.7	318	24	5

Table 8: Number of active vessels per length class in French Guiana (source: Weiss et al. 2019).

Length class	Coastal	Mixed	Offshore	Total
<7 m	3			3
7-9 m	17			17
9-12 m	79	8		87
20-24 m			13	13

Note: vessels having carried out more than 75% of their activity within 12 miles are qualified as "Coastal". Those having operated between 25 and 75% of their activity in this zone are qualified as "Mixed". Finally, those having operated more than 75% of their activity outside the coastal area are qualified as "Offshore". Note that the data refer to the 120 active vessels in 2018.

2.2.1.1 Artisanal fisheries

There are currently approximately 130 professional artisanal boats declared and licensed, with slightly more than a hundred actually active. Within this fleet there are several main types of boats:

- Pirogue (Ifremer, 2017) (2 boats): The pirogue consists of a monoxyle hull with planking, with a bow whose height is equal to or greater than that of the planking, and whose stern is closed by a vertical transom (racabat) which receives the outboard motor bracket. The pirogue is not suitable for sea navigation; it is used in estuaries. The gears used are gillnets, drifting or set.
- Canot créole (Ifremer, 2018a) (18 boats): The Creole canoe differs from the pirogue in that it has a larger planking. The bow is often reinforced by a counter-bow. The boats are often wider than the traditional pirogues, of which they are the marine adaptation. The gears used are gillnets, drifting or set.
- Canot créole amélioré (Ifremer, 2018a) (74 boats): The improved Creole canoe is a framed boat equipped with outboard motors. At the stern, a deckhouse serves as a crew and navigation station. An isothermal ice hold occupies the middle of the canoe. The open bow, covered with a simple wooden deck, is used for manoeuvring the fishing gear. Some canoes are equipped with a hydraulic net winder. The gears used are gillnets, drifting or set.
- Tapouille (Ifremer, 2018b) (7 boats): The tapouille is a typical boat of the Amazon region of Brazil, made of wood with a framed hull and fully decked. At the stern, the engine and fuel compartment are located below deck. The aft deck is topped by a deckhouse, which contains the bridge and the crew's quarters, sometimes surrounded by an exterior passageway. The fishing deck is located on the bow above a storage compartment for fishing materials. The integrated insulated hold is located below deck amidships. The tapouilles use exclusively drifting gillnets.

The informal sector is very important in French Guiana, but it is very difficult to collect data on this sector. As it is not covered by DCF, its study is mostly based on requests by local/regional authorities to answer on specific issues. According to Ifremer, there are very few coastal fishing boats that declare their catches and the data is of very poor quality. For the national fisheries information system, known as Système d'Informations Halieutiques (SIH), a comparative study was completed on observer data vs logbook data and it concluded that logbooks have a very low reliability for this section. Therefore, the SIH only uses observer data.

Ifremer statistics on the average artisanal vessels in French Guiana illustrate that the average boat is 11 m in length, encompass 105 kW, is 15 years old and holds 3 crew (Weiss et al., 2019).

The majority of vessels (82%) operate within the 12 nautical mile (nm) limit, and are thus considered coastal. Within the wider fleet, 11% operate on a regular basis outside the limit of the 12 nm and are thus fishing offshore, while a small percentage (7%) operate both in the coastal and offshore areas (Table 8). This typology of artisanal fisheries is different from Metropolitan France, and from most European artisanal fisheries in general. It is more similar to the type of artisanal fisheries operated in neighbouring countries such as Brazil and Suriname.

2.2.1.2 Industrial fishery

There are 13 industrial vessels larger than 12 m in length, that operate exclusively on the high seas trawling for penaeid shrimps. This fishery used to be much more developed, with more than 60 vessels operating, but it quickly shrunk due to reduced stock availability, from about 2007 to reach the current levels.

2.2.1.3 Illegal, unregulated, unreported fisheries

According to Ifremer, IUU fishing is a major issue, with catches roughly estimated to be at least equal to, if not higher than, legal catches. This is both from local "informal" boats not declaring their catches (see above), and in a large part from boats coming from adjacent countries (Brazil and Suriname), though there is no formal assessment of IUU fishing and the data remain highly uncertain.

2.2.1.4 Sports/recreational fishery

According to Ifremer, recreative fishing is quite developed, but there is no monitoring or data collection, mostly for staffing reasons; this is seen throughout the French ORs.

In 2008, there was a national survey on recreational fisheries in France (for France Agrimer), including the ORs. This was implemented by a polling company (BVA) through a panel-based survey, but the data collected wasn't of high quality (due mainly to methodology issues, especially in the ORs) and the participation dwindled as the survey progressed. There is a new call for tender to restart this survey, and for this survey France Agrimer will use Ifremer for technical advice, which should ensure that protocols and methodology are in line with best practices etc. The first such survey was conducted in 2020 in Martinique and Guadeloupe and its results will be presented very soon by Ifremer.

Foreign fisheries

Venezuelan boats are the only foreign vessels fishing in French Guiana waters. They use a highly targeted fishing technique: non mechanized handline, with up to 15 fishermen per boat. Most of their catches (95%) are red snapper. This is a fishery that has "always" existed, at least as far back as the 1980s.

This fishery is currently operating under an access agreement with the UE (European Council, 2012). The agreement fixes the number of boats allowed to operate (currently 45) and mandates that 75% of catches must be landed in French Guiana and sold to designated processing companies (currently two). However, according to Direction de la Mer (DM) in French Guiana and Ifremer, the reality is that catches for 1 trip out of 10 are not landed locally. Contracts run for 12 months-trips/year and usually the last trip of the year is landed in neighbouring countries, so there isn't any data on that last trip. Since 2020, the Venezuelan longliners are all equipped with e-logbooks.

According to Ifremer, there are no conflicts between local fishermen and 3rd party vessels because those do not exploit a resource targeted by local fishermen. Nor is there a will to develop a fishery on these resources because it would be too costly and not cost-efficient. The Venezuelan fishery on red snapper is only viable because vessels and staff operate under Venezuelan regulations, standards and salaries, which are generally lower in terms of safety, accommodation, labour standards and safety than the French equivalent.

Data collected under SMEFF on this fishery:

- EEZ entry/exit; and

- Landings of 75% of catches have to be landed in French Guiana as per agreement, and such landings are sampled by observers twice a month through random sampling.

A small number of trap fishing boats and longliners infrequently come from Martinique to fish red snapper and land their catches in Martinique, but these are classified as "French catches" and are thus not technically foreign. The total catches from these vessels are exceptionally small compared to those taken by the Venezuelan fleet.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

The typology of artisanal fisheries in French Guiana is comparable to other developing countries in the region, with mostly small scale fisheries operated by vessels less than 12 m in length. These fleet doesn't target specific species when going at sea, with boats catch what is available and all species are landed and sold. Therefore, the concept of bycatch can't be easily applied in the context of artisanal fisheries in French Guiana as it could be applied to industrial fisheries (for instance, industrial tuna longliners targeting yellowfin and bigeye tunas and catching billfish as bycatch).

2.3.2 Endangered, threatened and protected species

No information available on ETP species provided by stakeholders or available in the literature.

2.4 Summary of fisheries

A summary of the main artisanal and commercial metiers (gears, vessels and/or fishing techniques) operated in French Guiana is shown in Table 9. There are only 4 artisanal métiers in French Guiana. The most used artisanal fishing gear is drifting gillnets, followed by set gillnets – these two metiers account for up to 98% of artisanal boats gear use. One boat uses stow nets all year round, while another boat uses manual pole and line to catch Atlantic Goliath Grouper, but only during the month of June. Commercial vessels registered in French Guiana use bottom nephrops trawls to catch penaeid shrimps.

Table 9: Metiers used in French Guiana in 2018 (source: Weiss et al. 2019).

French Name	English Name	Number of boats
Filet Maillant Dérivant À Poissons	Drifting gillnets	96
Chalut De Fond Floridien À Crevettes	Floridian Shrimp Bottom trawls	13
Filet Maillant Fixe À Poisson	Set gillnets	11
Filets À L'étalage (Diables) À Poissons	Stow nets	1
Lignes Et Cannes Manuelles À Mérou Géant	Goliath grouper Pole and line (manual)	1

Although Ifremer compiles statistics on the metiers practiced by the various boats in French Guiana, the catches are collected and compiled by type of boat, as can be seen in Table 10, based on SIH detailed data for 2018 (see section 10.1).

As a conclusion, the fishery sector in French Guiana is a mix of a majority of small-scale vessels operating in coastal waters and a few larger vessels operating offshore (targeting shrimp). The most used fishing gear is drifting gillnets, while the fisheries are single

métier. The vessels tend to be fairly old and operate with a small crew of 3 members on average. The type of coastal metiers that can be practiced in French Guiana is heavily limited by the geophysical context (strong currents, heavy runoffs from large rivers, no lagoons). A number of Venezuelan longliners target red snapper under an SMEFF agreement with the EU.

SECTION 2 – KEY FINDINGS

- Exploited stocks in French Guiana are a mix of (i) a large number of coastal species, often undifferentiated, being dominated by one or two species, and (ii) a small number of species targeted by commercial fisheries.
- Operations are split between small single gear/métier artisanal fisheries operating gillnets in the coastal areas that do not target specific species, and a small number of commercial vessels targeting shrimp and red snapper.
- There are 43 species captured in French Guiana that are formally monitored (at least landing data). Of these only 2 species are formally assessed: penaeid shrimps and red snapper, both assessed by Ifremer.
- French Guiana stocks are covered by two RFMOs: ICCAT and WECAFC.
- Catch composition is largely dominated by coastal species, with weakfishes (acoupa weakfish and green weakfish) representing more than 65% of landings, followed by tripletail and crucifix sea catfish.
- The local industry (fish processors and vessel owners) have expressed interest in developing high seas fishery, targeting tuna and tuna-like species. This project is supported by local authorities and a pilot project implemented by IRD was expected to start in 2021.
- There are two segments in the fleet: less than 12 m and more than 20 m. The first segment is composed of the artisanal fleet operating in coastal areas, with a vast majority of boats in the 9-12 m segment, while the second segment is composed of commercial shrimp trawlers.
- Artisanal fisheries in French Guiana are clearly single métier.
- The commercial shrimp fishery was relatively important until 2007, after which date it rapidly declined, due to depletion of the stock and economic conditions. The informal sector is very important in French Guiana, but it is very difficult to collect data on this sector.
- There are very few artisanal (coastal) fishing boats that declare their catches, and the data is of very poor quality, so Ifremer relies on sampling at landing by observers.
- IUU fishing is a major issue, with catches roughly estimated to be at least equal to, if not higher than, legal catches.
- Though there are mandatory designated landing sites, catches are landed along the whole coastline, which makes sampling difficult.
- Ifremer has a national project to launch phone surveys for recreational fisheries in the Ors.
- There is currently a fishing agreement between EU and Venezuela, allowing 45 longliners from this country to come fish red snapper in French Guiana waters.
- Venezuelan boats do not land the catches from the last trip of the year in French Guiana but in neighbouring countries, so there isn’t any data on that last trip.

Table 10: Percentage of species and groups caught by each fleet in French Guiana (source: Weiss et al. 2019)

ASFIS code	French name	Scientific name	English name	% Canot créole	% Canot créole amélioré	% Tapouille	% Shrimp trawlers
YNV	Acoupa cambucu	*Cynoscion virescens*	Green weakfish	9.8	33.5	38.8	
NBM	Acoupa céleste	*Nebris microps*	Smalleye croaker	0.3	<0.1		
YNM	Acoupa doré	*Cynoscion microlepidotus*	Smallscale weakfish	0.1	0.1		
LGQ	Acoupa rivière	*Plagioscion squamosissimus*	South American silver croaker		<0.1		
WKB	Acoupa tident	*Cynoscion steindachneri*	Smalltooth weakfish	2.2	2.7	1.4	
YNA	Acoupa toeroe	*Cynoscion acoupa*	Acoupa weakfish	28.9	28.5	51.6	
WKX	Acoupas nca	*Cynoscion spp*	Weakfishes nei	0.5	0.5	0.4	
PEQ	Alose-écaille fluviale	*Pellona flavipinnis*	Yellowfin river pellona	0.1	0.4		
BPT	Bagre vaillant	*Brachyplatystoma vaillanti*	Laulao catfish		<0.1		
MZ1	Bagres nca		Sea catfishes nei	0.1	0.2		
CVJ	Carangue crevalle	*Caranx hippos*	Crevalle jack	0.8	0.5	1.9	
TFB	Crapaud guyanais	*Batrachoides surinamensis*	Pacuma toadfish	0.2			
ROB	Crossies nca	*Centropomus spp*	Snooks(=Robalos) nei	4.4	1	0.1	
LOB	Croupia roche	*Lobotes surinamensis*	Tripletail	6.4	14.5	1.2	
GEU	Lippu tricroupia	*Genyatremus luteus*	Torroto grunt	4.1	0.4	<0.1	
BEB	Machoiron coco	*Bagre bagre*	Coco sea catfish	0.6	0.1	<0.1	
AXP	Mâchoiron crucifix	*Arius proops*	Crucifix sea catfish		13.9	2.6	
AWP	Mâchoiron jaune	*Aspistor parkeri*	Gillbacker sea catfish	23.9	<0.1	<0.1	
AWR	Mâchoiron petite-gueule	*Amphiarius rugispinis*	Softhead sea catfish	1	<0.1		
CAX	Mâchoirons nca	*Ariidae*	Sea catfishes nei	0.9	1.1		
EET	Mérou géant	*Epinephelus itajara*	Atlantic goliath grouper	0.1	0.1	<0.1	
MGS	Mulets nca	*Mugil spp*	Mulets nei	10.4	<0.1		
STT	Pastenagues, etc. nca	*Dasyatidae*	Stingrays, butterfly rays nei	0.7	0.2	0.2	

ASFIS code	French name	Scientific name	English name	% Canot créole	% Canot créole amélioré	% Tapouille	% Shrimp trawlers
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei	0.5	0.6	0.3	
FLX	Poissons plats nca	*Pleuronectiformes*	Flatfishes nei	0.3			
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei	<0.1	0.4	0.7	
CKM	Tambour rayé	*Micropogonias furnieri*	Whitemouth croaker	0.7	<0.1		
TAR	Tarpon argenté	*Megalops atlanticus*	Tarpon	0.4	0.5	0.6	
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei	1.9	0.8	0.1	
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei	0.5		<0.1	
ONJ	Crevette orange	*Solenocera acuminata*	-				100
			Total	**100%**	**100%**	**100%**	**100%**

3 Institutional structures

Data collection in France and its ORs are well structured and there is a national framework in place, with some specificities in the ORs depending on the local context (Figure 7). In French Guiana, landings and biological data are collected by Ifremer on most fisheries, though some sampling is done by a local contractor. Paper-based fishing logbooks are submitted by fishermen directly to Direction de la Mer Southern Indian Ocean (DMSOI), then sent to FranceAgrimer for data entry.

3.1 Data collection

The overarching institution related to data collection is the Direction des pêches maritimes et de l'aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation[9]. Its roles are to ensure that France meets its obligation towards EU Common Fisheries Policy (1380/2013)[10], and its related Data Collection Framework (Council Regulation (EC) 2017/1004)[11], under the 2017-2019 EU-MAP[12] and the 2020-2021 EU-MAP (consisting of two Commission Decisions)[13].

The actual data collection field implementation involves several national institutions and research institutions:

- Ifremer (Institut Français de Recherche pour l'Exploitation de la Mer) : organizes data collection from samples (biological data) and catches/landings, manages the national fisheries information system (SIH).
- IRD (Institut de Recherche pour le Développement) : in charge of large pelagic (tuna fisheries) monitoring.
- University of Nantes – LEMNA (Laboratoire d'Economie et de Management de Nantes-Atlantique) : socio economic data for vessels above 12 m.
- FranceAgrimer: in charge of recreational fisheries monitoring and of industries/processing plants/auction houses monitoring in mainland France; also, in charge of digitizing paper logsheets/logbooks from the French ORs.
- OFB (Office Français pour la Biodiversité): in charge of data collection in French Guiana.

[9] https://agriculture.gouv.fr/

10 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22).

11 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

[12] Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

[13] Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

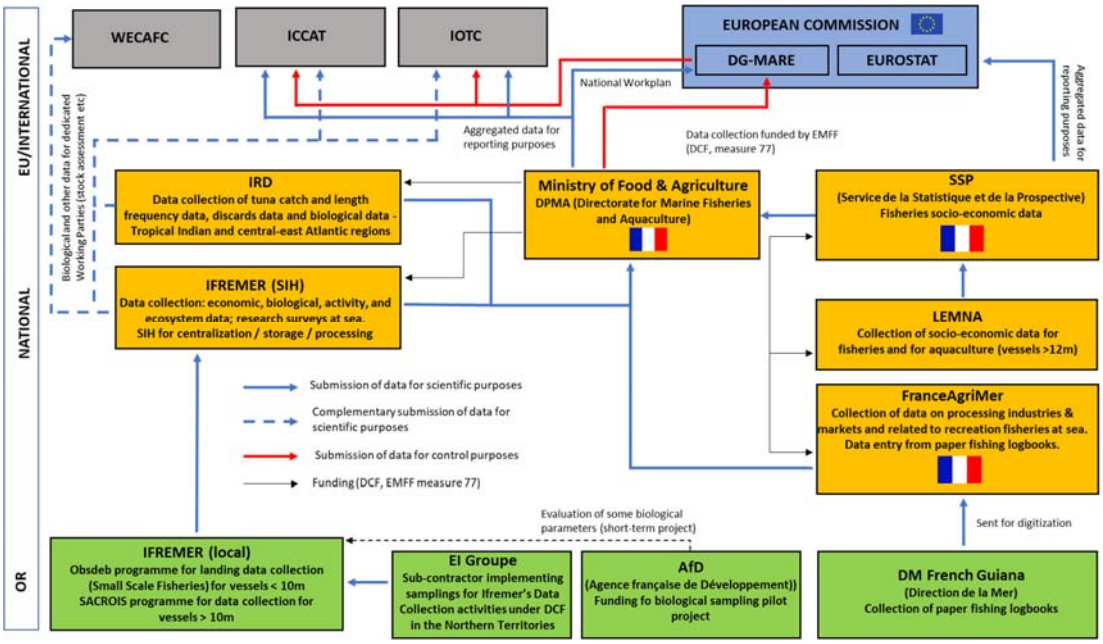


Figure 7: Institutional organisation of fisheries data collection in France, including French Guiana

3.1.1 Overall workflow of data collection in France and its ORs

The 2017-2019 EU-MAP and the 2020-2021 EU-MAP mandates multi-annual plans for data collection with lists of species, thresholds, data fields, etc. DPMA provides the National programme of work, revised on an annual basis, as needed. This document describes how France is going to comply with the DCF obligations, while each OR organizes its own fisheries monitoring system.

According to DPMA, the following workflow is in place for catch reporting, following the fisheries Control Regulation (EC) 1224/2009[14]:

- Vessels below 10 m (paper logsheets) and vessels 10 to 12 m (paper logbooks) send their paper-based catch data to the local Sea Directorates for quality control, which then transmit them to FranceAgrimer for data entry in the SACAPTE system, from where they are integrated into the SIH.
- Vessels above 12 m: e-logbooks are directly uploaded into the SIH. VMS data and sales data are also directly uploaded to SIH, but without data relevant to ORs.

The majority of data collection is under the management and supervision of Ifremer stationed in Martinique, in collaboration with the SIH team in Brest. In addition, IRD is responsible for collecting data on tuna fisheries (although this is minor for Martinique, as IRD mainly collects data from high sea fleets).

Ifremer is *de facto* "managing" fisheries data collection issues in ORs for DPMA. Ifremer has strived over the past year (2020) to set up a single focal point for all data-related questions, to make things easier when DPMA requests information from them. DPMA is also pushing for all fisheries data to flow into the SIH, whatever the institution involved

[14] Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

for data collection, to avoid multiplication of tools. The ultimate goal being one single tool at Ifremer to get all information and statistics on fisheries.

In the French Guiana, FranceAgrimer implement one-off surveys on recreational fisheries. They are also in charge of digitizing of paper logsheets and logbooks

SSP and LEMNA implement socio-economic surveys on all French vessels on the fleet register, including in the ORs and report to DMPA.

3.1.2 Data collection and other reporting obligations in French Guiana

Regarding data collection, Ifremer undertaken port activities (logbooks, VMS, processing plants data), with a number of local observers paid to sample landings. In addition, the local DM collects paper-based logbooks from professional fishers and sends them to France AgriMer for digitization. Of this, data collection dates back to 2006 for the small scale fisheries and from the 1990s for shrimps and red snapper.

In the Northern territories, data collection is handled for Ifremer by a private contractor (EI Groupe, a historical partner, also involved in other French ORs), as the coast is expansive and fishing activities are very spotty, thus not justifying a full-time position to cover them.

Regarding biological sampling, the shrimp fishery is sampled by Ifremer, with no other fisheries covered for staffing reasons. However, the Agence Française pour le Développement (AFD) will fund a short-term position to evaluate some biological parameters (length-weight relationships, sex-ratio, gonads). There is an issue of access to fish as they are landed in a large number of sites.

In French Guiana, Ifremer is trying to develop socio-economic indices through surveys, because they should collect and report this under DCF but don't because the data is not collected.

3.1.3 The SIH

The SIH (Système d'Informations Halieutiques) was developed under the framework of the ecosystem-based approach to fisheries, to cover both ecosystem resources and uses. The overarching aim of this system is to gather all fisheries information in a single system. This covers collected catch and effort data, as well as existing data. The system was developed to then harmonise the data, store and preserve them, and make the data available to partners.

The SIH was prototyped in 2007 in Martinique. Since 2017, the system has been managed from the Brest office of Ifremer, with regional focal points which serve as a relay for the national SIH people based in Brest.

The SIH is organised in 4 modules, all managed by Ifremer:

Ecosystems: Data collection for this module happens mostly in Metropolitan France (i.e. not in the ORs), and can include abundance indices for stock assessments, campaigns etc.

Exploited resources: This module examines population structure and collects the main biological parameters for stocks. This involves biological observation of landings, including in markets and factories. There is some biological sampling in the ORs, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers.

Biological sampling on large pelagics under the mandate of RFMOs (ICCAT, IOTC) is considered as generally good. In 2021, Ifremer plans to do more biological sampling in the ORs, mainly based on buying fish in ports, on a larger range of species, as per STECF recommendations.

Landings & effort: In Mainland France, data flow is considered good (e-logbooks etc), but not in ORs. The standard flow of reporting is as follows: fishers send their logbooks or logsheets to the local Direction de la Mer (DMSOI), which sends them after quality control to FranceAgrimer for data entry (in-house or by subcontractors). One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed. The overall reporting rate for the ORs is currently estimated at 50%. In this regard, the role of the local DMs is very important to train fishers, support them etc. for data reporting. To address this issue of reporting, Ifremer developed Observation des Marées au débarquement (OBSDEB) which works by performing sampling at landing sites, to rebuild catches and effort on the last 7 days. For 2021, Ifremer's objective is to improve catch and effort reporting by fishers.

Socio-economic data: Data on activities: month per month reconstitution of activity with métier, species & distance from coast. From there, segmentation of the fleet is derived. This information is used as basis for sampling plans. Availability of such data varies depending on the ORs.

LEMNA collects data from vessels with proper accounting. Ifremer tries and collect data from vessels without such information or refusing to provide them.

Database: SIH uses a central database named HARMONIE. It is used for storage, Quality Assurance, validation, aggregation, anonymisation, processing, statistics etc., and also for providing data to end users.

The current objective is to compile all available data from Ifremer, IRD and the Muséum national d'Histoire naturelle in the Ifremer Harmonie database used by the SIH, so that all data is already in a single system and format, ready for data calls. Data would be harmonised using the ICES RDBES data standard, which includes metadata on methodologies, campaigns, processing etc.

There is also work on harmonising sampling plans, data collection protocols, Quality Assurance methods, estimation and processing etc.

Harmonie and the related software etc are mostly developed and maintained in-house (DSI, Direction des services informatiques), with software development partly outsourced to external contractors, based on Ifremer specs.

Data calls: Ifremer is usually in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the caller (DPMA, ICES, ICCAT). There is a good collaboration with the Atlas of European Tuna fisheries[15] maintained by IRD to compile all tropical tuna fisheries data (which are not collected by Ifremer). In the case of IOTC, IRD is in charge of compiling requested data.

15 https://sirs.agrocampus-ouest.fr/atlas_thonV5-DEC/index.php?atl_version=0&idlang=uk

3.1.4 Reporting to regional/international organizations

DPMA does not report statistics *per se* to the European Commission but provides an Annual Report on the implementation of DCF through the Work Plan (2017-2019, 2020-2021).

DPMA reports statistics related to data calls from EC, ICES, RFBs (WECAFC, SIOFA) and RFMOs (ICCAT, IOTC, GFCM).

The Service de la statistique et de la prospective (SSP) sends statistics to Eurostat and FAO, with disaggregation per OR.

Ifremer and IRD both contribute biological data directly to dedicated regional working groups (e.g. WECAFC shrimp and groundfish working groups) to which the EU is a participant.

3.2 Scientific advice

Ifremer and IRD play a central role in the production of national scientific advice. Such advice is either requested by local authorities such as Direction de la Mer (DM) or by central French authorities such as Direction de la Pêche Marine et de l'Aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation.

As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests. However, access to actual SIH datasets is only granted on request, including for internal users.

- Internal users: if granted, they have access to raw datasets. In some cases, SIH staff prepares datasets for internal users (e.g. users who do not need and/or could not use raw data). VMS data is a specific case where access is given after very careful review of the request.
- External users: if granted, they have only access to prepared datasets, properly aggregated and anonymised.

All requests (including access to data or data calls) are reviewed by a dedicated structured, called CREDO (Cellule de Réponse aux appels de Données).

The review process includes:

- Determining who would prepare/provide the data within Ifremer.
- Who will use the data and for what.

The review process depends on the dataset:

- Ifremer only for less sensitive datasets.
- Ifremer plus DPMA for data such as SACROIS and OBSMER which include business-confidential information. For these there is a quarterly steerco meeting to review requests.

Access to data is mostly free, though Ifremer used to charge when data was requested by private for-profit entities such as engineering bureaus for impact studies. But the administrative overhead linked to charging for such information is so high that now they tend to just provide the data for free.

In the context of the French Government's policy on access to public data (open data), there is global review on the access to data in Harmonie, but this is a complex issue. DPMA mentions that in other areas, such as agricultural data, access is done entirely through an

online tool (Agreste portal). This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data. Overall, Ifremer reviews around 200-300 data requests each year.

Ifremer publishes fisheries data summaries, in the form of PDF fact sheets on given fisheries, métiers etc. Those are published on an annual basis and are accessible to everyone on the Ifremer website. The production of those documents is highly automated based on procedures and scripts stored in the SIH.

Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (such as working parties and scientific committee) to which France participates through the EU. ICCAT share aggregated data with the public and share fine grained data with their Working Parties according to their data confidentiality policy. They can also grant access on request for fine grained data to external scientists etc, subject to approval by the Members. RFMOs provide scientific advice based on the work of their scientific working groups and through their Scientific Committee. This scientific advice is made available to the general public on the respective RFMO websites.

3.3 Research institutions

Aside from Ifremer, there are no research institutions in French Guiana involved in fisheries.

3.4 Monitoring, control and surveillance

3.4.1 MCS workflow

The Control regulation mandates information requirements for fishers. These are received in paper form for smaller vessels (<12 m) by the local Sea directorates, then transferred to FranceAgriMer for data entry. There is an electronic data flow in place for larger vessels (≥12 m). All data then goes into the SIH (including VMS and sales).

The Préfet de region has the authority to adopt local regulatory measures applying to French vessels and territorial waters (sovereignty). But measures applied to the EEZ or high seas need to be proposed as new measures or amendments to STECF.

At the local level, DMSOI and the Préfet are in charge of regulation implementation and enforcement. Control is coordinated by DGPM through a 2-year sub-national fisheries control plan: each unit have their own objectives (Navy, Customs, Gendarmerie maritime, Littoral Unit of the Affaires maritimes). MCS activities are part of a National Biannual plan, which includes declinations at the local level. At the level of RFMOs, control is enforced by Member States, but the RFMO body in charge of Compliance can identify Members that are not compliant and ask them to remedy the situation.

3.4.2 MCS data for scientific purposes

Ifremer obtains administrative and control data from DPMA's SIPA (Système d'information de la pêche et de l'aquaculture)[16], such as vessel registration & characteristics, VMS data. In addition, IRD receive VMS data on longline fishing vessels to do cross checks on observer data/self-sampling (activities).

Specifically in French Guiana, control data are not shared with scientists, as there is no local mandate for doing this sort of research. The only MCS data Ifremer has access to is

[16] http://www.sipa.agriculture.gouv.fr

VMS data from shrimp and red snapper fishing vessels. However, there is a project to follow the evolution of fishing grounds used for such fisheries (in terms of depth) and to crosscheck with campaign data as they want to cross-check the VMS data from the Venezuelan vessels with data from fishery research campaigns (such as hiring one of those vessels to do experimental fishing and figure out what size of fish is captured where etc.). The23veralll aim is to manage to produce standardised CPUE for both shrimp and red snapper fisheries.

3.5 Institutional capacity

3.5.1 National level

DPMA considers that the major factor hampering work of Ifremer is a lack of human resources. In particular are the lack of local staff in the ORs, including fisheries experts in the field. Although monies can be obtained through EMFF, this does not cover hiring long term staff.

The objective of DPMA is to include under DCF all activities that should be part of regular data collection. In most cases, Ifremer and IRD implement all the activities themselves, but in French Guiana some work is undertaken by a private contractor.

Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which had not been planned/budgeted. Often requests passed by DPMA through official request to Ifremer take priority, which can impact routine and project work (IRD personal communication, 2020). Recruitment within IRD is an issue too, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed (IRD personal communication, 2020).

There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge). Contracts are currently on a 3-year basis, but the next ones will be for 4 years.

3.5.2 French Guiana

Ifremer mentioned that there is a problem of insufficient staff within French Guiana. There are only two Ifremer scientists, including the Research station director and a stock assessment expert. Data collection in the northern territories is handled by a private contractor, as the coast is expansive and fishing activities are very spotty, thus not justifying a full-time position to cover them.

SECTION 3 – KEY FINDINGS

- Data collection in France and its Ors is well structured and there is a national framework in place, with some specificities in Ors depending on the local context.
- At the national level, the main actor is Ifremer, responsible for 90% of data collection, with IRD on tuna fisheries in the Indian Ocean.
- DPMA is pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools: one-stop shop for all fisheries information.
- DPMA provides fisheries statistics to RFMOs, while Ifremer and IRD contribute scientific expertise and advice to both DPMA and RFMOs.
- Access to fisheries data for 3rd parties is free, but on request. This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data as in other agriculture sectors.
- The major hampering factor regarding Ifremer is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF.
- In most cases, Ifremer and IRD implement all the activities themselves, but in specific situations data collection is done by private contractors.
- There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).
- In French Guiana, landings and biological data is collected by Ifremer on most fisheries, though some samplings are done by a local contractor.
- Paper Fishing logbooks are submitted by fishermen directly to DMSOI, then sent to FranceAgrimer for data entry.
- In the Northern territories, data collection is handled for Ifremer by a private contractor, as the coast is expansive and fishing activities are very spotty, thus not justifying a full-time position to cover them.
- Regarding biological sampling, the shrimp fishery is sampled by Ifremer, but other fisheries are not covered for staffing reasons.
- In French Guiana, Ifremer is trying to develop socio-economic indices through surveys.
- Apart from Ifremer, there are no research institutions in French Guiana involved in Fisheries.
- The Préfet de region has the authority to adopt local regulatory measures applying to French vessels and territorial waters (sovereignty).
- Control is coordinated by DGPM through a 2-years Regional (sub-national) fisheries control plan.
- The only MCS data Ifremer has access to is VMS from the commercial fishing vessels, that they try to use to better assess fishing areas and fishing effort.
- Ifremer mentions that there is a problem of insufficient staff.

4 Funding and funding structures for data collection

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member state funding

DPMA provided a description of how the EMFF process works in France.

Top-down:

1. The European Union votes a global envelope for EMFF. It is the result of a political consensus.
2. A national envelope is scaled according to complex rules including different criteria
3. A percentage of this envelope is assigned to data collection (Article 77)

Bottom-up:

At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities (such as for recreational fisheries). A draft of the total budget for DCF data collection is made available.

Final negotiation: this draft is confronted to the DCF percentage available in EMFF for France. Discussions starts again to find the correct balance between priorities. It is a complex exercise with no magic recipe.

EMFF funds 80% of the eligible costs (not all data collection activities are eligible). The remaining 20% is supported by the institution's own budget.

DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. It takes usually 4-5 months to complete the process.

DPMA is also a beneficiary of measures on data collection referred to in Article 77. There are some projects related to data collection outside measures on data collection referred to in Article 77:

- Article 28: scientific partnership;
- Article 39: improvement of gear selectivity;
- Article 40: large marine ecosystem knowledge (to be confirmed); and
- Article 76 : MCS funding.

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.

Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French *Cours Des Comptes*. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

France received under the EMFF 2014-2020 EUR 588 million. In this respect, the EMFF Operational Programme for France 2014FR14MFOP001 (DPMA, 2019) described the proposed use of EMFF by France, including OR:

- Union Priority 1 (UP1): EUR 150.9 million (25.7% of total EMFF allocation) will aim at a better balance fisheries activities and environmental protection and sustainability. It will address (among others) fleet capacity by adjusting fleet capacity to resources, modernisation of the fleet, investments in port infrastructures in line with requirements under the discards ban, and improving traceability of fisheries products and processing.
- Union Priority 2 (UP2): EUR 88.8 million (15.1% of EMFF allocation) will go towards meeting the objectives of the French national strategic plan for aquaculture that aims at boosting competitiveness and sustainability of the French aquaculture sector.
- Union Priority 3 (UP3): EUR 122.3 million (20.8% of EMFF allocation) will go towards compliance with CFP rules regarding control and data collection. This include Article 77 of interest to this study: total budget in the programme is EUR 66 146 872. This is the main source of EMFF funding for DCF data collection at the national and OR level.
- Union Priority 4 (UP4): EUR 22.6 million (3.8% of EMFF allocation) will help ensure better territorial cohesion of fisheries and aquaculture. Foreseen activities include maintaining and creating new jobs, reinforcing the position of fisheries and aquaculture within the development of coastal territories, strengthening the FLAGs network, and increasing added value through innovative projects and research.
- Union Priority 5 (UP5): EUR 163.2 million (27.8% of EMFF allocation) will go towards improving the marketing, diversification and valorisation of seafood products. The French OP gives a central role to producer organisations (PO) that currently place almost 50% of the French production on the market, through the implementation of production and marketing plans and the reinforcement of POs across its territory (both mainland and outermost regions). Please note compensation for additional costs for seafood marketing etc in the six French ORs has more than doubled compared to the 2007-2013 period.
- Union Priority 6 (UP6): EUR 5.3 million (0.9% of EMFF allocation) will go towards strengthening the efficiency of maritime surveillance and widening the network of marine protected areas and improving knowledge on the marine environment and interactions with human activities.
- EUR 34.8 million (5.5% of EMFF allocation) are allocated to technical assistance in order to reinforce the implementation system, ensure efficient administration of the EU funding, including support to reducing burden on beneficiaries, improving administration and publicity and information measures.

Financial information:

- Total OP budget: EUR 774 353 018
- Total EU contribution: EUR 587 980 173, including EUR 66 146 872 for DCF
- Total national contribution: EUR 186 372 845

EMFF is operationally managed by DPMA. Some of the fund management is delegated to sub-national level (*Régions*).

4.1.2 OR funding

No specific budget has been proposed by the EMFF operational programme for French ORs. Nonetheless, use of EMFF funds in the OR can be extracted from France's financial report (Liste des opérations du programme national FEAMP 2014-2020, 2019). Total use of EMFF funds in French Guiana has been EUR 23 183 387 (as of December 2019), with 100% for cost compensation (Article 70), and no specific direct funding for data collection (Article 77).

4.2 Other sources of funding

Ifremer has a total annual budget in 2017 of EUR 194.4 million (Cours des Comptes17, 2019); with the following breakdown: (i) EUR 154.4 million directly supported by the national budget (subsidies for public services support), and (ii) approximately EUR 40 million from contracts and projects; the EUR 40 million includes support from EMFF.

EMFF reimburses 80% of eligible expense, which usually corresponds to 60% of the expenses. The remaining 40% are covered by Ifremer national budget. The other source of funding is France's regular national budget, which can provide funds under various mechanisms:

- Grant agreement with Ifremer and IRD
- "*Convention socle halieutique*" with Ifremer : used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan, and
- Triannual agreement with IRD

IRD mentioned that funding can be allocated by DG MARE and/or CINEA (formerly EASME) to specific projects for field data collection or meta-analysis. Several examples in recent years include (though these are not specific to French Guiana):

- Scientific advice on shark management in RFMOs: data exploration and retrieval and analysis (3 years)
- Shark management in Atlantic about key species (18 month)
- RECOLAP: evaluation of implementation of Electronic Monitoring Systems (EMS) in small longliners (only Réunion)
- Meta analysis of CMMs in longline fisheries in Atlantic about hook shapes etc, and
- Pilot study under EU MAP 2017-2019 and 2020-2021 funded by DCF on whitetip ban on retention -> survival rate post release in purse seine and longline fisheries in the Indian Ocean. POREMO

4.3 OR funding for data collection

Given the centralization of the data collection programme in Ifremer with a global support from SIH in Brest (Bretagne, France Metropolitan), funds for Article 77 are managed and engaged at the national level. These are then managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and the ORs, including sub-contracting with external vendors for data collection in some ORs. The already cited "*Liste des opérations du programme national FEAMP 2014-2020, 2019*" provides the detail for EMFF activities under Article 77.

17 Cours des comptes = Account court, the French National Institution in charge of controlling National Accounts.

Table 11: EMFF funds received by the various French institutions under Article 77.

Institution	Total eligible funds (EUR)	Total funding received (EUR)
Agence Des Aires Marines Protegees	293 416.05	234 732.84
Agence Francaise Pour La Biodiversite	914 730.00	731 784.00
Franceagrimer	44 961.90	35 969.52
Ifremer	41 517 440.00	33 213 492.00
Inra	1 025 238.00	820 190.00
IRD - Institut De Recherche Pour Le Developpement	9 628 639.00	7 702 911.00
Ministere De L'agriculture De L'alimentation Maa	9 670 201.00	7 736 160.00
Museum National D'histoire Naturelle	1 084 263.00	756 113.00
Universite De Nantes	3 049 192.00	2 439 353.00

There is no specific EMFF funding request for Ifremer data collection under DCF for each OR, but Ifremer provided a breakdown for expenses engaged specifically in each of the ORs for the period 2017-2018. For French Guiana, between EUR 180 000 and EUR 270 000 have been used for routine data collection over the last 3 years.

Table 12: Expenditures incurred (EUR) by Ifremer for data collection in French Guiana.

Type of Data	2017	2018	2019
Biological data	EUR 12 913	EUR 27 751	EUR 27 877
Economic data	EUR 0	EUR 0	EUR 7 194
Effort and landings data	EUR 170 269	EUR 243 974	EUR 236 507
Grand total	EUR 183 182	EUR 271 725	EUR 271 578

There exist some alternative sources of funding outside of the EMFF, for activities not covered under DCF. Regarding Ifremer, there are two main sources:

- Convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer beyond the DCF (Ifremer proposes actions, DPMA funds them). There is less and less activities under this line, as more and more is getting covered by the DCF. For years, the remaining 20% of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining include SACROIS and the data access portal.
- DCSMM: partnership with OFB/Marine parks to provide tools & services. In French Guiana, data is collected following SIH protocols and entered/stored using SIH tools. In other ORs, there is no data collection activities but Ifremer provides

summary data for marine parks and Natura 2000 areas, under a pluriannual data provision convention (latest from 2019).

In French Guiana specifically, Ifremer indicated that, in 2021/2022, AFD is going to fund a short-term position to evaluate some biological parameters (length-weight relationships, sex-ratio, gonads etc.).

SECTION 4 - KEY FINDINGS

- EMFF funding process is highly centralised in France: DPMA is the single EMFF management authority.
- At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities.
- There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.
- France received for EMFF 2014-2020 a total of EUR 588 million.
- Early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities.
- Total use of EMFF funds in French Guiana: EUR 23 183 387 (as of December 2019), with 100% for cost compensation (Article 70), and no specific direct funding for data collection (Article 77).
- For French Guiana, between EUR 180 000 and EUR 270 000 have been used by Ifremer (from their global EMFF Article 77 budget line) for routine data collection over the last 3 years.
- In French Guiana specifically, Ifremer indicated that, in 2021/2022, AFD is going to fund a short-term position to evaluate some biological parameters (length-weight relationships, sex-ratio, gonads etc.).
- Other sources of funding for data collection come from the national budget, through grant agreements, conventions etc. DG MARE and EASME can also contribute to funding specific projects or research activities.

5 Current state of data collection and other reporting obligations

Ifremer mentioned the convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer not covered under the DCF (i.e. Ifremer proposes actions, DPMA funds them). There are less and less activities under this line, as more and more are being funded within the DCF. For years, the remaining 20% of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining that are not funded by the DCF include SACROIS, data access portal. According to IRD, coverage is relatively good.

5.1 DCF data obligations

DCF obligations as per Commission Delegated Decision (EU) 2019/910 (EU, 2019) are detailed in Chapter III Data Requirements: Section III.2. lists requirements related to **biological data** on stocks caught by Union commercial fisheries in Union and outside Union waters and by recreational fisheries in Union waters:

a) *Catch quantities by species and biological data from individual specimens enabling the estimation of:*
   i. *For commercial fisheries, volume and length frequency of all catch fractions (including discards and unwanted catches) for the stocks listed in Tables 1A, 1B* (Table 13, below) *and 1C* (Table 14, below), *reported at the aggregation level 6 as set out in Table 2. The temporal resolution shall be coordinated at marine region level based on end-user needs;*
   ii. *For commercial fisheries, mean-weight and age distribution of catches of the stocks listed in Table 1A, 1B and 1C. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*
   iii. *For commercial fisheries, sex-ratio, maturity and fecundity data for stocks listed in Tables 1A, 1B and 1C of catches at frequencies needed for scientific advice. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*
   iv. *For recreational fisheries, annual volume (numbers and weights or length) of catches and releases for the species listed in Table 3 and/or the species identified at marine region level as needed for fisheries management purposes End user needs for age or other biological data as specified in paragraphs (i)-(iii) shall be evaluated for recreational fisheries at marine region level.*

Table 13 (listed as 'Table 1B' in the regulation) gives the list of stocks that are specifically to be reported for French Guiana under the DCF.

Table 13: DCF Table 1B list of stocks that are specifically to be reported for French Guiana.

List of stocks as per Table 1B	2017-2019 France Workplan	2020-2021 France Workplan
Red snapper (*Lutjanus purpureus*)	Yes	Yes
Prawns (*Farfantepenaeus subtilis*)	Yes	Yes
Acoupa weakfish (*Cynoscion acoupa*)	Yes	Yes

List of stocks as per Table 1B	2017-2019 France Workplan	2020-2021 France Workplan
Smalltooth weakfish (*Cynoscion steindachneri*)	No	No
Green weakfish (*Cynoscion virescens*)	Yes	Yes
Sea catfishes (*Ariidae*)	No	No
Tripletail (*Lobotes* surinamensis)	No	No
Torroto grunt (*Genyatremus luteus*)	No	No
Snooks (*Centropomus spp.*)	No	No
Groupers (*Serranidae*)	No	No
Mullets (*Mugil spp.*)	No	No

Both France work plans for data collection in the fisheries and aquaculture sectors for 2017-2019[18] and 2020-2021[19] refer to method of data collection through sample based surveys (Text Box 4A in 2020-2021 workplan for instance). Table 13 shows that, of the 11 stocks to be specifically included under DCF in French Guiana, 7 of them are not included in the French workplan, but analysis of the catches show that they are all species with catches under 200t, so technically not mandatory to report.

The STECF, in 2020, conducted an analysis of the Work Plans and National Reports submitted by all EU Member States with ORs. Regarding France, it concluded that there was a lack of specific mention of the individual ORs in the work plans and national reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds (see complete STCF19-19 report for more details).

Specifically about French Guiana, the same report concluded:

"*According to the 2019 EU-MAP list, 9 species (22% of the total) were covered representing respectively 92% and 91% of the landings in tons and euros. In terms of species sampled and reported in the 2018 national report, the number of species is lower with 4 species (10%) covered. The samples concerned the shrimp species (Farfantepeneus subtilis) captured by the shrimp trawling fishery, the red snappers (Lutjanus purpureus) captured by the non EU handliners fleet from Venezuela and landed in French Guiana, and the Acoupa (Cynoscion acoupa) and Green weakfish (Cynoscion virescens) catched by the coastal small-scale fleet of drifting netters. Despite a lower number of species sampled than required by the EU-MAP list, the species sampled represent 80% and 82% of the total in weight and value. The provisional species list (provided by EWG 19-12) for future EU-MAP considers 4 species for French Guiana, the shrimp species (Farfantepeneus subtilis), the red snappers (Lutjanus purpureus), the Acoupa weakfish (Cynoscion acoupa) but the Green weakfish (Cynoscion virescens) has been replaced by the Tripletail (Lobotes surinamensis).* "

Table 1C adds to that list the species under RFMO mandates, ICCAT (no species actually captured by French Guiana fisheries) and WECAFC in the case of French Guiana, which

18 https://datacollection.jrc.ec.europa.eu/documents/10213/1131890/France_WorkPlan_2017-2019.pdf/03a63d30-0e32-4289-a839-47c6b914ae44?version=1.1&download=true

19 https://datacollection.jrc.ec.europa.eu/documents/10213/1283898/FRA_WP_2020-2021_text.pdf/3fcdda81-ae34-4238-a3b3-c9602bb3ae5a?version=1.0&download=true

have to be reported specifically for French Guiana (Table 14). The only covered stock (Prawns, *Farfantepenaeus subtilis*) is included in the French workplan

Table 14: DCF Table 1C list of stocks that are under the mandate of an RFMO and to be reported for French Guiana.

List of stocks as per Table 1C	Included in 2017-2019 France Workplan?	Included in 2020-2021 France Workplan?
Prawns (*Farfantepenaeus subtilis*)	Yes	Yes

Regarding chapter III section 2.a.ii and section 2.a.iii on commercial fisheries related to mean-weight and age distribution of catches, limited data are reported. Generally speaking, there is a need for more research on biological parameters to conduct stock assessment except for some large pelagics.

No reporting is done for chapter III section 2.a.iv on recreational fisheries.

The STECF in its 2020 report (op. cit.), concluded that:

"*Before 2018, no data was provided for fleet segments less than 12 meters in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks.*"

Section III.3. lists requirements for Data to assess the impact of Union fisheries on marine ecosystems in Union waters and outside Union waters:

a) For all types of fisheries, incidental bycatch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, including the species listed in Table 1D, including absence in the catch, during scientific observer trips on fishing ships or by the fishers themselves through logbooks.
b) Data to assist in the assessment of the impact of fisheries in Union waters and outside Union waters on marine habitats.
c) Data for estimating the level of fishing and the impact of fishing activities on marine biological resources and on marine ecosystems, such as effects on non-commercial species, predator-prey relationships and natural mortality of fish species in each marine region.

Many of listed species in table 1D are not relevant to French Guiana. The list contains sharks and rays, mammals and crustacean species to be reported for certain areas or for all regions / oceans.

Section III.4. lists requirements for Detailed data on the activity of Union fishing vessels in Union waters and outside Union waters as recorded under Regulation (EC) No 1224/2009. Data to assess the activity of Union fishing vessels in Union waters and outside Union waters consist of the variables as indicated in Table 4.

SIH provides information per métier on vessel activity, such as average vessel size, tonnage and power, as well as total landing and value. Average number of crew is also mentioned. High level information on effort (days at sea for instance) is available, but no detailed information. Compliance to III.4 is considered good.

Section III.5. lists requirements for Social and economic data on fisheries to enable the assessment of the social and economic performance of the Union fisheries sector.

a) Economic variables as indicated in Table 5A according to the sector segmentation of Table 5B and according to the supraregions as defined in Table 5C, and for enterprises making profit.
b) Social variables as indicated in Table 6. Social data shall be collected every three years starting in 2018.

The STECF in its 2020 report (op. cit.), concluded that:

"*Before 2018, no data was provided for fleet segments less than 12 meters in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks*."

5.1.1 Implementation of DCF data collection obligations and potential issues

Data collection for vessel landings is implemented by Ifremer in French Guiana. IRD runs observer programmes in the Indian and Atlantic oceans to complement biological data under DCF obligations. If an observer is on board, there isn't another observer to monitor the landings. Observer data collection includes discards following depredation. For the purse seine fleet within the Indian Ocean and Atlantic, data collection is in logbooks.

Ifremer indicated that shrimp biological sampling is done at processing plants. Red snapper biological sampling is limited to length measurements at landing sites from coastal fishermen (the processing plants buying the catches from Venezuelan vessels are not cooperating with Ifremer), while acoupa weakfish length measurements are done at the landing sites.

Ifremer has started a project (Multifish) to try and collect information on data poor species, mostly weakfishes and sea catfishes. The DM indicated that there are some species for which data is not collected because they are not covered by DCF. It also mentioned that it would like to have more biological data on a number of species, especially on the life cycle, to better be able to assess and manage the stocks.

IRD mentioned that stomach content sampling is not yet included in the DCF, but that it can produce useful information to understand regime shifts, especially in longline and recreative fisheries.

Regarding the new EU-MAP, Ifremer and IRD were consulted on the new DCF species list and mentioned the need to add species of particular interest in the ORs. IRD indicated that, for the Indian and Atlantic Oceans, all new DCF species are covered by the French national data collection scheme.

Ifremer and IRD mentioned that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be extended (see similar recommendation in January 2020 STECF report) so that species important for the ORs can be covered by EMFF.

Regarding French Guiana, the new EU-MAP list adds 3-4 coastal species (such as green acoupa). There are some exploratory samplings in project as there is currently very little data available for stock assessment, but staffing remains an issue.

5.1.2 Additional data collected

IRD mentioned that there might be data collected in anticipation of future requests by RFMOs or DCF, e.g. data on anatomical implantation of hooks had been collected for several years in anticipation of potential measures on hooks (see AZURE project on megafauna release survival in longline fisheries). These activities are launched based on the expertise of scientists, on requests or suggestions from WPs in RFMOs etc.

SECTION 5 - KEY FINDINGS

- Coverage of DCF data collection obligations is mostly good, even if gaps exist on biological sampling in the ORs.
- Of the 11 stocks to be specifically included under DCF in French Guiana, 7 of them are not included in the French workplan, but analysis of the catches show that they are all species with catches under 200 tonnes, so technically not mandatory to report.
- Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be should be extended.
- Regarding French Guiana, the new EU-MAP list adds 3-4 coastal species (such as green acoupa). There are some exploratory samplings in project as there is currently very little data available for stock assessment, but staffing remains an issue.
- There are issues with local processors of shrimps and red snapper, which sometime refuse to allow Ifremer to sample the catches they purchase from fishing boats.
- In 2020, the STECF19-19 reviewed the French DCF data collection in the ORs and made a number of recommendations, including:
    - The absence in the French WP of a section addressing the ORs specifically;
    - The general lack of sampling in the ORs other than collecting length distributions.
    - Severe difficulties encountered in the implementation phase, due to local conditions.
    - Regarding French Guiana specifically, the report concluded that " *Despite a lower number of species sampled than required by the EU-MAP list, the species sampled represent 80% and 82% of the total in weight and value.*".

6 Fisheries management and conservation measures

6.1 Management and conservation measures

6.1.1 National

The regulation of sea fisheries is essentially of a Community or national nature (see Title IX of the Rural and Maritime Fishing Code and the Environment Code for national rules).

Locally, while respecting the Community and national framework, the Préfet can impose additional provisions. Certain decisions of the *Comité regional des pêches maritimes et des élevages marins* (CRPMEM) can be made mandatory.

There are very few provisions specific to French Guiana in terms of the regulation of professional maritime fisheries (Table 15).

Table 15: List of local regulations applicable to French Guiana fisheries

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning management
Article 1 de l'arrêté préfectoral du 21 juillet 1984	1984	Gear/technique	Prohibition	Curtain nets are prohibited	N/A
Arrêté préfectoral 1090 du 5 juillet 1999	1999	Gear/technique Spatial	Limitation	Trawling for shrimp may not be carried out on seabeds of less than 30 m (EU regulation) or below a line defined by this text.	N/A
Décision CRPMEM du 12 mars 2009 et du 30 mars 2016	2016	Gear/technique Species selectivity	Selectivity devices	Shrimp trawls must be equipped with a catch selection device	N/A
Arrêté préfectoral du 6 juillet 2010	2010	Spatial	Designated landing sites	Catches can only be landed in designated sites	Mostly for safety and sanitary reasons.

6.1.2 International

Being an Outermost region of the EU, all EU regulations apply to French Guiana, through their implementation in the French national regulations. In this respect, there are two specific EU management measure that applies to French Guiana, an access agreement with Venezuela, and definition of a yearly TAC for the penaeid shrimp fishery.

In terms of the access agreement with Venezuela, a Council Decision (2012/19/U)[20] allows Venezuelan longliners to fish for red snapper in French Guiana waters. This agreement fixes the number of boats allowed to operate (currently 45) and mandates that 75% of catches must be landed in French Guiana and sold to designated processing companies (currently two).

According to the most recent stock assessments performed by Ifremer on red snapper, the current management measure for that stock (a limitation of the number of boats allowed to fish), is not adequate to properly manage the stock. Indeed, the stock is subject to growth overfishing due to the nature of the fishery, targeting a relatively limited body size (i.e. juveniles). According to Ifremer, consideration could be given to setting a fishing effort ceiling (total number of days at sea) and/or a Total Allowable Catch (TAC) (tonnage), which has successfully been accomplished in the south Atlantic. This would entail an opening between July and December, and an annual quota (number of fish and weight). In addition, the adoption of regulatory tools to reduce fishing mortality on juveniles, such as a change in selectivity with larger hook sizes, could also be enacted.

Ifremer nonetheless concludes that the available data for the red snapper are too uncertain to draw conclusions about the state of the stock and the fishery, and therefore recommend more precise quantitative management measures. Potential solutions to remedy the data gaps include scientific studies (survey on possible changes in fishing practices, including an experimental study comparing different hook sizes with fishing success) but also possible changes to the regulations, particularly by increasing the proportion of the catch landed in French Guiana (currently 75%) and/or by imposing size sampling of these catches.

As the EU is a Contracting Party (Member) of the ICCAT and WECAFC, all conservation and management measures adopted by these RFMO apply to French Guiana. Nonetheless, no species covered by ICCAT are fished in this OR, and WECAFC does not adopt binding management and conservation measures.

The second is the definition of a yearly TAC for the penaeid shrimp fishery[21]. The TAC is defined annually on the basis of advice from Ifremer to DPMA on the status of the stock. The last proper regulation in setting the TAC was in 2019. Since then (2020 and 2021), the TAC has been proposed by France to the Commission and renewed, but without regulatory formalisation. Discussions are underway with the Commission to improve this process.

[20] 2012/19/EU: Council Decision of 16 December 2011 on the approval, on behalf of the European Union, of the Declaration on the granting of fishing opportunities in EU waters to fishing vessels flying the flag of the Bolivarian Republic of Venezuela in the exclusive economic zone off the coast of French Guiana (OJ L 6, 10.1.2012, p. 8–9).

21 Council Regulation (EU) 2020/123 of 27 January 2020 fixing for 2020 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters, vol. 025. 2020. Accessed: May 31, 2021. [Online]. Available: http://data.europa.eu/eli/reg/2020/123/oj/en

Table 16: List of international regulations applicable to French Guiana fisheries

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
Council Decision (2011/19/U)	2011	Capacity and effort restrictions	Fishing Effort Control	Limit to the number of boats allowed to fish	Not currently adapted to the stock status, should be revised.
			Territorial Use Rights for Fisheries TURFs	Access agreement with Venezuela	
Council Regulation (EU) 2020/123	Yearly	TAC controls	Total Allowable Catch (TAC).	TAC for the shrimp fishery	TAC based on stock assessments by Ifremer. Ifremer recommends moving towards an adaptive management and more adequate measures such as a limitation of fishing effort

In recent years, Ifremer's assessment concluded that the TAC was probably too high. However, Ifremer mentioned that, due to the significant reduction in landings in 2018 affecting the proper implementation of the catch sampling plan and the lack of cooperation from some shipowners, a stock assessment couldn't be performed. Ifremer's advice is that an annual TAC alone is probably not the best management measure for a short-lived stock with rapid cyclical dynamics. They propose that in-year reassessment (adaptive management) should be the preferred option. Other management measures, in particular by means of fishing effort, could be envisaged, but would require a very thorough study of the relationship between fishing effort and mortality. Finally, the setting of an alternative management objective to MSY is essential. Furthermore, a fishery-independent study would be required to properly assess the shrimp stock.

6.2 Science and management

In French Guiana, Ifremer organises joint meetings twice a year with all stakeholders (Ifremer, DM, CRPMEM) to discuss fisheries related issues. They are particularly useful to inform and raise awareness amongst the fisherfolk communities on their assessment of the fisheries (e.g. stock assessments) before actually releasing the reports, which works well to avoid negative/adverse reactions. This process has been showing promising results, but Covid-19 has put a stop to it in 2020/2021.

A couple of times a year, Ifremer collects logbooks, vessel register etc data from DM (mostly shrimp and red snapper), allowing Ifremer to cross-check and improve data collected. There is also a collaboration with the processing plants where Ifremer uses their data to cross-check and improve logbook data (weights etc), but that is mostly for the shrimp fisheries.

DPMA or DM address requests for advice to Ifremer on specific issues, and Ifremer produces reports to answer them, which are then used in the decision-taking process.

Ifremer's advice is more and more taken into account, in line with the continuing focus of EU regulations on science-based policymaking. For example, there was a request from local industry (processing plants for which the Venezuelan vessels work) to increase the number of licenses for red snapper by 5 vessels, but, based on the stock assessment, Ifremer advised against it and the DM rejected the request.

There are some ad hoc collaborations with fisheries economists, such as students undertaking PhDs on the economics of the coastal or shrimp fisheries, but nothing routine, so it is difficult to base any policymaking on socio-economic information. Socio-economic needs are investigated biannually during the meetings with the fishermen and the national and regional administrations, to implement scientific projects.

SECTION 6 - KEY FINDINGS

- Relevant EU regulations apply to French Guiana due to its EU OR status.
- There are very few provisions specific to French Guiana in terms of the regulation of professional maritime fisheries.
- All ICCAT and WECAFC theoretically apply to French Guiana, but no species covered by ICCAT are fished in this OR, and WECAFC does not adopt binding management and conservation measures.
- There are two specific EU management measure that apply to French Guiana: an access agreement with Venezuela, which allows Venezuelan longliners to fish for red snapper in French Guiana waters; and the definition of a yearly TAC for the penaeid shrimp fishery.
- According to the most recent red snapper stock assessments performed by Ifremer, the current management measure for that stock, that is a limitation of the number of boats allowed to fish, is not adequate to properly manage that stock.
- The available data are too uncertain to draw conclusions about the state of the red snapper stock and the fishery and therefore to recommend precise quantitative management measures.
- Potential solutions to remedy the red snapper data gaps include scientific studies (survey on possible changes in fishing practices, experimental study comparing different hook sizes) but also possible changes to the regulations, particularly by increasing the proportion of the catch landed in French Guiana (currently 75%) and/or by imposing size sampling of these catches.
- In the shrimp fishery, due to the significant reduction in landings in 2018 affecting the proper implementation of the catch sampling plan and the lack of cooperation from some shipowners, a stock assessment couldn't be performed.
- Ifremer's advice is that an annual TAC alone is probably not the best management measure and that in-year reassessment (adaptive management) seems to be the preferred option. Other management measures, in particular by means of fishing effort, could be envisaged but would require a very thorough study of the relationship between fishing effort and mortality. Finally, the setting of an alternative management objective to MSY is essential.
- Furthermore, a fishery-independent study of the shrimp stock would be required to properly assess the fishery.

7 Shortcomings or obstacles to fisheries management

The following table provides a summary of the main shortcoming or obstacles to sound fisheries management identified through the literature review or interviews with relevant stakeholders. Given the predominance of small scale multi-gear fisheries in French Guiana, the issues identified apply broadly to all metiers and resources.

Table 17: Summary of shortcomings or obstacles to fisheries management

Category	Shortcoming or obstacle
Data collection	There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors.
	There are a number of species important for SSF that are not covered or not covered anymore by DCF EU-MAP and; therefore, the list of species should be extended. This was mentioned in interviews but it was not possible to obtain a list of species no longer covered.
	There is a general lack of sampling other than for size frequency.
	The major hampering factor regarding Ifremer is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF.
	There are issues with local processors of shrimps and red snapper, which sometime refuse to allow Ifremer to sample the catches they purchase from fishing boats.
	There are very few artisanal (coastal) fishing boats that declare their catches, and the data is of very poor quality, so Ifremer relies on sampling at landing by observers.
	Though there are mandatory designated landing sites, catches are landed along the whole coastline, which makes sampling difficult.
	Venezuelan boats do not land the catches from the last trip of the year in French Guiana but in neighbouring countries, so there isn't any data on that last trip.
	There is a general lack of data and/or high uncertainty to conduct proper stock assessments on most of the fisheries.
Funding and resources	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection.
	EMFF funding cannot be used to recruit staff in the relevant French institutions.
	There is a lack of human and financial resources to properly monitor the recreative fisheries.
	There is a lack of Ifremer staff in French Guiana to properly collect biological and socio-economic data and to perform general research activities.
MCS and IUU	IUU fishing is a major issue, with catches roughly estimated to be at least equal to, if not higher than, legal catches.

Category	Shortcoming or obstacle
	Control data are not shared with scientists, as there is no local mandate for doing this sort of research.

Note that the report of the STECF19-19 meeting identified a number of issues with fisheries data collection in the French ORs. Please refer to that report for more details.

8 Recommendations

- Improve knowledge of composition of catch landed by artisanal fisheries.
- Try to apply data-poor assessment methods to key species deemed of local importance and/or subject to high fishing pressure.
- Improve knowledge on IUU fishing.
- Improve human and financial resources allocated to local data collection, to be able to better cover all landings. This might require switching to a model where data collection is done by a 3rd party private contractor.
- Find ways to increase staff and expertise retention.
- Implement research to collect data on the IUU sector.
- Implement monitoring of recreational and sport fisheries.
- Implement collection of socio-economic data.
- To properly assess the shrimp stock, the diagnosis requires a fishery-independent stock assessment study.
- Improve cooperation from local processors of shrimp and red snapper to allow for better sampling of catches by Ifremer.

For reference, here are the main recommendations included in the STECF19-19 report related to Fishery Data Collection in the EUORs.

- Review the future EU-MAP with an OR perspective, namely considering each OR separately;
- Increase share between ORs experts on data collection and on calculation of indicators methodologies - Expert Group(s) on ORs (more transversal between economic, social and biologists);
- DCF Recreational fisheries coverage should be extended, namely in terms of species;
- An assessment of IUU by ORs is fundamental to establish the ecosystem, social and economic impact of fisheries;
- An assessment of recreational fisheries by ORs is fundamental to establish the ecosystem, social and economic impact of fisheries;
- An assessment of the capacities in the different ORs (human and financial resources, facilities, equipment) should be carried out in order to secure the resources necessary to implement the DCF;
- At-sea monitoring should be improved in each ORs including recreational fisheries;
- Increase the number of species sampled, for a least length composition;
- France WP to include ORs specifically;
- French ORs to improve biological sampling;
- France to collect and report economic data by ORs and metiers;
- French ORs need to improve social data collection; and
- Review data and methods dedicated to the assessment of small-scale multi-specific multispecies fisheries on data limited context & test several assessment methods in different ORs and compare results – possibly within an existing WG.

9 Management Strategy Evaluation (DLMtool) of French Guiana Red Snapper Fishery

Management strategy evaluation (MSE) is the process of evaluating the performance of alternative management strategies. Real world experiments in fisheries management are extremely difficult, primarily because two of the most important components of an experiment, replication and control groups, are usually not possible. For this reason, comparison and evaluation of the performance of alternative fisheries management procedures are conducted with computer simulation, with models that are conditioned on the existing knowledge of the target stock dynamics, the characteristics of the fishing fleet, and the existing management framework. With the aid of computer simulation, it is possible to run many hundreds of simulations– each representing a different possible "reality" – and to take into account the uncertainty in knowledge of the stock and fishery (i.e. errors in observation) as well as the uncertainty in future environmental and ecological conditions that are likely to affect the stock dynamics. Through these simulations, users can see the relative impacts of specified management approaches to their fishery decades into the future and choose the approach that best achieves their management objectives.

The DLMtool Toolkit contains an integrated management strategy evaluation function to identify acceptable harvest control rules based on user-specified stock type, fishing fleet, management type, and performance criteria. DLMtool is limited to management procedures (index-based) for data-limited fisheries. The software is not exhaustive, but it is possible to set up an MSE without a significant investment in writing code. Using FLR software package would be preferable, but to our knowledge it does not yet support many data limited methods (see recommendations).

The MSE evaluates management procedures, generates explicit guidance for fisheries managers based on those procedures and evaluates the current data and potential new data collection priorities to improve management.

The following sections evaluate the current red snapper data to set up the MSE components, and then runs the MSE against some selected management procedures to evaluate performance. Some commentary is provided on data needs and management approaches, illustrated by the simulations.

The code chunks set up the model components with parameters and documents them. This is all done in a single file. Data are not recorded in a separate Excel file (except the Fleet object due to a feature of DLMtool). This therefore keeps all information and code in a single RMarkdown file, which encapsulates the entire process and should help with maintenance and sharing the MSE.

9.1 The Red Snapper Fishery

The red snapper fishery in the waters of French Guiana has always been traditionally carried out by foreign fishermen, especially by Venezuelan trollers. They fish with bottom-set hand lines drifting on hard ground within the EEZ.

The EEZ of French Guiana covers an area of 130 000 km^2 (the EEZ of mainland France covers 340 400 km^2). It extends over a rectangle delimited by two lines perpendicular to the coast, to the north-west at the level of the Maroni River and to the south-east at the

level of the Oyapock River, up to a distance of 200 nautical miles (approximately 370 km) from the coast. It comprises a very gently sloping continental shelf (about 1%) over an average width of 150 km, which represents an area of about 50 000 km^2, followed by a steeper continental slope that begins at a depth of 90 m.

Before the creation of the EEZ in Guyana, this fishery was subject to occasional landings in the Caribbean. Prior to the effective application in French Guyana of the "regime for the conservation and management of fisheries resources in the Exclusive Economic Zones (EEZs) of the member states of the European Community" in 1983, the exploitation of snapper was not controlled and there were no statistics available to assess the impact of this fishery on the resources of the plateau. From 1983-1984, the fishery was subject to a management system where only passive gear was authorised through a limited licensing system. The fishery expanded until 1998, after which annual catches declined until 2002 before recovering again to 2006 and seem to have broadly stabilised since then. Apart from the licence, no other controls are applied.

Three fishing techniques have been used to fish for snappers (Caro 2010; Caro and Lampert 2011).

- Trawling was developed in the mid-1970s, but was banned in 1983 due to suspected overfishing.
- Trap fishing remains and is practised essentially by a few Martinican vessels. Their red snapper production represented nearly 10% of the Venezuelan production.
- Demersal hand-line fishing by Venezuelan trollers still accounts for the majority of production, operating under a quota of 45 licences issued each year.

Venezuelan trollers are traditional boats, mostly made of wood, 14 to 19 m long, registered to the ports of Margarita Island in Venezuela. The power of these boats varies for the most part between 150 and 300 kw/h. and they have 11 to 17 crew. The fish is stored in an ice hold.

9.2 Available Information

Since 1985, Ifremer has set up a system for monitoring landings in the snapper fishery by Venezuelan trollers (Charau and Die 2000). The data collection system has two components:

A system of fishing sheets filled in by the trollers, as well as contacts with processors and the Regional Directorate of Maritime Affairs, provide spatialised data on effort and production.

Since 1985, Ifremer has been monitoring and sampling landings by Venezuelan trollers, formerly in the old port of Cayenne and now in the port of Larivot, of three species of snapper, red snapper (*Lutjanus purpureus*), striped snapper (*Lutjanus synagris*) and ti-yeux snapper (*Rhomboplites aurorubens*). The purpose of this sampling is to obtain an estimate of the species composition and size structure of the catch. Red snapper accounts for the vast majority of these landings.

These data are necessary for the stock assessment that is required by Community regulations.

9.2.1 Stock Structure and Species Biology

The proportion of the stock exploited and shared stock with Brazil / Suriname is unknown. The stock is presumed to be a single self-contained population within the French Guiana waters, but it is quite possible that population includes fish in Brazil and/or Suriname waters. No co-operation has been sought with neighbouring countries for the management of this fishery.

There is no direct information on population structure. It is known that size composition changes with depth and location, so snappers will migrate as they age and there is no reason to suppose that this migration does not cross jurisdictional boundaries. Fisheries exist in the neighbouring countries (Suriname and Brazil), and extend over the Brazil-Guianas shelf (Gomes et al. 2012; da Silva et al. 2016; Charauau et al. 2000). Catch data are not available for these countries. The degree to which stocks are shared is unknown, and therefore whether the French Guiana fishery can be treated as a single management unit is uncertain.

The SS3 model (Tagliarolo 2019, 2020) is a single-area stock without separate components. It is unlikely that there is sufficient information (e.g. no tagging data) to construct a spatial model.

Natural mortality, growth, maturity and length weight model parameters are fixed. There is insufficient support in the data to fit these parameters without highly informative priors.

Fish are landed gutted, so direct observations on maturity are unavailable and lengths are estimated. Observations are also unsexed for the same reason, so no sex difference is assumed.

For the growth model, Tagliarolo (2019) used a von Bertalanffy growth form and fixed parameters of \(L_\infty\) = 85 cm and \(K\) = 0.14. This compares to \(L_\infty\) = 105cm and \(K\) = 0.12 used for the previous VPA (Rivot et al. 2000; Baulier et al. 2016). The VPA \(L_\infty\) is higher than that reported in Fishbase which ranges from 85.1 cm to 98.6 cm, although the SS3 is at the lower end of this range. Fishbase reports K estimates from around 0.10 to 0.13 year-1.

For the maturity model, Tagliarolo (2019) used 42.3 cm as the length at 50% maturity and logistic (presumed) slope of -1.0. Fishbase reports 50% maturity ranges from 27 cm to 47 cm, and 32 cm has been used in the past for this fishery (Caro 2010).

Length-weight parameters used are a=1.97E-05, b=2.95455.

Tagliarolo (2019) fixed natural mortality at 0.2 year-1, which is consistent with the growth rate.

Another approach that might provide a reasonable range for natural mortality in this case is to use Beverton–Holt life-history invariants. This is based on the idea that a species' life history will adjust as far as possible to optimise it's reproductive output. This implies that given two out of the three of 1) the growth rate and form, 2) mortality and 3) maturity, the other can be inferred. Growth and maturity can often be observed directly, so natural mortality might be inferred from these.

Based on the proposals of Hordyk et al. (2015) and Prince et al. (2015), natural mortality should be around 0.4 for this species. For a growth rate K=0.14 year-1, length weight

parameter b = 3, and typical size at maturity being 66% \(L_\infty\), the natural mortality should be around 0.22 year-1, not much different to that used. However, the length weight parameter is slightly lower than 3 (2.95) and the size at maturity is closer to 50% \(L_\infty\). The equation used is:

\[M = K*b*(1-L_m/L_\infty)*L_\infty/L_m \]

This can be used to consider the range of parameter inputs, which then implies the range M might take:

K	b	Lm	Linf	M
0.10	2.9	39	85	0.3420513
0.14	2.9	39	85	0.4788718
0.10	3.0	39	85	0.3538462
0.14	3.0	39	85	0.4953846
0.10	2.9	47	85	0.2344681
0.14	2.9	47	85	0.3282553
0.10	3.0	47	85	0.2425532
0.14	3.0	47	85	0.3395745
0.10	2.9	39	92	0.3941026
0.14	2.9	39	92	0.5517436
0.10	3.0	39	92	0.4076923
0.14	3.0	39	92	0.5707692
0.10	2.9	47	92	0.2776596
0.14	2.9	47	92	0.3887234
0.10	3.0	47	92	0.2872340
0.14	3.0	47	92	0.4021277

Natural mortality estimates vary from 0.23 to 0.57 year-1, so the SS3 model used a value just below the lower end of this range. It seems likely that natural mortality may be higher primarily because the size at maturity seems quite low for this species.

9.2.2 Catches and Mortality

The European regulations on the "conservation and management regime for fisheries resources in the EEZ are accompanied by the introduction of a log book system, which is completed and submitted for each trip. Trips are uniquely identified by the vessel name and the landing date. These fishing forms provide spatial information on effort and catches. The logbooks record the zone and depth which indicates the general location of fishing.

The EEZ is divided into 4 zones numbered from 1 to 4. Zones 5 and 6 represent the border areas with Brazil (5) and Suriname (6). The fishers indicate each day of fishing the zone and 10m depth categories in which they operate as well as the number of hours fished and the weight of the catch. The rate of completion of the fishing sheets was over 80% (in 1998). This provides data that can be assumed to be reliable for the years 1988 to 1990 and 1994 to 2008. For reasons inherent in the difficulty of collecting information from professionals, the data for the years 1991 to 1993 were incomplete (Caro 2010).

Reported catches are thought to represent between 70-80% of the true catch (Figure 8). Under European regulations, the granting of a fishing licence in the EEZ requires Venezuelan trollers to land at least 75% of their catches in Cayenne, which must be sold to the only two fish processors in Cayenne (the companies Abchée and Cogumer). However, the Venezuelan fishers have an interest in landing the minimum in Cayenne because they get a higher price in Venezuela and the West Indies. In estimating catches for the stock assessment, it is assumed that the available landings data represent 75% of the catches, so the Venezuelans, after having made 3 or 4 landings in Cayenne as required, a final landing will be made elsewhere and is unrecorded. This is in line with the regulations, but there are currently no means to verify it. Landings by the Guiana shrimp fleet and West Indian pot vessels have also not been recorded (Baulier et al. 2016).

Raising overall catches by a fixed percentage will make little difference to the stock assessment. The model will compensate by inventing production (recruitment) to cover the additional catch. More important are changes in the catch recording, so the percentage changes over time, and in particular the earliest catches may make a significant difference to the perception of current status. Trawlers are reported as taking some catches before being banned in 1983.

Prior to the effective application in French Guyana of the 'regime for the conservation and management of fisheries resources in the Exclusive Economic Zones (EEZs) of the member states of the European Community' in 1983, the exploitation of snapper was not controlled and there were no statistics available to assess the impact of this fishery on the resources of the plateau (Rivot et al. 2000). Caro (2010) stated that trawling was developed in the mid-1970s, but it had been banned since 1983. However, Caro (2010) also stated that "it has undoubtedly led to an over-exploitation of the resource" (translated from original text in French). This was not repeated in subsequent reports and specifically Rivot et al. (2000) stated that there are no statistics available, so the exploitation is unknown. It is likely that there was concern that overfishing was occurring during this period, but it is not clear that the stock became overfished because the period was short. As part of the MSE, these early years trawl need to be included in case they have had a significant impact on the stock status.

Harper et al. (2015) has carried out a reconstruction of historical catches including the Venezuelan snapper fishery. However, the study focuses on bycatch and does not estimate historical catch of snappers as a separate group, so it is not usable for this study.

In summary, the key uncertainties are that only a proportion of catches are reported, although this is likely to exceed 70% of the total catch, and the early catch history is not recorded and uncertain.

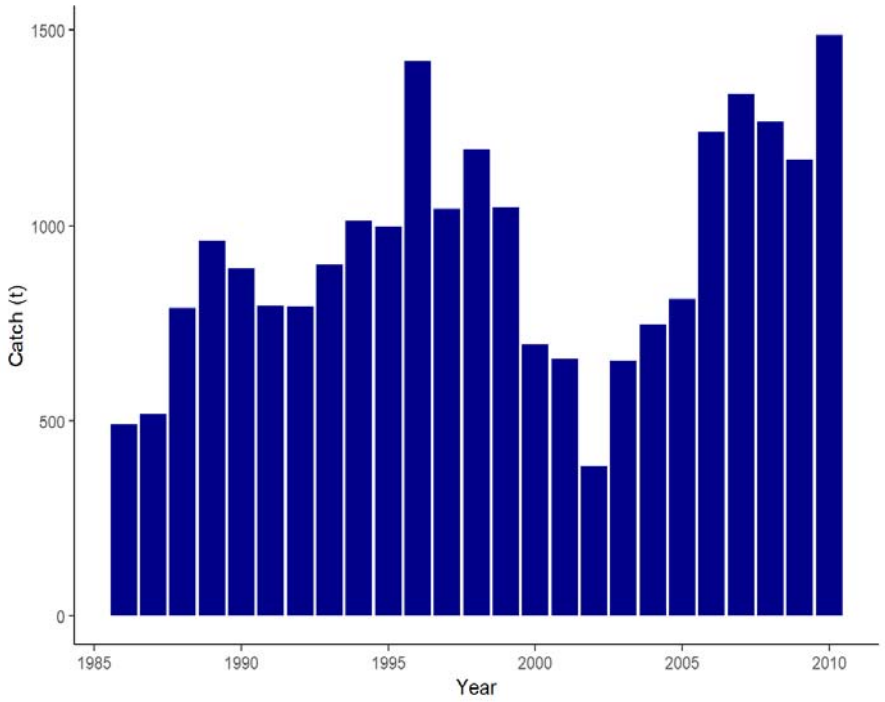


Figure 8: Red snapper annual recorded landings (tonnes)

9.2.3 Catch, Effort and the CPUE Abundance Index

For each fishing trip, the area, the 10 m depth band (20 m to 29 m; 30 m to 39 m, etc.), the fishing effort (in hours for the boat) and the weight caught, as estimated by fishers, are recorded in the fishing logs.

The total annual fishing effort in hours of fishing (Figure 9) has been estimated by cross-checking various sources of information from the fishing forms completed by fishers, data from processors, observation and the experience of Ifremer experts. Since it is estimated that landings represent about 75% of catches, it is also estimated that the recorded fishing effort represents 75% of the real effort. Fishing effort is unevenly distributed throughout the EEZ. Over the years, effort has been concentrated in the area off Cayenne (Area 2) and, since 2005, mainly in the 30-60 m depth range (on average 65% of total fishing effort). Excursions outside the EEZ (zones 5 and 6) are rare, but this may be because fishermen avoid reporting them.

The catches per unit of fishing effort in kg per fishing hour has been proposed as an index of abundance because the Venezuelan trollers are of homogeneous size, have the same number of crew and the same number of gear (bottom lines). However, CPUE has not been standardised so the effect of differences, if any, among trollers has not been estimated.

Baulier et al. (2016) did not use the CPUE to tune their VPA because they believed the CPUE was not related abundance. They stated (translated) that "Due to the concentration of the fishery on aggregations of fish and the rapid saturation of the fishing gear used, yields expressed in terms of quantity caught per unit time cannot be considered as reflecting red snapper abundances. They used an arbitrary terminal F to fit the VPA rather than using CPUE to tune it. In contrast, CPUE was used as an abundance index by Tagliarolo (2019, 2020) in the Stock Synthesis model.

The hyperstability suggested by Baulier et al. (2016) does not appear to be consistent with the observed mean CPUE which has changed significantly through the monitoring period. Baulier et al. (2016) also do not give a precise testable assessment of how the hyperstability would work. The hand lines used are effectively active gears with fishers able to actively move and search for fish. It would still be likely that CPUE reflects abundance, although fish aggregations may distort the relationship and it is quite possible that the relationship between stock size and CPUE is non-linear. So, the concerns raised by Baulier et al. (2016) are probably valid, but insufficient to lead to a rejection of CPUE as an abundance index.

The main fishing area of good production (corresponding to CPUE ≥ 20 kg / h.boat) is well distributed over the entire width of the EEZ ranging from 30 m to 130 m, suggesting in turn that the abundance of snapper is also well distributed over the entire area, predominantly at depths greater than 30 m.

Before 1994, the CPUE was relatively stable, followed by a fall from 1994 to 2002, and subsequent recovery (Figure 10). The decline in CPUE was during a period of increased fishing effort 1996-2000.

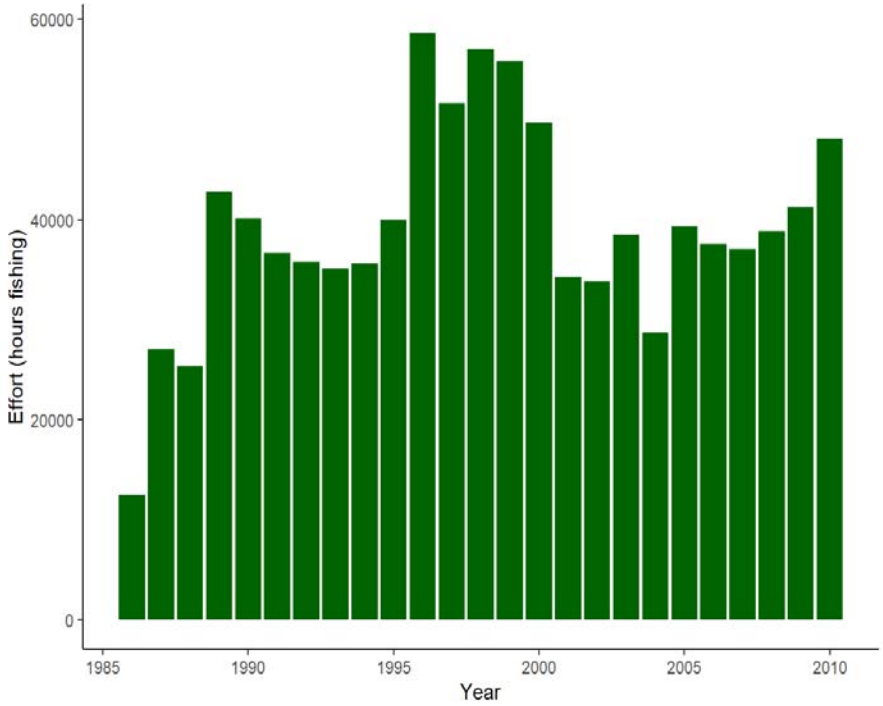


Figure 9: Red snapper annual recorded effort (hours fishing)

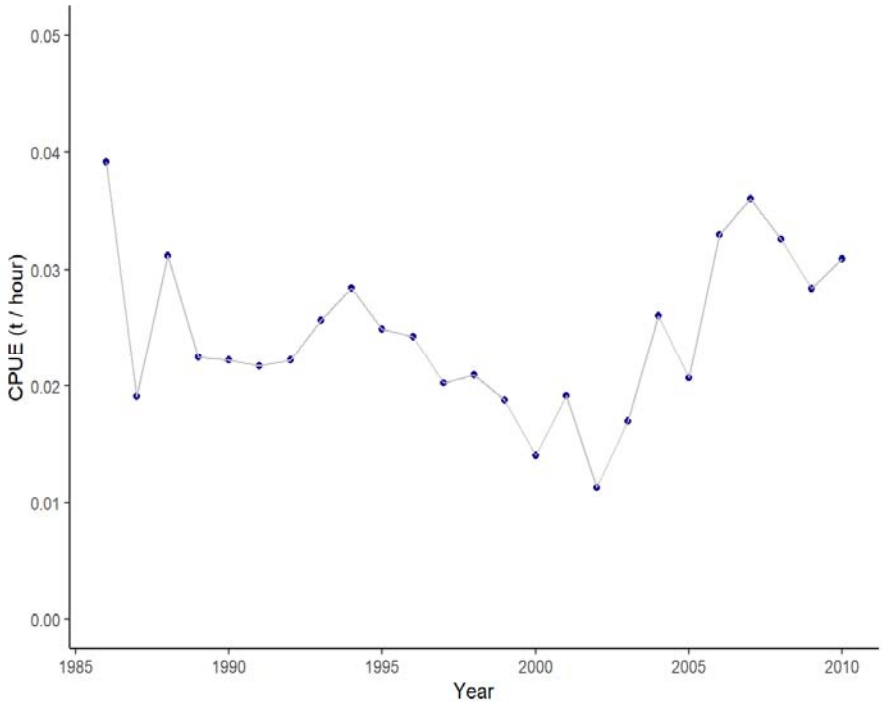


Figure 10: Red snapper catch-per-unit-effort (tonnes / hour fishing) based on the reported values in the log books.

9.2.4 Length & Selectivity

For each boats sampled, a sample of the landings is taken to estimate the length composition by 1 cm class (defined as lower bound). This gives rise to the annual length frequency data (Figure 11) used in the stock assessment.

The selectivity change is clearer if the years are grouped as suggested by Caro (2010) into periods when mean length was more stable. Caro (2010) reported that the decline in size occurred over several short periods, approximated by:

- From 1986 to 1991, the fishery was stable with an average size of red snapper caught of around 45 cm;
- From 1992 to 1998, a collapse in average landed size to 35 cm in 1998;
- From 1999 to 2002, stabilisation of the fishery at around 35 cm average size;
- From 2002 to 2003, a further fall in average sizes, less pronounced than the previous one; and
- From 2004 to 2008, stabilisation of the fishery at around 33 cm average size of red snapper caught.

From this, four selectivity periods were identified that capture most of this change: 1986-91, 1992-98, 1999-03, 2004-20 (Figure 12).

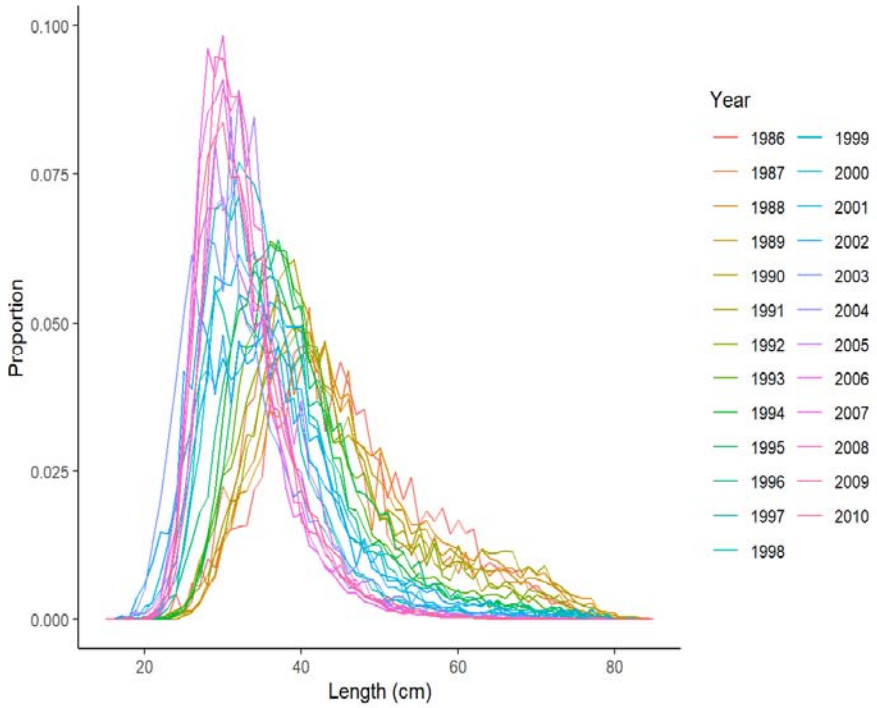


Figure 11: Red snapper length composition data.

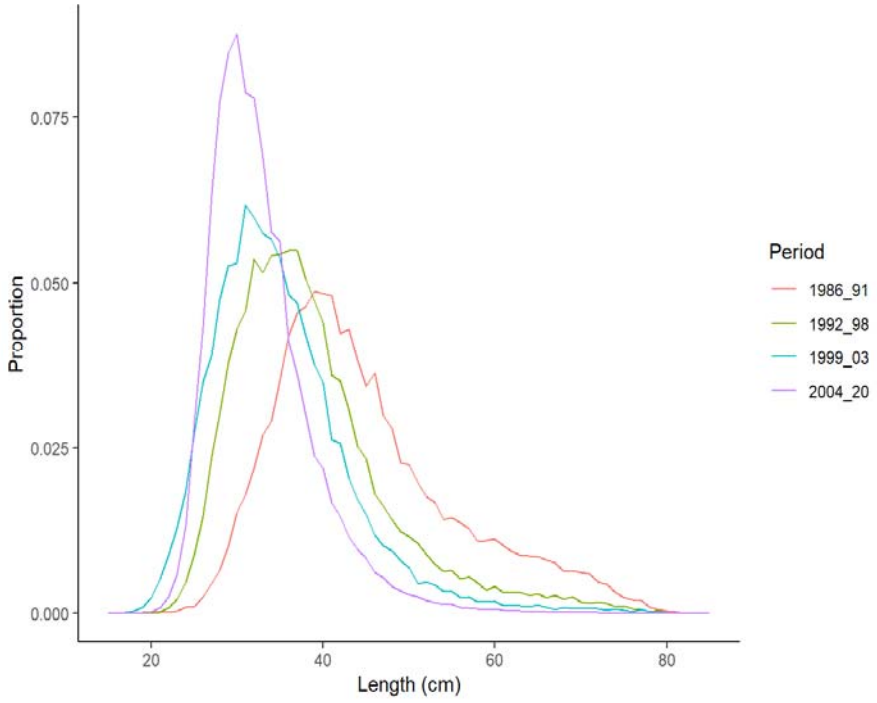


Figure 12: Red snapper length composition data grouped into four periods.

There is clear evidence that selectivity has changed. The fish being caught are much smaller at the end of the series than the beginning and this is due to a shift in the length frequencies from larger to smaller fish. This can be explained by selectivity change because the left side of the length frequency shifts towards small fish and/or the reduction of larger

fish on the right-hand side may also be explained by depletion. It is difficult to separate these effects with any confidence.

For the MSE the selectivity is defined by three parameters representing 5% and full selectivity and the relative selectivity at the maximum length. DLMtool appears to implement these as linear changes over length, which, therefore, is only an approximation to the real selectivity. Real selectivity is likely to exhibit smoother changes. For the current purpose, the DLMtool implementation error will not be significant.

The selectivity can be estimated allowing for the likely range of underlying mortality using the available length frequency data (Figure 13). This is fitted as a double-sided normal (as used in SS3 and in DLMtool) assuming a range of fixed total mortality so these ranges of selectivity can be used in the MSE. The mortality range used is 1-2 times the natural mortality. Because selectivity causes fishing mortality to decline, 2 times natural mortality will likely overestimate mortality. Clearly, this could be improved if the mortality took into account the selectivity.

For the initial trawl data, a logistic type selectivity is assumed with close to knife-edge selectivity between 20 cm and 30 cm. There is no evidence to support this, but a logistic curve is precautionary and it is likely any trawl would include smaller fish.

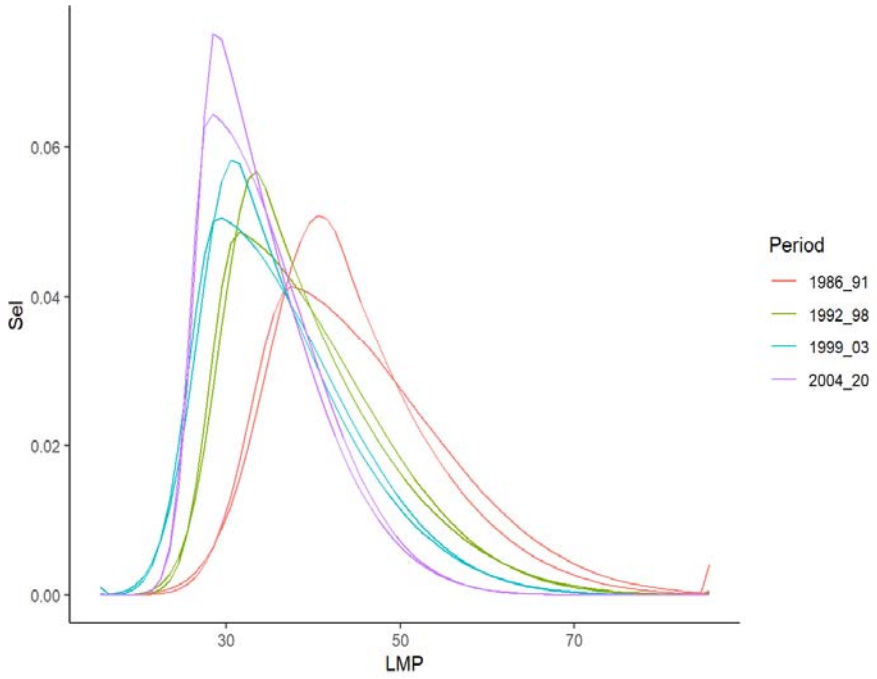


Figure 13: Red snapper high/low selectivity patterns for each period for use in MSE.

9.3 Operating Model (OM)

The OM is built from four separate components, each containing a set of parameter values for different aspects of the simulation:

- Fleet - parameters describing the fishing fleet dynamics;
- Obs (Observation) - parameters describing the observation processes (how the observed fishery data is generated from the simulated data);

- Imp (Implementation) - parameters describing the management implementation (how well the management regulations are implemented); and
- Stock - parameters describing the stock dynamics.

These objects are built within this document, and do not refer to any external data file (except the workaround for the selectivity "feature" in DLMtool - see below).

DLMtool tries to avoid requiring absolute numbers (effort, catch etc.), as it is assumed in most data limited fisheries this is missing. Most information is therefore supplied in the form of relative change. These parameters can still be calculated from real data, where such data are available, as has been done above, which is clearly preferable.

The time step is one year. All parameters in the simulation are provided with ranges. Random draws are made from these ranges using a default uniform distribution. Using the uniform is not ideal, and this could be improved by providing parameter arrays. However, in terms of general patterns, this is not likely to make much difference.

The model describes the historical fishing in terms of effort and catches. No spatial information is used, although some is available from the fishery and could be included in the DLMtool model. However, some spatial changes may be attributed to changes in selectivity. The DLMtool assumes separate sub-populations with some exchange rather than heterogeneous size-specific distribution. However, as has been noted previously (Caro and Lampert 2011), the areas where fishing effort is concentrated do not correspond to areas of concentration of the snapper biomass, which is more evenly distributed over the whole of the Guiana plateau. This implies local depletion could be a factor in the abundance index as well as the size composition.

9.3.1 Fleet Model

The fleet object is constructed around the main known changes in the fishery. This reflects the main selectivity changes indicated above and fishing effort changes.

The drop in catch sizes may reflect a change in the fishing strategy of the Venezuelans, who catch smaller individuals because they frequent areas further west and shallower, and therefore further from the Brazilian border where the larger individuals are caught. The strategy may serve two purposes. Firstly, the market appears to demand the smaller fish for the restaurant trade (each fish is the right size for a single portion) and secondly, the decreasing abundance favours vessels targeting smaller fish which have a higher abundance.

It is also possible that spatial distribution of size has changed. For example, it has been suggested that there has been earlier migration of small individuals from mudflats to reefs due to the depletion of reef population by the fisheries. This effect, however, is accounted for by the change in selectivity that has been estimated.

No significant modification of the hooks for smaller sizes was reported during the main selectivity change (size between n°5 and n°7 used to 2010; Caro and Lampert 2011), although this is being reconsidered as an effect (STECF 2020).

It is assumed there is no discarding, so retention is 100%.

In terms of the history of exploitation, the actual effort is used as a proxy for fishing mortality 1986-2010. However, as noted above, trawling took place from 1975-1983, but it is not known how much. It was considered unsustainable and the practice was banned. Tagliarolo (2020) assumed catches were low 1975-1985 compared to later years and there is nothing to suggest that this was not the case. However, for the MSE a wider range of initial exploitation levels can be explored, in this case 10-100% of the maximum observed effort equivalent.

Parameter	Value	Comment
Name	Venezuela Fleet	Object name
nyears	35	Years of fleet development: Default
Spat_targ	1.00 1.00	Distribution of fishing in relation to spatial biomass: fishing distribution is proportional to B^Spat_targ. : Default
EffYears	0.00 0.23 0.26 0.31 0.34 0.37 0.40 0.43 0.46 0.49 0.51 0.54 0.57 0.60 0.63 0.66 0.69 0.71 0.74 0.77 0.80 0.83 0.86 0.89 0.91 0.94 0.97 1.00	Years representing join-points (vertices) of time-varying effort 0-1.
EffLower	0.00 0.10 0.27 0.27 0.58 0.54 0.91 0.86 0.78 0.76 0.75 0.76 0.85 1.25 1.10 1.22 1.19 1.06 0.73 0.72 0.82 0.61 0.84 0.80 0.79 0.83 0.88 1.03	Lower bound on relative effort corresponding to EffYears
EffUpper	0.00 1.43 0.31 0.31 0.66 0.62 1.04 0.98 0.90 0.87 0.86 0.87 0.98 1.43 1.26 1.39 1.36 1.21 0.84 0.83 0.94 0.70 0.96 0.92 0.90 0.95 1.01 1.17	Upper bound on relative effort corresponding to EffYears
Esd	0.10 0.40	Additional inter-annual variability in fishing mortality rate: Default value
qinc	0.00 1.00	Average percentage change in fishing efficiency going forward: Default is 0-2, set low 0-1
qcv	0.10 0.30	Interannual variability in q: Default
L5	-9999.00 -9999.00	Shortest length corresponding to 5 percent vulnerability: Loosely based on length composition data
LFS	-9999.00 -9999.00	Shortest length that is fully vulnerable to fishing: Loosely based on length composition data

Parameter	Value	Comment
Vmaxlen	-9999.00 -9999.00	The vulnerability of fish at Stock@Linf: Limited reduction to 90% is assumed.
isRel	FALSE	Selectivity parameters in units of size-of-maturity (or absolute eg cm): Default value
SelYears	0 8 17 24 29	Years representing join-points (vertices) at which historical selectivity pattern changes
AbsSelYears	1975 1983 1992 1999 2004	Calendar years corresponding with SelYears (eg 1951, not 1), used for plotting only
L5Lower	15.00 26.93 24.23 21.36 23.14	Lower bound of L5 (set by ChooseSelect function): Not used
L5Upper	20.00 29.10 24.93 22.24 23.63	Upper bound of L5 (set by ChooseSelect function): Not used
LFSLower	25.00 37.72 31.35 29.17 28.09	Lower bound of LFS (set by ChooseSelect function): Not used
LFSUpper	30.00 43.46 34.31 31.86 29.24	Upper bound of LFS (set by ChooseSelect function): Not used
VmaxLower	0.95 0.00 0.00 0.00 0.00	Lower bound of Vmaxlen (set by ChooseSelect function): Not used
VmaxUpper	1.00 0.53 0.18 0.03 0.00	Upper bound of Vmaxlen (set by ChooseSelect function): Not used
CurrentYr	2010	Final year of the historical simulations

9.3.2 Code

9.3.3 Observation Model

There is operating model component that controls the observation model. This describes the outcome from the data collection and estimation activities, and in particular how representative and accurate these observations might be. In almost all cases, the default DLMtool errors are assumed.

Most of these parameters are not used because the data are not collected or estimated. Important parameters are those related to catch (Cobs, Cbiascv), the abundance index (Iobs, beta) and catch-at-length (CAL_nsamp, CAL_ESS). Although age observations are not made, it is possible to pretend that they are in the simulation so that the potential value of these data can be evaluated.

Length composition and CPUE data does exist, and therefore it might be possible to provide real estimates of variance for these observations from the recent stock assessment, for example. This has not been done yet.

Parameter	Value	Comment
Name	Venezuela snapper Observations	Object name
Cobs	0.20 0.60	Log-normal catch observation error as a coefficient of variation: Default
Cbiascv	0.05 0.05	Log-normal coefficient of variation controlling the sampling of bias in catch observations for each simulation: Default
CAA_nsamp	50.00 100.00	Number of catch-at-age observation per time step: Default value
CAA_ESS	10.00 20.00	Effective sample size of the multinomial catch-at-age observation error model: Default value
CAL_nsamp	50.00 100.00	Number of catch-at-length observation per time step: Default value
CAL_ESS	10.00 20.00	Effective sample size of the multinomial catch-at-length observation error model: Default value
Iobs	0.10 0.40	Observation error in the relative abundance indices expressed as a coefficient of variation: Range based on CV from the standardisation mean as close to the lower value of the CV range.
Ibiascv	0.20 0.20	Not Used. Log-normal CV controlling error in observations of relative abundance index: Default
Btobs	0.20 0.50	Log-normal coefficient of variation controlling error in observations of current stock biomass among years: Default
Btbiascv	0.33 3.00	Uniform-log bounds for sampling persistent bias in current stock biomass: Default
beta	0.67 1.00	A parameter controlling hyperstability/hyperdepletion where values below 1 lead to hyperstability (an index that decreases slower than true abundance) and values above 1 lead to hyperdepletion (an index that decreases more rapidly than true abundance): A lower value <1 should be more precautionary.

Parameter	Value	Comment
LenMbiascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in length at 50% maturity: Default value
Mbiascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in observed natural mortality rate: Default
Kbiascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in observed growth parameter K: Default
t0biascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in observed t0: Default
Linfbiascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in observed maximum asymptotic length: Default
LFCbiascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in observed length at first capture: Default
LFSbiascv	0.05 0.05	Log-normal coefficient of variation for sampling persistent bias in length-at-full selection: Default
FMSYbiascv	0.10 0.10	Not used. Log-normal coefficient of variation for sampling persistent bias in FMSY
FMSY_Mbiascv	0.25 0.25	Log-normal coefficient of variation for sampling persistent bias in FMSY/M: Default
BMSY_B0biascv	0.10 0.10	Log-normal coefficient of variation for sampling persistent bias in BMSY relative to unfished: Default
Irefbiascv	0.20 0.20	Log-normal coefficient of variation for sampling persistent bias in relative abundance index at BMSY: Default
Brefbiascv	0.50 0.50	Log-normal coefficient of variation for sampling persistent bias in BMSY: Default
Crefbiascv	0.20 0.20	Log-normal coefficient of variation for sampling persistent bias in MSY: Default
Dbiascv	0.50 0.50	Log-normal coefficient of variation for sampling persistent bias in stock depletion: Default
Dobs	0.05 0.10	Log-normal coefficient of variation controlling error in observations of stock depletion among years: Default

Parameter	Value	Comment
hbiascv	0.20 0.20	Log-normal coefficient of variation for sampling persistent bias in steepness: Default
Recbiascv	0.10 0.30	Log-normal coefficient of variation for sampling persistent bias in recent recruitment strength: Default

9.3.4 Implementation Model

The implementation model specifies the degree of adherence to management recommendations ("Implementation error"). This is assumed in this case to be perfect implementation, so that the days at sea or catches are precisely controlled. These components may need to be updated to more realistic values.

Parameter	Value	Comment
Name	French Guiana Implementation	Object name
TACFrac	1.00 1.00	Mean fraction of TAC taken: Default. Not used.
TACSD	0.00 0.00	Log-normal coefficient of variation in the fraction of Total Allowable Catch (TAC) taken: Default. Not used.
TAEFrac	1.00 1.00	Mean fraction of TAE taken: Default value
TAESD	0.00 0.00	Log-normal coefficient of variation in the fraction of Total Allowable Effort (TAE) taken: Default value
SizeLimFrac	1.00 1.00	The real minimum size that is retained expressed as a fraction of the size of retention: Default value. Not used.
SizeLimSD	0.00 0.00	Log-normal coefficient of variation controlling mismatch between a minimum size limit and the real minimum size retained: Default value. Not used.

9.3.5 Stocks

The dominant species are:

- Red snapper (*Lutjanus purpureus*);
- Striped snapper (*Lutjanus synagris*);
- Ti-yeux snapper (*Rhomboplites aurorubens*); and
- In this case, the MSE is only set up for red snapper which makes up the vast majority of the catch. DLMtool does not support simultaneous mixed fisheries MSE.

As well as estimates used in recent stock assessments (Baulier et al. 2015; Tagliarolo 2019, 2020), Fishbase also reports various estimates of parameters which are used to help provide parameter ranges. The ranges for parameters used are given below.

Parameter	Value	Comment
Name	RedSnapper	Object name
Common_Name	Red snapper	Common name
Species	Lutjanus purpureus	Scientific name
maxage	35.00	The maximum age of individuals that is simulated: Based on lowest 99.9% survival at lowest M
R0	9966.55	The magnitude of unfished recruitment: Tagliarolo 2020
M	0.20 0.30	Natural mortality rate: 0.29 reported by Rivot 2000, current stock assessment mortality 0.2
Msd	0.00 0.10	Inter-annual variability in natural mortality rate expressed as a coefficient of variation: Not used
h	0.65 0.75	Steepness of the stock recruit relationship. Precautionary range around 0.7 steepness
SRrel	1.00	Type of stock-recruit relationship. Single value, switch (1) Beverton-Holt (2) Ricker. B-H assumed.
Perr	0.20 0.60	Process error, the CV of lognormal recruitment deviations: Default value
AC	0.10 0.90	Autocorrelation in recruitment deviations rec(t)=AC*rec(t-1)+(1-AC)*sigma(t): Default value
Linf	85.00 105.00	Asymptotic mean length: 105 cm reported by Rivot 2000. Fishbase ranges 85-99 cm. See text.
K	0.10 0.15	von Bertalanffy growth parameter k: Rivot 2000
t0	-0.25 0.00	von Bertalanffy theoretical age at length zero: Estimate reported in Fishbase -0.25
LenCV	0.08 0.12	Coefficient of variation of length-at-age (assumed constant for all age classes): default low range around 10%
Ksd	0.00 0.02	Inter-annual variability in growth parameter k expressed as coefficient of variation: default
Linfsd	0.00 0.02	Inter-annual variability in maximum length expressed as a coefficient of variation: default
L50	39.00 47.00	Length at 50% maturity: 39-47 cm 1st maturity reported in Fishbase

Parameter	Value	Comment
L50_95	5.00 10.00	Length increment from 50% to 95% maturity: reasonable range
D	0.20 0.50	Current level of stock depletion SSB(current)/SSB(unfished): E=0.51
a	0.00	Length-weight a: Lampert 2013
b	2.95	Length-weight b: Lampert 2013
Size_area_1	0.10 0.10	The size of area 1 relative to area 2: Default
Frac_area_1	0.10 0.10	The fraction of the unfished biomass in stock 1: default
Prob_staying	0.90 0.99	The probability of individuals in area 1 remaining in area 1 over the course of one year: default
Source	Tagliarolo 2020	Tagliarolo 2020

For the stock assessment, a "dome shape" selectivity was chosen to better represent this type of fishery capable of targeting part of the population by the choice of hook sizes (Tagliarolo 2020) or other method.

9.3.6 Data

The main observations are: catch estimates (1986-2019) (Figure 14), effort and CPUE (1986-2019) (Figure 15), length composition (1986-2019) (Figure 16) (Tagliarolo 2020). The data used in the MSE are annual subset of these data, taken from Caro and Lampert (2011).

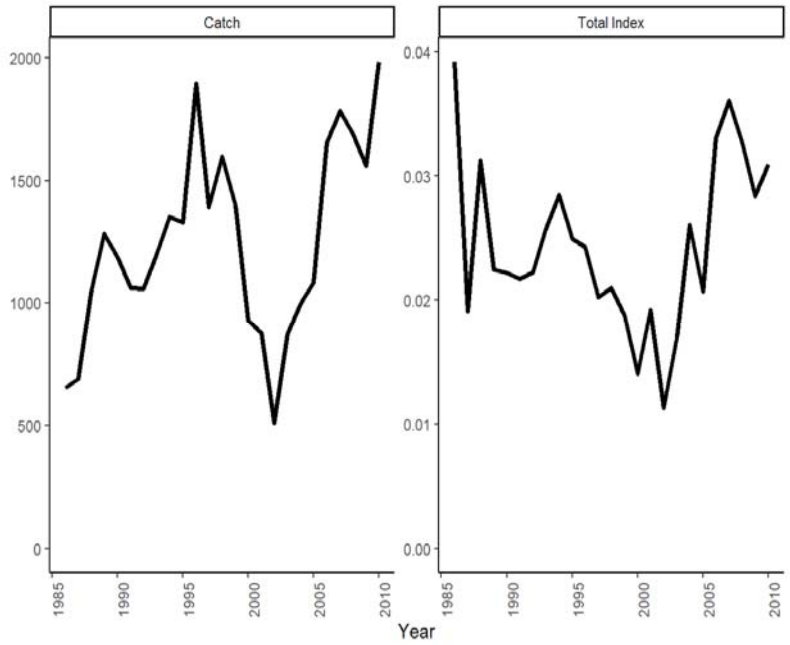


Figure 14: Catch estimates (1986-2019)

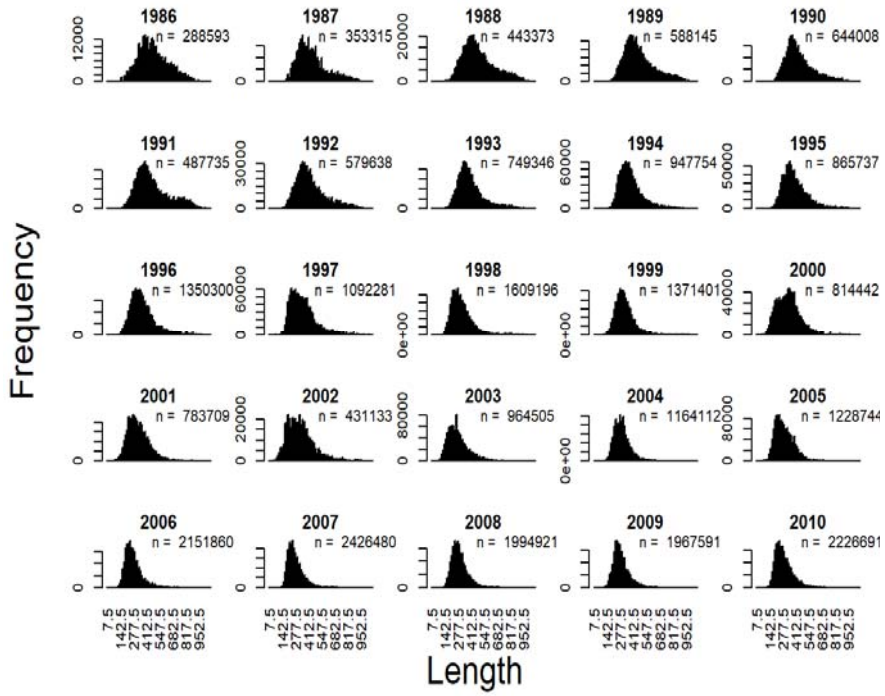
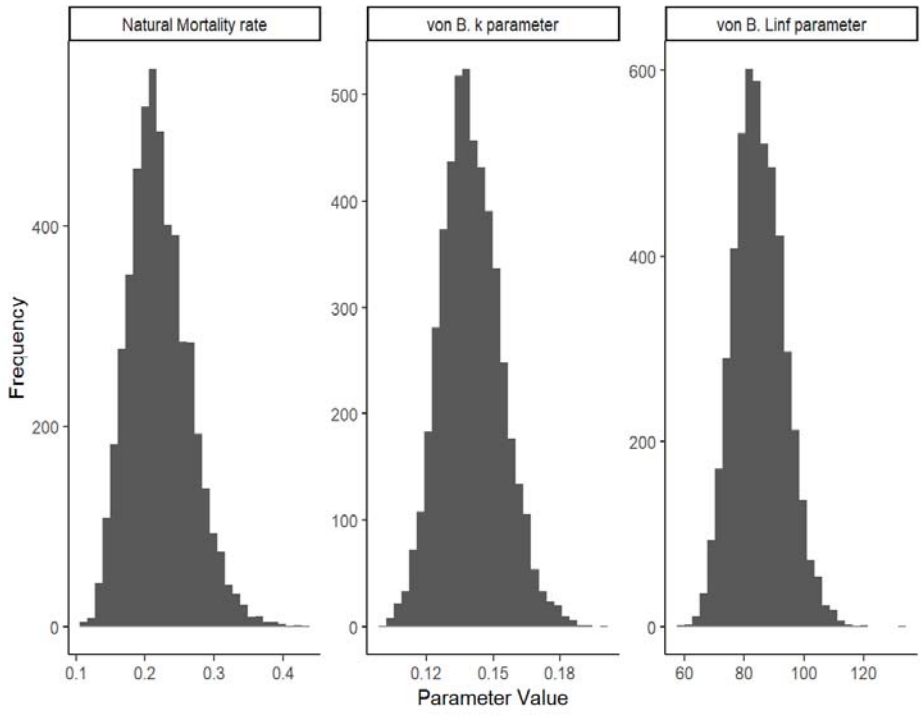


Figure 15: Effort and CPUE (1986-2019)



9.4 Final Operating Models

The operating models combine the stocks with the same fleet, observation and implementation models.

The following code chunk must be run to obtain summary plots of the operating model as HTML files in the output directory.

9.4.1 Alternative Harvest Control Rules (HCR)

In DLMtool, HCR are referred to as management procedures. As an example, a new HCR not in the procedures supplied by DLMtool, has been written and included in the loaded package. Otherwise, tested HCR are already included in the DLMtool package.

The new HCR estimates the ratio between the mean standardised CPUE for the two most recent years and the two years before that. This would mean that if CPUE was declining or increasing, the effort is reduced or increased proportionately to a maximum of 10%. This HCR does not require an explicit reference point. It is an adaptation of the Iratio management procedure that is used for data-limited stocks in European fisheries for TAC ("Category 3").

The uncertainty over the degree to which the stock is shared with other countries' fisheries cannot be addressed directly by DLMtool. It simulates an area as unexploited (like an MPA), but not multiple connected areas (or multiple stocks and fleets). The only way to simulate shared stocks is to adapt the HCR so that it represents a lack of control over part of the exploitation. This part would represent the neighbouring fleets which might continue to fish normally even in the local fleet's fishing is reduced. The assumption is that the historical modelled exploitation pattern applies across all fisheries on the same stock, which is unlikely. DLMtool documentation is insufficient to identify a better way to deal with this issue.

Code

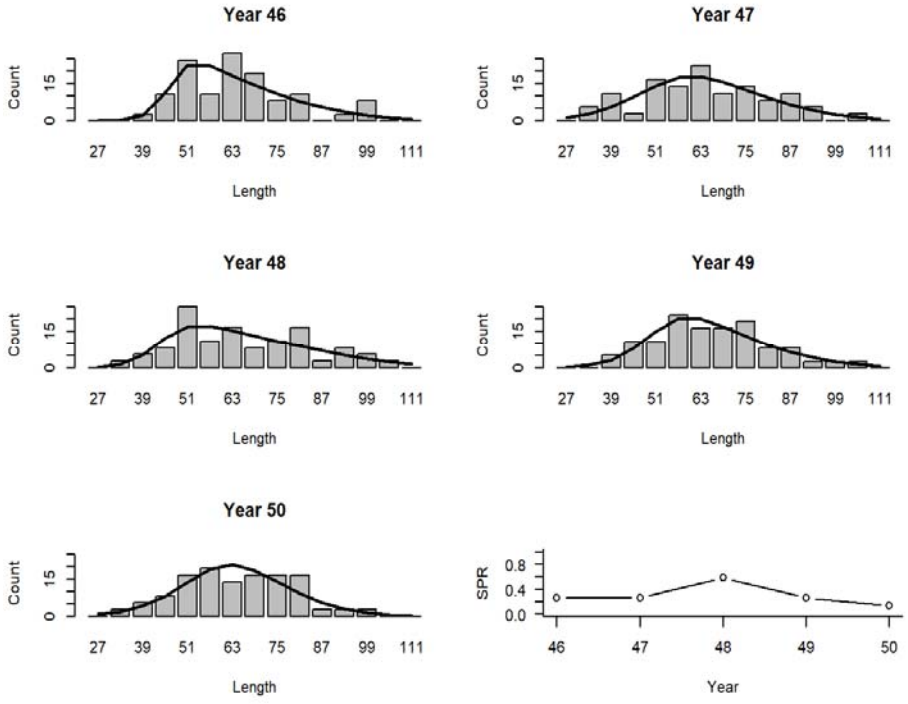


Figure 16: Length composition (1986-2019)

This is a very crude representation of the effect, and could be corrected if the percentage of the stock that is exploited in nearby states is known. One obvious comparison that would be useful is to evaluate the relative catches that come from the potentially shared stocks. This unfortunately is unknown as relevant catch estimates do not exist for Suriname or Brazil, at least in the public domain.

9.4.2 Management Strategy Evaluation Results

The MSEs are run with the current model and proposed HCRs. Simulations can take a long time to run, so advantage is taken of the parallelisation for the calculations. MSEs are run separately for each species. The resulting MSE objects are potentially large. A "high-end" fast computer with a lot of memory may be required to complete this task.

The full list of HCR available in DLMtool can be found by typing 'avail("MP"). The functions are described at, where detailed reference information has been made available: https://protect-eu.mimecast.com/s/ygi1ClpnRt2gYntGpmTJ?domain=dlmtool.github.io.

The TAC is calculated as the most recent catch, modified by the ratio alpha, where the numerator is the mean length of the catch (of lengths larger than Lc) and the denominator is the mean length expected at MSY. Here, Lc is the length at full selection (LFS).

The TAC is calculated as:

\[TAC_y=C_{y−1} {L \over L_{ref}}\]

where \(C_{y−1}\) is the catch from the previous year, \(L\) is the mean length of the catch over the last yrsmth years (of lengths larger than Lc) and \(L_{ref}\) is the mean length expected at MSY. Here, Lc is the length at full selection (LFS).

This HCR assumes M/K = 1.5 and FMSY/M = 1. Natural mortality M and von Bertalanffy K are not used in this MP (see Appendix A of Jardim et al. 2015).

9.4.3 Code

A summary of performance indicators tested is presented in the summary table below.

The first table shows the available performance indicators for the HCR. "AAVE" is the average annual variability in effort. "AAVY" is the average annual variability in yield.

The second shows how each harvest control rule has performed in the simulation.

In this case, length-based SPR has done slightly better overall than the two-index based HCR in terms of limiting fluctuations in catch or effort. However, all these HCR are precautionary and seem to prevent overfishing. Perhaps a more important consideration is the data required to apply the HCR and implementation error. If the level of control over catch versus effort is included, it may become clearer whether an output or input control is preferred.

Code

N	Measure	Performance Indicator
1	Average Annual Variability in Effort (Years 1-30)	Prob. AAVE < 20% (Years 1-30)
2	Average Annual Variability in Yield (Years 1-30)	Prob. AAVY < 20% (Years 1-30)
3	Spawning Biomass relative to SBMSY	Prob. SB > 0.1 SBMSY (Years 1 - 30)
4	Spawning Biomass relative to SBMSY	Prob. SB > 0.5 SBMSY (Years 1 - 30)
5	Spawning Biomass relative to SBMSY	Prob. SB > SBMSY (Years 1 - 30)
6	Probability of not overfishing (F<FMSY)	Prob. F < FMSY (Years 1 - 30)
7	Average Yield relative to Reference Yield (Years 1-10)	Prob. Yield > 0.5 Ref. Yield (Years 1-10)
8	Yield relative to Reference Yield (Years 1-30)	Mean Relative Yield (Years 1-30)
9	Average Yield relative to Reference Yield (Years 21-30)	Prob. Yield > 0.5 Ref. Yield (Years 21-30)

Performance	Species	Harvest Control Rule		
Indicator		EU_MP	Lratio_BHI	LBSPR
Prob. AAVE < 20% (Years 1-30)	Red snapper	1.0000000	0.0080000	1.0000000
Prob. AAVY < 20% (Years 1-30)	Red snapper	0.2600000	0.8600000	0.2920000
Prob. SB > 0.1 SBMSY (Years 1 - 30)	Red snapper	0.9992000	0.9999333	1.0000000
Prob. SB > 0.5 SBMSY (Years 1 - 30)	Red snapper	0.9501333	0.9870667	0.9895333
Prob. SB > SBMSY (Years 1 - 30)	Red snapper	0.6702667	0.8870000	0.8162667
Prob. F < FMSY (Years 1 - 30)	Red snapper	0.6738667	0.9437333	0.8674667
Prob. Yield > 0.5 Ref. Yield (Years 1-10)	Red snapper	0.8564000	0.4940000	0.7790000

Performance	Species	Harvest Control Rule		
Indicator		EU_MP	Lratio_BHI	LBSPR
Mean Relative Yield (Years 1-30)	Red snapper	0.9529525	0.3614235	0.8552761
Prob. Yield > 0.5 Ref. Yield (Years 21-30)	Red snapper	0.9250000	0.0648000	0.9088000

Performance	Species	Harvest Control Rule		
Indicator		EU_MP	Lratio_BHI	LBSPR
Prob. AAVE < 20% (Years 1-30)	Red Snapper	1.0000000	0.0340000	1.0000000
Prob. AAVY < 20% (Years 1-30)	Red Snapper	0.2440000	0.8920000	0.2860000
Prob. SB > 0.1 SBMSY (Years 1 - 30)	Red Snapper	0.9873333	0.9706667	0.9941333
Prob. SB > 0.5 SBMSY (Years 1 - 30)	Red Snapper	0.7040667	0.8562000	0.7575333
Prob. SB > SBMSY (Years 1 - 30)	Red Snapper	0.2969333	0.6795333	0.3278667
Prob. F < FMSY (Years 1 - 30)	Red Snapper	0.2988667	0.7983333	0.3280000
Prob. Yield > 0.5 Ref. Yield (Years 1-10)	Red Snapper	0.9302000	0.6720000	0.9314000
Mean Relative Yield (Years 1-30)	Red Snapper	0.9822476	0.5038196	0.9929455
Prob. Yield > 0.5 Ref. Yield (Years 21-30)	Red Snapper	0.9038000	0.1542000	0.9408000

The MSE could be used to address other issues. For example, the degree to which the stock is shared. With a fully shared stock, the data should represent the population (so CPUE is proportional to stock size and the sample length composition represents the population length composition). So, the HCR should work, except the changes to the exploitation rate is limited to the French Guiana fishery.

Performance	Proportion Shared						
Indicator	0	0.1	0.2	0.3	0.4	0.5	1
Prob. AAVE < 20% (Years 1-30)	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
Prob. AAVY < 20% (Years 1-30)	0.2840000	0.2880000	0.2900000	0.2920000	0.2840000	0.2820000	0.2820000
Prob. SB > 0.1 SBMSY (Years 1 - 30)	1.0000000	1.0000000	0.9998667	0.9996000	0.9996000	0.9995333	0.9988667
Prob. SB > 0.5 SBMSY (Years 1 - 30)	0.9891333	0.9874000	0.9845333	0.9812000	0.9771333	0.9734667	0.9492000
Prob. SB > SBMSY (Years 1 - 30)	0.8155333	0.8028667	0.7894667	0.7762667	0.7618667	0.7466000	0.6695333
Prob. F < FMSY (Years 1 - 30)	0.8699333	0.8543333	0.8342667	0.8153333	0.7954000	0.7770667	0.6721333
Prob. Yield > 0.5 Ref. Yield (Years 1-10)	0.7780000	0.7904000	0.8010000	0.8120000	0.8222000	0.8298000	0.8676000
Mean Relative Yield (Years 1-30)	0.8552163	0.8681033	0.8799572	0.8916923	0.9030722	0.9134114	0.9585797
Prob. Yield > 0.5 Ref. Yield (Years 21-30)	0.9122000	0.9150000	0.9174000	0.9248000	0.9276000	0.9294000	0.9384000

The results suggest that the HCR is quite robust to a wide range of control over exploitation. However, the HCR is applying a fixed exploitation rate for a significant proportion of the stock (i.e. the stock outside French Guiana jurisdiction), and this fixed exploitation rate is quite effective at protecting the stock even without other measures (Proportioned shared=1.0). Clearly, it is an assumption that there will be no increases in exploitation of this stock in other jurisdictions. So, an alternative interpretation is that, in this model, adding an additional management intervention to HCR to reduce exploitation

if overfishing is detected makes only a small difference to the result, but does reduce risks somewhat. This reduction would be more substantial if the fishery was operating a TAC, but modelling the shared portion of the stock would require some estimate of catch in other jurisdictions.

A multitude of plots and other visual aids can be produced as well as the tables above to help make decisions on what HCR to apply. It is also possible to put real data into the HCR to look at what controls would have been applied in the past if the HCR had been in use. All this information can used to decide on what an appropriate would be and what might work. However, this tool only simulates what might happen. Care and expertise will still be need to set up, apply and monitor any HCR in a real-world application.

9.4.4 MSE Conclusions

The key uncertainties to be addressed were an alternative early catch history, current landings, change in selectivity, biological parameter uncertainty. A preliminary exploration of these using an MSE suggest the following:

The current status is likely robust to alternative catch histories. Although it cannot be tested directly, if behaviour in relation to the proportion of catches landed and sampled has remained constant, it is also likely that past unrecorded landings will not make much difference to determination of the current stock status. However, measuring future catches accurately will clearly be a priority, particularly if management wishes to move to a TAC control.

While accurate estimates of biological parameters are important, again, results seem robust to reasonable ranges of parameters. Growth parameters are likely to be a significant source of uncertainty for models which depend on a growth model for age estimates however.

Results appear most sensitive to selectivity models. This sensitivity applies to management advice and is supported by stock assessment results. The change in length composition must be explained, at least in part, by selectivity change, so improving selectivity models is an important high-priority recommendation.

In summary, the index-based HCRs could perform reasonably well and should progressively adjust exploitation until the stock stabilises probably a little above the MSY. This presents an alternative to annual stock assessments, although a stock assessment that is able to account for selectivity change is likely to perform better.

An important consideration would be whether the quantity and quality of data would be available for monitoring purposes. This again could be tested using the MSE to ensure it was robust enough for the level of data collection that could in reality be sustained.

9.5 Notes on the Recent Stock Assessment

Tagliarolo (2020) provides a description of the most recent stock assessment, although outputs are incomplete. More detailed diagnostics are provided in the accompanying linked documents to STECF (2020). Overall, the Stock Synthesis model is a clear improvement on the previous VPA approach.

The impact of early trawl activity was most probably low because it would not have been directed at red snapper. This implies that the assumption in the MSE, that exploitation

levels could have been high as suggested by Caro (2010) may be over-precautionary. However, based on the later data, the MSE suggested that it is unlikely to make much difference to the final stock status. It still might be worth including higher trawl catches into the stock assessment as a sensitivity run.

By means of observations to know:

- The areas in which snappers of different ages are present and to confirm the presence of different stocks of different sizes and characteristics. The juveniles would be closer to the ribs and specimens matured further off the coast;
- The life cycle of snappers: Identify the breeding season, spawning grounds or whether stocks in French Guiana are shared with other States.
- Through experiments to know the impact of the various fishing techniques: Variation in hook size, impact of shoot — pot, to determine the selectivity of the different gears and their impact on the environment and all species.
- The spatial distribution of species and lengths could be obtained by a scientific survey. The survey would need to provide sufficient data to estimate the effect of area and hook size on size composition. A well-designed experimental scientific survey could be used to estimate these with reasonable precision, and estimates could be incorporated into the stock assessment.

It is important that the regular monitoring of the stock is sustained. Current data collection is sufficient to apply length-based age structured model to

The French authorities will quickly return to the Commission to provide it with additional information, in particular on the financing and timing of the study.

In the immediate future, it was agreed to complement the data of Ifremer observers present at landing on sizes, including observation in processing plants and the use of size or weight data available to companies.

It may be possible to extend the biological sampling by requesting data from the processors. Fish processing companies will often have staff involved in quality control who will have the ability to take accurate measurements of weight or length.

Sample otoliths could be taken to examine how difficult ageing might be to improve growth parameters estimates.

It would be useful to attempt to standardise the CPUE. Information on vessels and trips (time of year, location) could be used for this purpose, and to standardise selectivity in a similar way to aid the stock assessment.

SS3 offers ways to model time varying selectivity parameters as autoregressive or trending parameters. This could be explored in this case to avoid defining artificial time blocks and help avoid parameter aliasing.

9.5.1 Per-Recruit Analysis

The shape of the selectivity function will have considerable impact on spawner and yield per recruit calculations. The relatively narrow domed-shaped selectivity fitted to the length frequency data above, and used in the MSE, means that typical SPR and YPR function shapes may not apply. Therefore, the per-recruit calculations are carried out below. This selectivity was not used or fitted in the stock assessment, so current fishing mortality is

not known and only the reference points are calculated. Nevertheless, this provides some insight on what effect changing the size selectivity might have on the population.

The selectivity function is a double-sided normal. For the evaluations below, the length at maximum capture (mode of the selectivity function) is changed while the left and right-hand slopes of the curve remain constant.

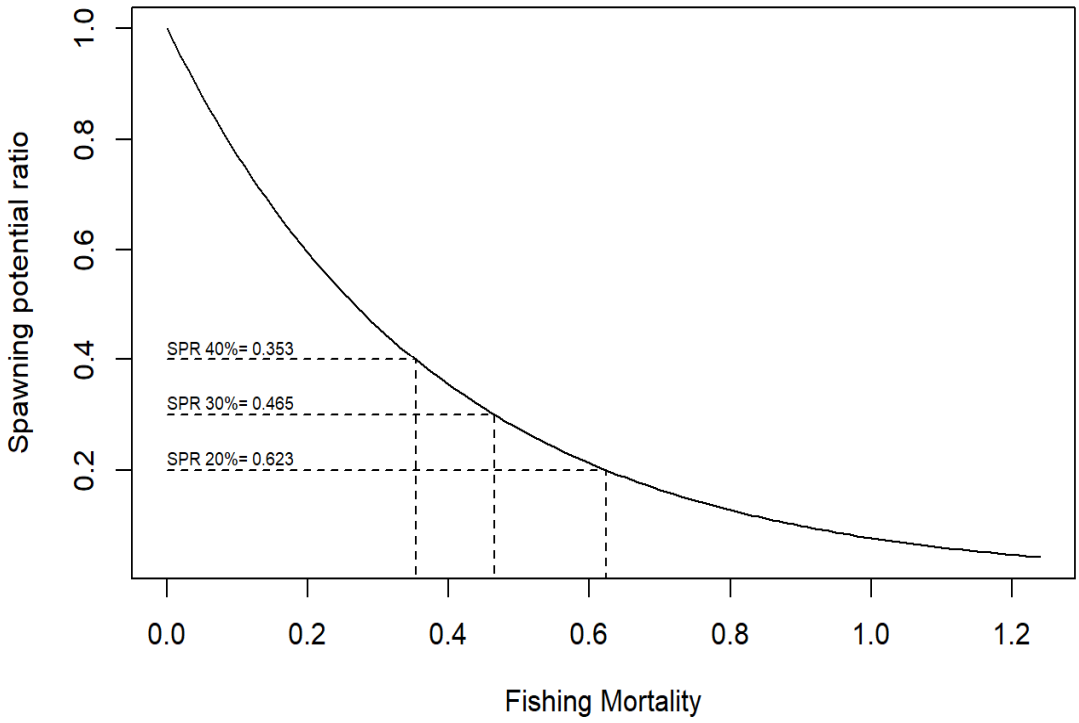


Figure 17: Fishing mortality against spawning potential ratio

Because the selectivity is heavily domed, the SBPR fishing mortality reference points for different criteria (40% - 20% = low risk - high risk) is relatively high, varyng from 0.353 to 0.623 yr-1. This result depends on the selectivity function being an accurate description of the fishery selectivity (Figure 17).

We can grid the function and look at the combination effect of fishing mortality and length at first capture (Figure 18). The current status for the fishery is marked (black point) and the reference point for the fishing mortality and 50% selectivity marked with a red line.

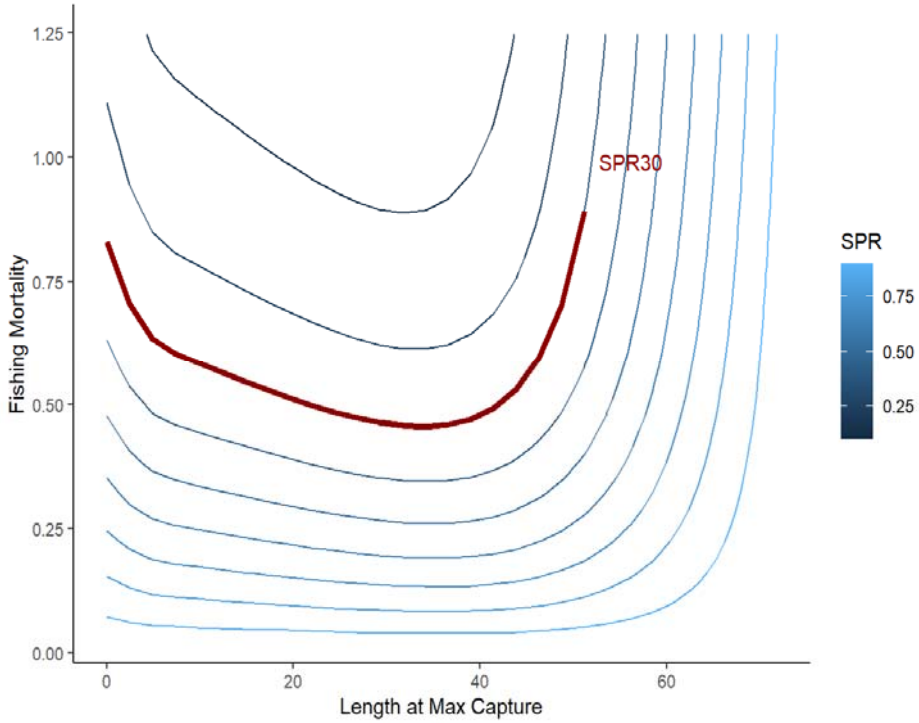


Figure 18: Fishing mortality against length at maximum capture

The key point here is that initially, increasing the size-at-capture results in lower fishing to achieve the target spawning potential ratio. So, if the fishing mortality does not change (effort remains constant), increasing the mean size at capture decreases the spawning stock size (Figure 19). Obviously, this would be similar or worse if the selectivity became less narrow and larger fish were caught without decreasing the vulnerability of smaller fish. The difference is not large, but it does indicate naively raising the size at capture does not necessarily achieve the objective of lowering the risk of overfishing. This is because as growth slows with size, the maximum vulnerability selectivity applies for longer periods increasing the effective mortality. Subsequently, this effect decreases as the maximum vulnerability moves above the size at first maturity. This effect can be seen in the figure above as the SPR_30%_ initially decreases then increases around the 40-45 cm where the fish become mature.

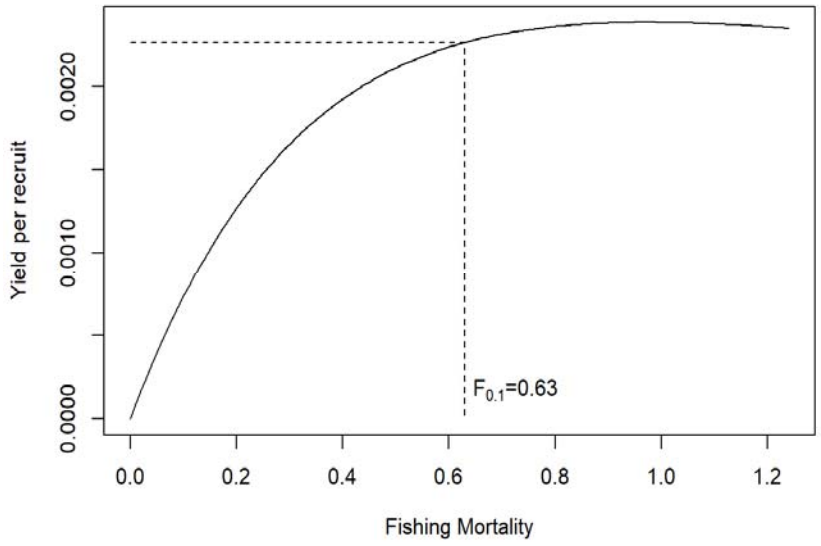


Figure 19: Fishing mortality against yield per recruit

Similarly, to SPR, the yield curve can be plotted showing the current status and the F0.1 reference point (Figure 20).

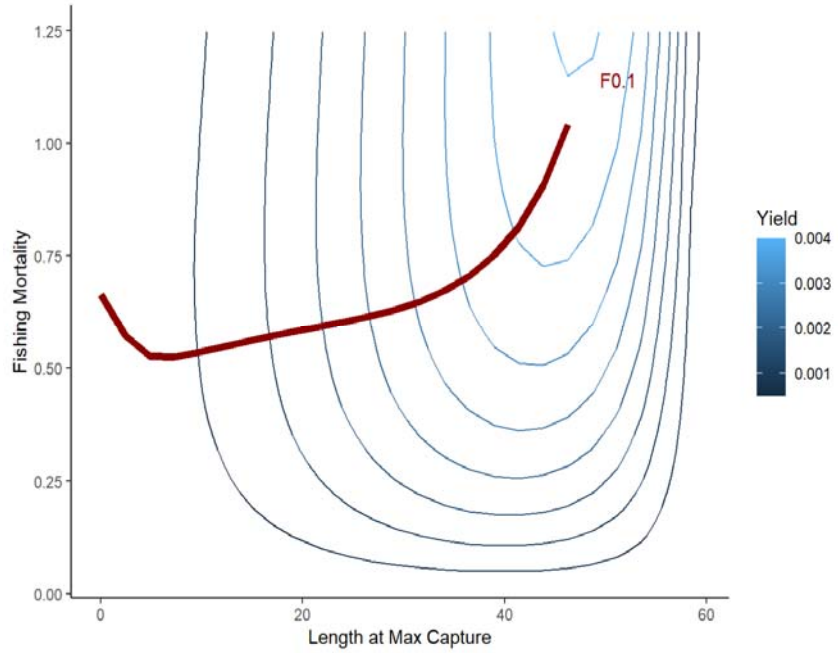


Figure 20: Length at maximum capture against fishing mortality

9.5.2 Code

In contrast to SPR, F0.1 effectively increases as length at maximum vulnerability increases to the optimum size. A high fishing mortality is estimated because the selectivity is narrow in range. If the selectivity widens (e.g. more logistic-like) the optimal fishing mortality would greatly decrease.

9.6 Conclusions and Recommendations

9.6.1 Stock Assessment

The latest stock assessment (Tagliarolo, 2020) demonstrated the importance of estimating selectivity in determining stock status and management advice. The MSE suggested that because the fishery is capturing a narrower range of smaller fish, larger fish are escaping exploitation compared to previous periods. This may be because fishers are actively targeting particular sized fish based on market demand (single portion whole fish demanded by restaurants). So, market demand may be protecting spawners or alternatively spawners are depleted in French Guiana waters so fewer can be caught. It is not clear which applies, but the models currently favour the former hypothesis. It is important therefore to consider alternative selectivity in the stock assessment to improve the assessment and management advice. The following recommendations are suggested:

- Try more selectivity blocks based on length composition residual patterns. The single selectivity block appears to have improved model fit.
- Consider more than one selectivity for different vessel groups. Vessels might be grouped based on the length compositions they are landing improving selectivity estimates.
- Examine parameter correlation matrix, particularly correlation between selectivity double-normal right-side parameter and fishing mortality.
- Consider using the time series approaches to changing selectivity parameters available in SS3 (autoregressive or moving average).
- Consider a bespoke stock assessment model, that will be able to try alternate approaches to modelling selectivity that are not available in SS3. These could include but not be limited to:
    - adjusting the selectivity model, so it is possible to use the covariance between selectivity parameters to allow progressive change as well as controlling the way selectivity changes so selectivity parameters are not independent.
    - develop a selectivity random-effects model to allow for differences among vessels while preserving parsimony.
    - use a non-linear CPUE model that accounts for potential gear saturation and other non-linear effects.
    - include in the stock assessment model standardisation of the CPUE. For example, a random-effects model of catchability can account for average as well as individual vessel changes in catchability.
    - converting the assessment to a Bayesian model that would better assess risks of management actions in projections.

9.6.2 Data Collection

The most useful data would be obtained by conducting a fishery independent survey. This would be useful to estimate selectivity, even if not continued as a time series. Selectivity is the most important source of uncertainty for the management of this fishery. A single vessel fishing in a stratified randomised design in different areas at different depths, employing several hook sizes simultaneously, would provide important data testing assumptions about selectivity in the stock assessment and management advice. The survey could be conducted in various ways, including:

- Charter a vessel from the current fleet to conduct the survey with fisheries scientists board to direct and monitor operations. This is the most expensive approach.
- Link a licence condition to co-operation with an annual scientific survey. This would allow vessels with access to share the burden for the survey.

So, the survey would be conducted with fisheries scientists aboard, but only one trip per vessel every few years. The vessel would be allowed to keep and sell the catch and could in addition be compensated. However, the main objective for vessels would be to protect their access to the fishery, so co-operating vessels would be guaranteed priority licensing, for example (see stakeholders below).

The abundance index (CPUE) could be standardised to account for different fishing power. This would require obtaining relevant information on vessels, such as vessel length and crew size, that can be linked to landings. Although this is always valuable to do, it is not clear this will make much difference in this case because vessels may not vary enough that would imply significant difference in fishing power, and critical historical information may be lacking, so that the full time series cannot be standardised. Differences would most likely reflect the number of lines that could be set which would be dependent on the crew and vessel size. However, standardisation can be extended to selectivity as well, and in terms of accounting for the spatial distribution of effort, this might make more sense. This would attempt to some extent to account for selectivity differences among vessels and among areas (i.e. catchability-at-length rather than average catchability).

Interviews of the fishers may improve understanding of how fishing power and selectivity might have changed since 1986, and the causes for these. This could be done as formal interviews or through a meeting of vessel captains gathered in Cayenne as stakeholders (see below). Meetings are valuable because they allow discussion among stakeholders reaching consensus to a degree on different effects and their impact on the fishery. STECF has suggested a tagging programme. A successful tagging project would provide significant information on population size, growth and movement, but would be costly and have a high risk. It would be most important that recaptured tags are returned, and if 25% of landings do not take place in French Guiana, and fisheries outside French Guiana do not co-operate, the stock size may be significantly over-estimated and mortality estimates biased.

One or more fishery independent surveys and other data collection will allow:

- A review definition of the snapper stock based on the distribution of fish to the EEZ borders. These data could be shared with Brazil and Suriname as an expression of good faith and to encourage a meeting of a WECAFC Brazil-Guianas groundfish ad hoc scientific working group. Such a survey would not provide definitive information on stock structure, but would aid expert opinion on how the stock structure should be handled.
- Improvements in mortality and growth parameter estimates. Without ageing fish, such estimates would likely not be well-estimated, but it is possible that multiple surveys could detect cohorts which may aid estimation of the growth rate parameter (K) as well as (L_{infty})
- The survey should collect maturity data, so maturity at length should be estimated with length-weight parameters. Maturity, length and weight data could also be collected from current landings over a longer period. Maturity would require a trained

scientists to collect and evaluate samples of ovaries and testes, but length and weight could probably be collected by quality control staff in a processing facility with a little training.

- Bycatch species and potential discarding could also be evaluated by comparing survey and commercial landings. In looking at the other snapper species, assuming length composition data are available, the data will make a useful contrast to the length compositions for red snapper and evaluating the effect of hook size. * One of the likely drivers behind productivity on the Brazil Guianas shelf will be river outflow which carries nutrients into the marine environment. While it is unlikely that a long time series of river water volume in the rivers is available, rainfall may have been recorded over a long-time interval. These data should be compiled and made available for further analysis, as a driver for example of recruitment.

As well as collecting data, French Guiana should seek to convene a WECAFC scientific meeting which can discuss data collected as well as present the current SS3 stock assessment to encourage co-operation between countries, at least at a technical level. The fisheries in South America on red snapper are likely to be very similar, and most countries could begin biological sampling with the objective of producing data very similar to that used for the French Guiana stock assessment.

9.6.3 Management

Simpler index-based assessment of status with infrequent full stock assessments may provide a more efficient approach. For example, annual CPUE and spawning potential ratio may be estimated each year and reported to guide management decisions, or apply a pre-agreed harvest control rule. Then, every 5 years, a full stock assessment in SS3 might be conducted to evaluate performance and adjust the harvest strategy accordingly. While the full annual stock assessment that has been conducted recently is the best approach, it is expensive and may use up scarce scientific resources whilst other stocks remain unassessed.

Stakeholders should be extended to include the Venezuelan fishers. One of the problems with allowing foreign access to fish stocks is the foreign vessels may not feel they have a long-term stake in maintenance of the resource. If there is no interest in developing a local capture fleet for this resource, it would be well worth developing a long-term relationship with the vessels and fishing companies given access. Therefore, the Venezuelan fishers and fishing companies should be recognised as full stakeholders in the fishery and consulted on management decisions and access to the fishery could be linked to co-operation with the science and management. This could improve compliance in the long term with any management initiatives.

A management strategy evaluation would be useful to explore alternative efficient and robust approaches to management. The DLMtool used in this report was limited to exploring index-based management approaches using a model very similar to that used in the stock assessment. It may be worth developing a more sophisticated approach within the FLR framework[22] which could be expanded to include a length-based stock assessment approach). This might mean using different software to SS3 which is not consistent with the FLR model. Developing an approach in FLR would require considerably more resources than for DLMtool, but might be worthwhile if it were useful for other fisheries within the Outermost Regions.

[22] https:// flr-project.org

Input controls, such as fishing effort and hook size limits, rather than output controls, such as catch or minimum landing size, is probably the best approach. Vessels have no incentive to make all landings in French Guiana, so applying a TAC may be difficult to enforce. Effort control is effective unless fishing power increases. In this case, big increases in fishing power are unlikely (in contrast to trawl) because there are few opportunities to do so for hook and line.

Limiting licences is not, by itself, sufficient. Fishing effort has not increased in line with licences issued, presumably because licences are used opportunistically and to improve flexibility in vessel operations rather than to allow more access. Nevertheless, some cap is required on numbers of trips or fishing days, to prevent overfishing. If selectivity is dependent hook size and area fished, it may be possible to control selectivity placing licence conditions on hook size and using VMS (or other location and time monitoring) to limit where fishing takes place. This has been recommended as a long-term approach by STECF (2020), but this would greatly benefit from including the current fishers as stakeholders which would help with compliance, particularly given their experience in controlling capture size.

There is little doubt that the snapper population in French Guiana may be connected to populations in neighbouring countries and across the Brazil-Guiana's shelf. While STECF recommends identifying stock boundaries as "paramount" (STECF 2020), obtaining regional co-operation has been very slow and so far, there has been no joint management agreed for any stock, although there are good examples of scientific co-operation. In practice, while international co-operation should be sought to improve stock definitions, this should not delay management any actions for the French Guiana red snapper. Any study should be carried through WECAFC to ensure co-operation from all countries in the region.

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Mayotte

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Mayotte Profile Report

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Acronyms

Term	Description
CMM	Conservation and Management Measures
CRPMEM	Comité regional des pêches marines et des élevages marins
DPMA	Direction des pêches maritimes et de l'aquaculture
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DM	Direction de la Mer
DMSOI	Direction de la Mer South Indian Ocean
EASME	Executive Agency for Small and Medium Sized Enterprises
EMFF	European Maritime and Fisheries Fund
EU	European Union
Ifremer	Institut Francais de Recherche pour l'Exploitation de la MER
IOTC	Indian Ocean Tuna Commission
IRD	Institut de Recherche pour le Développement
LEMNA	Laboratoire d'économie et de management de Nantes-Atlantique
MCS	Monitoring, control and surveillance
NEI	Not elsewhere included
NGO	Non-governmental organisation
OBSDEB	Observation des Marées au débarquement
OFB	Office Français pour la Biodiversité
OR	Outermost Region
RDBES	Regional Database and Estimation System
SIH	Système d'Informations Halieutiques
SIPA	Système d'information de la pêche et de l'aquaculture
SMEFF	Sustainable management of external fishing fleets
SSF	Small scale fisheries
SSP	Service de la statistique et de la prospective
VMS	Vessel monitoring system

1 Introduction

1.1 Geographic and economic characteristics

Since 2011, Mayotte is a region ("Région", Administrative level 1) of the Republic of France, a department ("Département", Administrative level 2) and a single territorial collectivity. This entity is an Outermost Region of the European Union[1] (Figure 1).

Mayotte is located in the Mozambique Channel, part of the Comoros archipelago, and is composed of a main island (Grande-Terre or Maore), a smaller island (Petite-Terre) and a number of islets. The land area of Mayotte is 376 km^2 while the lagoon covers 1 100 km^2.

Figure 1: France Metropolitan vs Outermost Regions and French Territories (source: Wikipedia.org).

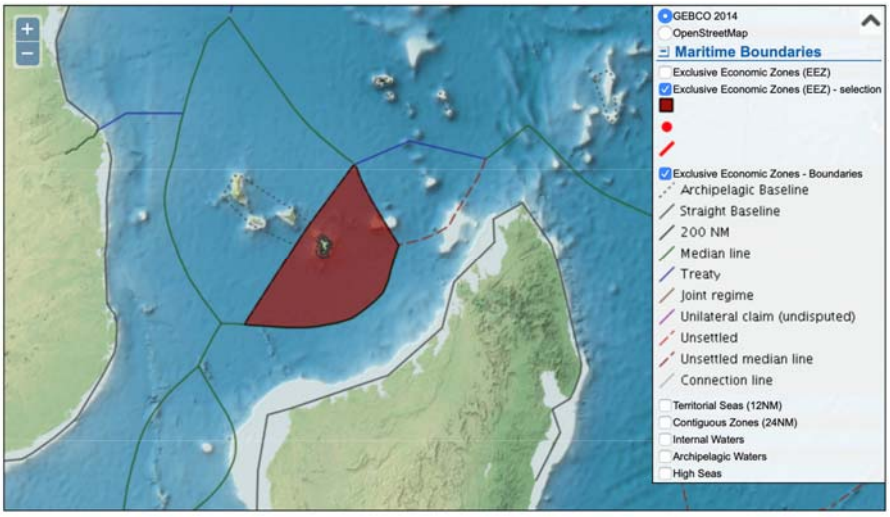

Figure 2: Map of Mayotte and its EEZ (source: www.marineregions.org)

1 Note: in this document, the term Metropolitan France ("*France métropolitaine*") will be used to differentiate the French territory in Europe from the Outermost Regions (Guadeloupe, Martinique, St Martin, French Guiana, La Réunion and Mayotte).

The EEZ of Mayotte covers 66 176 km^2, which is very small compared to the overall French total EEZ of 9 638 369 km^2 (see Table 1).

Table 1: Surface area of the French ORs.

Outermost Region	EEZ Area
Guadeloupe/Martinique	123 483 km^2
Saint Martin	2 665 km^2
French Guiana	121 746 km^2
La Réunion	311 426 km^2
Mayotte	**66 176 km^2**
Rest of French EEZ	9 015 873 km^2
TOTAL	**9 638 369 km^2**

Source: https://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies

Figure 3: Map of Mayotte archipelago (source: © Rémi Kaupp, CC-BY-SA, Wikimedia Commons)

Figure 3 presents the Mayotte archipelago and the geographical distribution of the different islands: Grande-Terre (Mahoré) and Petite-Terre (Pamanzi) constitute the main of the land area, while a number of smaller islets are dotted around Grande-Terre.

There are a large number of landing sites in Mayotte, but no real fishing ports. They are nonetheless all listed in a local regulation (Arrêté préfectoral n°01/UTM/2013 - Points débarquement pêche maritime), which categorises them in terms of primary or secondary landing sites. It is forbidden to land and sell catches outside of these designated sites. Currently, there is a project under way to develop 7 "official" ports for landing and selling catches around Mayotte, funded under EMFF Article 43 (source: Office français de la biodiversité (OFB) interview).

Table 2: General geographic indicators

	Description	Unit	Source
Archipelago area	Grande-terre	363 km^2	Wikipedia
	Petite-terre	11 km^2	
	Islets	2 km^2	
Land area	Grande-terre	363 km^2	
	Petite-terre	11 km^2	
	Islets	2 km^2	
Inland water area	Grande-terre		Negligible[2]
	Petite-terre		
	Islets		
Population size		288 926 (2021)	INSEE, 2021[3]
Exclusive Economic Zone (EEZ)		63 176 km^2	Portail national des limites maritimes[4]

1.2 Fisheries statistics

Mayotte have undergone substantial drops in reported catch after 2014 (Figure 4, top). Such reductions in catches recorded by FAO after 2014 are entirely due to where the fisheries data for Mayotte is being reported from. In 2014 Mayotte changed from a French Overseas territory to a French Département, and thus became an Outermost Region of the EU. Therefore, catches of tuna and tuna-like species reported to the IOTC under "Mayotte, France" began to be reported from 2015 under "EU, France".

The majority of the tuna and tuna-like species catches associated with Mayotte before 2015 were high-sea catches made by vessels registered in Mayotte but based in Seychelles (source: Direction de la Mer South Indian Ocean (DMSOI) Mayotte Interview).

2 Mayotte SDAGE: https://www.mayotte.gouv.fr/content/download/5118/43221/file/SDAGE%202016-2021.pdf

3 https://www.insee.fr/fr/statistiques/2012713

4 https://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies

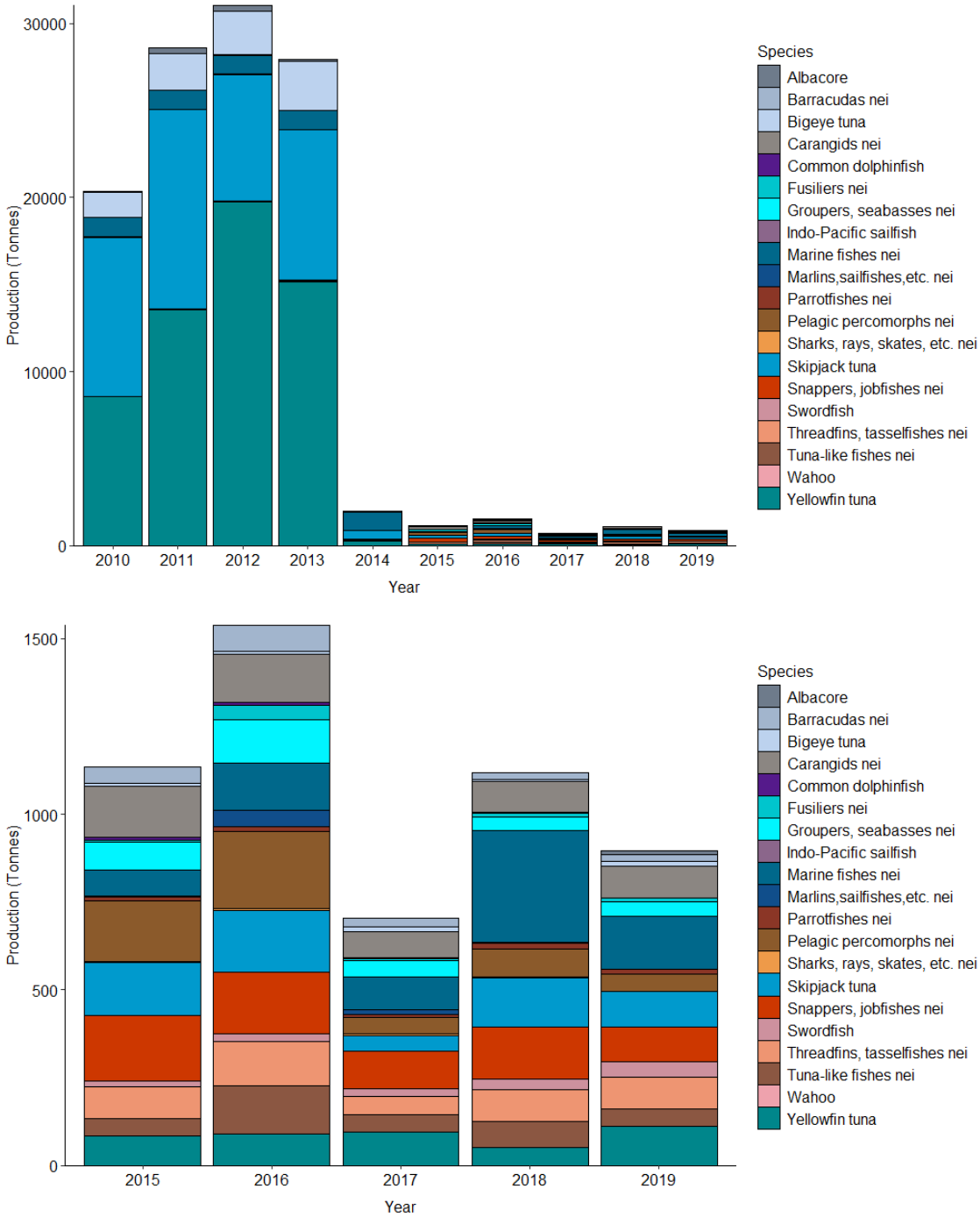

Figure 4: Total capture production for the periods 2010-2019 (top, reported for Mayotte, France) and 2015-2019 (bottom, reported for EU, France) (source: FAO FishStat).

There is no detailed database that holds information on the trade in seafood products (i.e., import / export) for Mayotte. What is available is highly disaggregated data on the French Customs website[5] for all French seafood trade. However, the analysis and assessment of

5 https://www.douane.gouv.fr/la-douane/opendata?f%5B0%5D=categorie_opendata_facet%3A459

such data to decipher patterns for Mayotte would require in-depth extraction and compilation of data, which is beyond the realm of this study.

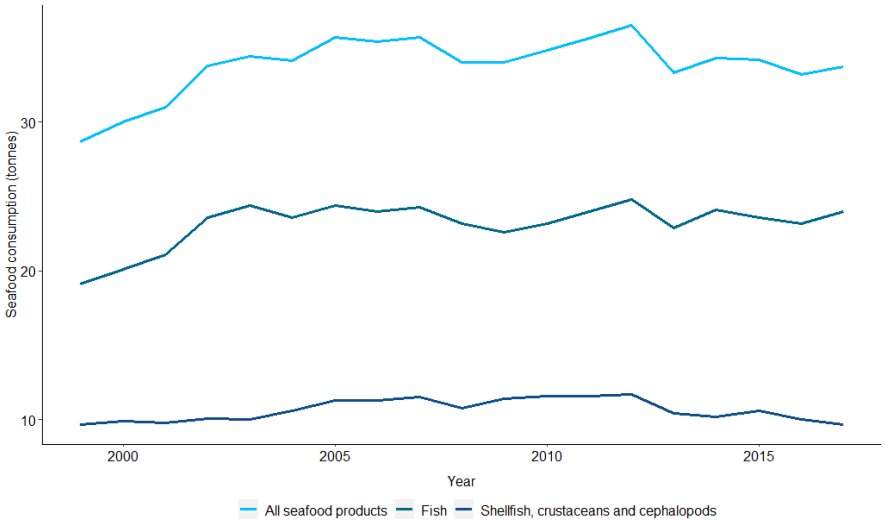

Figure 5: Composition of per capita fish supply for France, including OR (source: FranceAgrimer).

Regarding consumption of fish per capita, there are no specific time series for Mayotte. The data available is aggregated at the national level (Figure 5), and show that average consumption is 24.2 kg per person per year for fish, and 35.6 kg per person per year[6] for all seafood products.

1.3 Regional fisheries management

The European Union (EU) is a contracting party of the Indian Ocean Tuna Commission (IOTC[7]) and, as such, represents France (including Mayotte) within the IOTC. IOTC is a tuna Regional Fisheries Management Organization (t-RFMO), with a mandate on tuna and tuna-like species fisheries in the whole Indian Ocean, including Mayotte. IOTC Management and Conservation Measures (more specifically its Resolutions) are binding on Contracting and Cooperating non-contracting Parties (CPCs).

Until 2014, Mayotte was a French overseas territory and was thus directly represented by France at the IOTC. However, from 1 January 2014, Mayotte ceased to be a French overseas territory, and it became a French Département d'outremer (and thus an outermost region of the European Union). As such, Mayotte is now represented at the IOTC by the EU.

SECTION 1 - KEY FINDINGS

- Mayotte is a small archipelago close to Madagascar and part of the Comoros islands.
- Its EEZ is fairly small, at 66 176 km^2.
- Mayotte only became an EU OR in 2014.

6 https://www.umr-amure.fr/wp-content/uploads/2018/08/situation-peche.pdf

7 https://www.iotc.org

2 Fish stocks and other marine organisms and associated fishing activities

2.1 Commercial fish stocks

Exploited stocks in Mayotte are all caught within the EEZ, and are predominantly coastal catches, with very little activity outside of the lagoon.

Fisheries in Mayotte catch a large variety of fish: there are about 700 fish species in Mayotte, of which about 300 are fished. The multigear artisanal fisheries within Mayotte (see section 2.2.1 for more details) does not target specific species and is predominantly structured as an opportunistic fisheries (in comparison to the large pelagic species longline fisheries operating in Reunion Island) (OFB, DMSOI interviews). For example, the targeted species or even metiers utilised can vary daily for the same fisher.

Table 3: Species captured by Mayotte fisheries, not covered by an RFMO

ASFIS code	French name	Scientific name	ASFIS en Name
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei
EMP	Empereurs nca	*Lethrinidae*	Emperors (Scavengers) nei
CGX	Carangidés nca	*Carangidae*	Carangids nei
GPX	Mérous nca	*Epinephelus spp*	Groupers nei
ARQ	Vivaneau rouillé	*Aphareus rutilans*	Rusty jobfish
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei
BEN	Aiguilles, orphies nca	*Belonidae*	Needlefishes, etc. nei
LJG	Vivaneau pagaie	*Lutjanus gibbus*	Humpback red snapper
AVR	Vivaneau job	*Aprion virescens*	Green jobfish
PWT	Perroquets nca	*Scaridae*	Parrotfishes nei
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei
SDX	Comètes nca	*Decapterus spp*	Scads nei
SUR	Chirurgiens nca	*Acanthuridae*	Surgeonfishes nei
VRL	Croissant queue jaune	*Variola louti*	Yellow-edged lyretail
DOT	Bonite à gros yeux	*Gymnosarda unicolor*	Dogtooth tuna
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
RAG	Maquereau des Indes	*Rastrelliger kanagurta*	Indian mackerel
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad
CJX	Fusiliers nca	*Caesionidae*	Fusiliers nei
GBA	Barracuda	*Sphyraena barracuda*	Great barracuda

ASFIS code	French name	Scientific name	ASFIS en Name
EBS		*Eumegistus illustris*	Brilliant pomfret
TRI	Balistes nca	*Balistidae*	Triggerfishes, durgons nei
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei
MUX	Rougets nca	*Mullus spp*	Surmullets(=Red mullets) nei
LVK	Vivaneau à raies bleues	*Lutjanus kasmira*	Common bluestripe snapper
HCZ	Marignans nca	*Holocentridae*	Squirrelfishes nei
ETA	Vivaneau rubis	*Etelis carbunculus*	Deep-water red snapper
ETC	Vivaneau flamme	*Etelis coruscans*	Deepwater longtail red snapper
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei
MUI	Murènes nca	*Muraenidae*	Morays nei
GRX	Grondeurs, diagrammes nca	*Haemulidae (=Pomadasyidae)*	Grunts, sweetlips nei
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei
NSG	Mamila arabe	*Scolopsis ghanam*	Arabian monocle bream
CLU	Clupéoidés nca	*Clupeoidei*	Clupeoids nei
OCT	Pieuvres, poulpes nca	*Octopodidae*	Octopuses, etc. nei
RAJ	Rajidés nca	*Rajidae*	Rays and skates nei
MUV	Capucin à bande jaune	*Mulloidichthys flavolineatus*	Yellowstripe goatfish

Note: species are ordered by highest to lowest catches. Source: Weiss et al. (2019)

The list of stocks presented (50 species or groups of species) below reflects this variety of catches (Table 4), which results from the nature of artisanal fisheries in Mayotte.

Table 4: Species and stocks monitored in Mayotte (source: Blanchard et al. 2018, part II)

Region	Mayotte
Species monitored (number)	50
Stocks assessed (number)	5
Stocks not assessed (number)	90%
Landings (tonnes)	234
Stock assessed by landed weight	21%
Value of landings (EUR million)	5.8
Stock assessed by value	17%

NB. All reported stocks are extracted from Blanchard et al. 2018, which compiles all stocks for Mayotte and other French ORs. Some information was also taken from Weiss et al., 2019 which provides a summary of catches in Mayotte for 2018. 2019 is not yet published.

Importantly, there are very few species fished within Mayotte waters that have had a formal stock assessment. For example, of the approximately 50 species in which catch are monitored (Table 5), only 5 (10%) are formally assessed; these are species covered and assessed by IOTC (Table 5). There is no formal stock assessment for non-tuna like species in Mayotte. OFB described that due to the highly opportunistic nature of the artisanal fisheries within Mayotte, it is nearly impossible to collect all the data required to conduct proper stock assessments of the majority of species fished.

Table 5: Stocks assessed in Mayotte

Species code	Common name	Scientific name	Assessment by	Year	Status
ALB	Albacore tuna	*Thunnus alalunga*	IOTC	2019	Overfishing/Not overfished
YFT	Yellowfin tuna	*Thunnus albacares*	IOTC	2018	Overfishing/Overfished
SWO	Swordfish	*Xiphas gladius*	IOTC	2020	No overfishing/Not overfished
BLM	Black marlin	*Makaira indica*	IOTC	2020	Uncertain (2018 status was No overfishing/Not overfished)
MLS	Striped marlin	*Tetrapturus audax*	IOTC	2020	Overfishing/Overfished

Source: Blanchard et al. 2018 (part 1), updated with most recent IOTC stock assessment results.

2.1.1 Species covered by an RFMO

The EU being an IOTC Contracting Party, France has to comply with the Commission Conservation and management Measures (CMMs) and report on fisheries catching species under its mandate. In Mayotte, the species listed in Table 6 have to be reported to IOTC.

Table 6: Species captured by Mayotte fisheries, covered by an RFMO (source: Weiss et al. 2019)

ASFIS code	French name	Scientific name	ASFIS en Name
SKJ	Listao	Katsuwonus pelamis	Skipjack tuna
YFT	Albacore	Thunnus albacares	Yellowfin tuna
BIL	Makaires, marlins, voiliers nca	Istiophoridae	Marlins, sailfishes, etc. nei
BET	Thon obèse(=Patudo)	*Thunnus obesus*	Bigeye tuna
COM	Thazard rayé indo-pacifique	*Scomberomorus commerson*	Narrow-barred Spanish mackerel
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
KAW	Thonine orientale	*Euthynnus affinis*	Kawakawa
SWO	Espadon	*Xiphias gladius*	Swordfish
SFA	Voilier indo-pacifique	*Istiophorus platypterus*	Indo-Pacific sailfish
TUN	Thonidés nca	Thunnini	Tunas nei
ALB	Germon	*Thunnus alalunga*	Albacore
MLS	Marlin rayé	*Tetrapturus audax*	Striped marlin
BLM	Makaire noir	*Makaira indica*	Black marlin

Note: species are ordered by highest to lowest catches.

2.1.2 Catch composition

The composition of catches is largely dominated by "marine fishes nei" group, followed by "other species nei" which reflects the opportunistic, multispecies nature of the Mayotte artisanal fisheries (Figure 6).

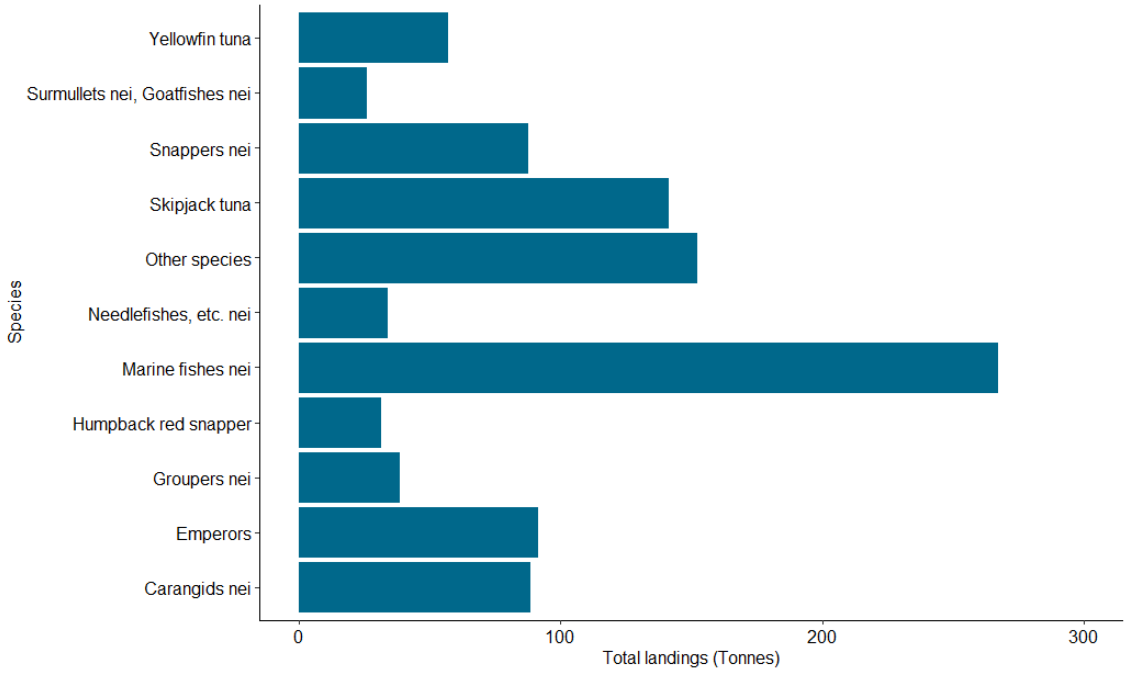

Figure 6: Mayotte catch composition in 2018 (source: Ifremer, 2019)

2.1.3 Declining and emerging stocks

2.1.3.1 Declining stocks

Fisheries targeting sea cucumbers (Holothuroidea) for export to Asian seafood markets have been operating in the Indo-Pacific region for a long time (Conand, 1989), and have proven very difficult to manage, often developing at a rapid pace before collapsing (Anderson et al. 2011). Such a fishery developed in Mayotte after the mid-1990s, when Chinese shark fin traders motivated harvests of sea cucumbers (Pouget, 2004), based on increased global demand and high market value. At the height of this fishery, there were approximately 85 sea cucumber fishers in Mayotte. When it started and developed, there was no local regulation in place for this specific fishery or its target species (Eriksson et al, 2015).

According to Eriksson et al, 2015, scientific research was conducted on sea cucumber stocks in the early 2000s, to assess the fishery. This multi-disciplinary assessment showed (i) declines in *in situ* population abundance, (ii) that other nations had failed to manage fisheries in similar circumstances, (iii) the ecological roles of sea cucumber in reef ecosystems were significant, and (iv) stocks within Mayotte were considered fragile to fishing impacts. Following the results of this research and in order to protect the resource and to mitigate the impacts of this fishery on the environment, the fishery was closed in 2004 (Prefecture de Mayotte, 2004); this fishery remains closed.

2.1.3.2 Emerging stocks

According to local stakeholders (OFB and DMSOI), the current EU-wide fleet renewal process should be an opportunity to develop local fisheries away from overexploited and fragile lagoon/reef stocks, to pelagic resources (e.g., tuna and tuna-like species).

There is a project underway to fund the purchase of new artisanal boats < 12m (±9m). Funded by the Marine Park, the aim of this project is to move part of the fishing pressure out of the lagoon towards anchored fishing aggregation devices (FADs), around 20Nm offshore. Deployment of anchored FADs would help fishermen access pelagic resources without the need to venture onto the high seas. In this respect, one option would be small longliners (currently 2 - 3) fishing around anchored FADs for tuna and tuna-like species. Such catches would likely be for the local market (restaurants, hotels), with emphasis on quality and sanitary standards.

There are also trials (by 1 private vessel) to target small pelagic species with a small seine, but the vessel is not designed for this gear, and therefore it is likely that such trials will be unsuccessful.

The conditions of the EU in providing funding is the stipulation that boats need to have been licensed in Mayotte for at least the last 3 years. Although there are currently 157 licensed artisanal boats, there are approximately 300-400 unlicensed boats. In addition, species targeted should be exploited sustainably, in exchange for financing of renewal. Importantly, local sentiment is that even if the tuna and tuna-like resources are already highly exploited (and for some species, overexploited), they are better monitored and regulated (by the IOTC) than current artisanal fisheries, while the contribution to overall catch and effort of tuna and tune-like species by Mayotte fishers would be minimal.

2.2 Fleet structure

All fishing vessels in Mayotte are below 12 m. Of these, 96% of active vessels in 2018 are below or equal to 10m. All vessels are multigear.

2.2.1 Domestic fisheries

Table 7 below presents the technical characteristics of the average vessel by length category. This shows that the fleet is composed of two segments: ≤10 m (encompassing boats ≤7 m and those that are 7-10 m) and ≥40 m. The first segment is composed of the artisanal fleet operating in Mayotte, while the second segment is composed of industrial vessels.

Table 7: Technical characteristics of the average vessel by length category (source: Weiss et al. 2019).

Length class	Number of boats	Average length (m)	Average power (kW)	Average age (years)	Average crew (persons)
≤7 m	43	6.1	26	18	2.0
7-10 m	100	7.4	47	23	2.5
≥40 m	5	87.3	3 880	10	31.5

2.2.1.1 Artisanal vessels and fisheries

The typical artisanal vessels are locally named "pirogues" (under 7 m long) and "barges" (longer than 7 m). There are currently 143 professional artisanal boats declared and licensed, with an estimated total of ~500 boats in Mayotte, with 300-400 being unlicensed boats (termed the 'informal sector') and often belonging to owners of licensed boats. Licensed and unlicenced boats are the same type of vessels.

The catch associated with the informal sector is important both socially and economically for Mayotte, but it is very difficult to collect data on this sector. As it is not included in the French work plan for the DCF, its study is mostly based on requests by local/regional authorities to answer on specific issues.

The most recent estimates of the average structure of the artisanal fleet in Mayotte is the majority of boats being 6-7 m long, holding 25-50 kW, being 18-23 years old and holding 2-2.5 crew (Ifremer, Système d'Informations Halieutiques, 2019). In 2021, a full inventory of all boats is expected at landing sites throughout Mayotte. This fleet assessment ties in with the proposal by French authorities to improve the fleet within the context of the fleet renewal process and to purchase new boats (focusing on boats ~9m long) to allow fishermen to venture outside of the lagoon (see Section 2.1.3.2 above for more details).

The majority of vessels (74%) operate within the 12 nm limit and are thus considered coastal. In addition, 21% of vessels fish offshore, operating on a regular basis outside the limit of 12 nm, while a small percentage (4%) operate both in the coastal and offshore areas (Table 8). Importantly, this typology of artisanal fisheries is different from Metropolitan France, and from most European artisanal fisheries in general: relatively small wooden boats, with very little technology, often open-decked. The typology presented here for Mayotte is more similar to the type of artisanal fisheries operated in neighbouring islands, such as Comoros.

Table 8: Number of active vessels per length class in Mayotte (source: Weiss et al. 2019).

Length class	Coastal	Mixed	Offshore	Total
≤7 m	32	NA	NA	32
7-10 m	52	5	25	82
Total	84	5	25	114

Note: vessels having carried out more than 75% of their activity within 12 miles are qualified as "coastal", while those operating between 25 and 75% of their activity in this zone are qualified as "Mixed". Finally, those operating more than 75% of their activity outside the coastal area are quantified as "offshore". Note all data refer to the 114 active artisanal vessels in 2018.

2.2.1.2 Industrial fishery

There are only 5 industrial purse seiners longer than 40 m registered in Mayotte, but they operate from Port Victoria in the Seychelles and target tuna and tuna-like species. They were registered just before the baseline reference capacity freeze by IOTC in 2012. They do not land or dock in Mayotte.

2.2.1.3 Sports / recreational fishery

For all of the French ORs, there is little data on these fisheries, and there is still little unanimous definition of this fishery. In 2008, there was a national survey on recreational fisheries in France (for France Agrimer), including the ORs. This study was implemented by a polling company (BVA) through a panel-based survey, but the data collected wasn't not of high quality (i.e., due to methodology issues, especially in the ORs) with low participation rates. There has recently been released a new tender to restart this survey, and for this France Agrimer will use Ifremer for technical advice, which should ensure that protocols and methodology are in line with best practices.

There is a strong recreational fisheries sector in Mayotte (though no sport fisheries), that occurs predominantly across weekends. This segment is currently not monitored, but there is a working group on this topic created within OFB to work on targeted surveys to evaluate recreational fishing. There is a lack of human and financial resources to properly monitor this segment.

Data provided by the OFB/Marine Park[8] paint the following picture of the recreational fleet in Mayotte in 2017:

- 548 vessels
- 203 vessels active all year / 136 vessels inactive all year / 209 vessels unknown
- 10 434 KW of total power
- 5.1 m average length: 165 vessels <5 m; 107 vessels between 5-6 m; 98 vessels between 6-7 m; 164 vessels between 7-8 m; 14 vessels >8 m, and
- 19 kW average power

Note that the data for non-professional vessels are subject to a high uncertainty due to the realities in the field and sometimes inconsistencies are observed. The figures are

8 Personal communication, Melissa Conord, OFB, June 2021

therefore given as an indication. Work to identify these boats has been carried out between 2020 and 2021 and should make it possible to improve the data.

2.2.2 Foreign fisheries

There is an agreement with the Republic of Seychelles to allow Seychellois purse seiners to fish in the Mayotte EEZ, which dates back to before Mayotte became an EU OR (2012). This agreement is under renegotiation in the context of SFPAs, though catches by these vessels in the Mayotte EEZ are almost zero.

2.3 Other non-target marine organisms

2.3.1 Bycatch species

The typology of fisheries in Mayotte is comparable to other developing countries in the region, comprised exclusively by small-scale fisheries operating multigear vessels less than 12 m. As this fleet does not target a specific fish species the concept of by-catch can't be easily applied as in industrial fisheries (for instance, industrial tuna longliners targeting yellowfin and bigeye tunas and catching billfish as by-catch).

2.3.2 Endangered, threatened and protected species

2.3.2.1 Sea cucumbers

As mentioned in Section 2.1.3, there has been a moratorium on sea cucumber (*Holothuroidea*) harvesting since 2004 to protect and rebuild sea cucumber resources. In this respect, fishing, transport, processing, packaging, offering for sale or purchase of all species of sea cucumber is prohibited throughout the territory (sea and land) of the Department of Mayotte (Arrêté préfectoral n°32/SG/DAF/2004 - Holothuries).

2.3.2.2 Sharks

Based on the CITES convention, the low stock status of coastal sharks and on the endemic status of ciguatera within Mayotte and Reunion, a local regulation ban on the trade of all sharks from families *Carcharhinidae*, *Hexanchidae* and *Sphyrinidae* is in place. There is an exception made for blue shark (*Prionace glauca*), oceanic whitetip shark (*Carcharhinus longimanus*) and shortfin mako shark (*Isurus oxyrhynchus*), as well as silky shark (*Carcharhinus falciformis*) when caught inside the Mayotte lagoon (Arrêté préfectoral n°08/UTM/2015 interdiction commercialisation requin).

2.3.2.3 Mobulids

Based on the fact that Mobulid rays are protected species under CITES, and within the Mayotte lagoon show relatively low abundances, a local regulation has banned professional and recreational fishing manta rays. This ban is year round, irrespective of fishing techniques, and encompasses the territorial and inland waters of Mayotte (Arrêté préfectoral n°37/UTM/2013 portant interdiction de pêche des raies Manta)

2.3.2.4 Coral and shellfish

Based on the need to protect fauna in the Mayotte lagoon, as well as reduce excessive harvesting of large molluscs, which has led to increases in abundance of coral-feeding starfish, a local regulation prohibits the harvesting of coral and the collection of certain shellfish species in Mayotte (Arrêté préfectoral n°481/DAGC - corail et coquillage):

- All coral species
- *Chariona tritonis*, commonly called Conque

- *Cypraecassis rufa*, commonly known as Casque rouge
- *Cassis cornuta*, commonly known as Fer a repasser.

2.4 Summary of fisheries

Table 9 provides the main artisanal metiers (gears and/or fishing techniques) operating in Mayotte. All types of gears are listed, reflecting the multigear specificity in the island. Fishermen can opportunistically change gear or metiers depending on the day or the season. Such opportunistic fishing activities have a high resilience to change, as no specific species are targeted, therefore fishers can adapt their activities to seasonality and external constraints (e.g., market forces). Overall, 53% of licensed boats operated 1 metier, 28% operated 2 metiers, and 20% operated 3 or more metiers (Weiss et al. 2019).

Table 9: Metiers used in Mayotte in 2018 (source: Weiss et al. 2019)

French Name	English Name	Number Of Boats
Lignes et cannes manuelles à poissons démersaux	Non mechanised handlines and pole and lines for demersal fish	83 (42%)
Lignes de traîne à grands pélagiques	Troll line for large pelagic fish	56 (29%)
Lignes et cannes manuelles à petits pélagiques	Non mechanised handlines and pole and lines for small pelagic fish	33 (17%)
Filets maillants à poissons	Set gillnets	10 (5%)
Filets maillants encerclants à petits pélagiques	Encircling gillnets for small pelagic fish	6 (3%)
Lignes et cannes manuelles à grands pélagiques	Non mechanised handlines and pole and lines for large pelagic fish	3 (2%)
Lignes à main et à cannes mécanisées à poissons démersaux	Mechanised handlines and pole and lines for demersal fish	2 (1%)
Apnée à poissons	Free diving for fish	2 (1%)
Palangres dérivantes à grands pélagiques	Drifting longlines for large pelagic fish	1 (1%)

Note: industrial purse seiners not operating in Mayotte are not included.

Table 10 presents the main species caught by the various metiers in Mayotte, based on SIH detailed data for 2018 (see Section 9.1). First, there are a high diversity of gear/metiers operated in Mayotte, focused solely on two vessel types, “barges” and "pirogues". However, non-mechanised lines are used by close to 90% of boats, with gillnets used by less than 10% of boats; other metiers are almost anecdotal.

Table 10: Description of species and groups caught by the various metiers in Mayotte (percentage of total catch per gear) (source: Weiss et al. 2019)

ASFIS code	French name	Scientific name	English name	Set Gillnets	Encircling gillnets for small pelagic fish	Troll line for large pelagic fish	Non-mechanised handlines and pole and lines for large pelagic fish	Non-mechanised handlines and pole and lines for small pelagic fish	Non-mechanised handlines and pole and lines for demersal fish
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna			21.9	28.6	<0.1	1.5
TRI	Balistes nca	*Balistidae*	Triggerfishes, durgons nei	0.5				0.4	0.1
GBA	Barracuda	*Sphyraena barracuda*	Great barracuda	0.2		0.2		1.6	0.3
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei					0.2	<0.1
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei					7.6	1.5
DOT	Bonite à gros yeux	*Gymnosarda unicolor*	Dogtooth tuna	0.1			<0.1	1.4	0.5
EMP	Empereurs nca	*Lethrinidae*	Emperors (=Scavengers) nei	3.1	0.2			2.5	13.8
CGX	Carangidés nca	*Carangidae*	Carangids nei	7.4	0.2	0.4	14.3	21.2	10.9
SUR	Chirurgiens nca	*Acanthuridae*	Surgeonfishes nei	15.3	0.2			<0.1	0.1
SDX	Comètes nca	*Decapterus spp*	Scads nei	0.2			7.1	51.1	0.7
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish			1.0		1.1	<0.1
VRL	Croissant queue jaune	*Variola louti*	Yellow-edged lyretail					0.2	0.2
SWO	Espadon	*Xiphias gladius*	Swordfish				42.9		
CJX	Fusiliers nca	*Caesionidae*	Fusiliers nei	6.6	9.9				<0.1

ASFIS code	French name	Scientific name	English name	Set Gillnets	Encircling gillnets for small pelagic fish	Troll line for large pelagic fish	Non-mechanised handlines and pole and lines for large pelagic fish	Non-mechanised handlines and pole and lines for small pelagic fish	Non-mechanised handlines and pole and lines for demersal fish
ALB	Germon	*Thunnus alalunga*	Albacore			0.2			<0.1
GRX	Grondeurs, diagrammes nca	*Haemulidae (=Pomadasyidae)*	Grunts, sweetlips nei					<0.1	<0.1
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna			65.9			0.1
NSG	Mamila arabe	*Scolopsis ghanam*	Arabian monocle bream					<0.1	
RAG	Maquereau des Indes	*Rastrelliger kanagurta*	Indian mackerel		23.7			<0.1	<0.1
HCZ	Marignans nca	*Holocentridae*	Squirrel fishes nei					0.2	1.2
GPX	Mérous nca	*Epinephelus spp*	Groupers nei	<0.1				1.4	6.0
BEN	Aiguilles, orphies nca	*Belonidae*	Needle fishes, etc. nei	2.8	52.6				0.6
PWT	Perroquets nca	*Scaridae*	Parrot fishes nei	18.2	0.8				<0.1
OCT	Pieuvres, poulpes nca	*Octopodidae*	Octopuses, etc. nei	0.1					
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei	39.7	12.1			1.1	35.2
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei			0.9		<0.1	<0.1
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei					0.2	0.1
MUX	Rougets nca	*Mullus spp*	Surmullets (=Red mullets)	<0.2	0.2	0.2		<0.1	3.9

ASFIS code	French name	Scientific name	English name	Set Gillnets	Encircling gillnets for small pelagic fish	Troll line for large pelagic fish	Non-mechanised handlines and pole and lines for large pelagic fish	Non-mechanised handlines and pole and lines for small pelagic fish	Non-mechanised handlines and pole and lines for demersal fish
			nei						
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad		<0.1				<0.1
COM	Thazard rayé indo-pacifique	*Scomberomorus commerson*	Narrow-barred Spanish mackerel	1.1		3.3			1.1
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo			0.9		0.7	
BET	Thon obèse(=Patudo)	*Thunnus obesus*	Bigeye tuna			0.1			
TUN	Thonidés nca	*Thunnini*	Tunas nei			4.7			0.1
KAW	Thonine orientale	*Euthynnus affinis*	Kawakawa			0.1		0.4	<0.1
LVK	Vivaneau à raies bleues	*Lutjanus kasmira*	Common bluestripe snapper					0.2	0.4
ETC	Vivaneau flamme	*Etelis coruscans*	Deepwater longtail red snapper	0.3					0.2
AVR	Vivaneau job	*Aprion virescens*	Green jobfish					5.8	3.1
LJG	Vivaneau pagaie	*Lutjanus gibbus*	Humpback red snapper	0.1				0.7	4.3
ARQ	Vivaneau rouillé	*Aphareus rutilans*	Rusty jobfish	4.1				0.2	0.1
ETA	Vivaneau rubis	*Etelis carbunculus*	Deep-water red snapper	<0.1			<0.1		0.1

ASFIS code	French name	Scientific name	English name	Set Gillnets	Encircling gillnets for small pelagic fish	Troll line for large pelagic fish	Non-mechanised handlines and pole and lines for large pelagic fish	Non-mechanised handlines and pole and lines for small pelagic fish	Non-mechanised handlines and pole and lines for demersal fish
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei		<0.1	0.1	<0.1	1.9	13.7
SFA	Voilier indo-pacifique	*Istiophorus platypterus*	Indo-Pacific sailfish	<0.1		0.1			
				100%	100%	100%	100%	100%	100%

As a conclusion, the fishery sector in Mayotte is exclusively composed of small scale fisheries, operated from two type of vessels designed to be multigear and offering high resilience to change for fisheries. Such fishing activities are also highly dependent on fragile lagoon and coastal resources.

Multiple metiers are operated from these artisanal vessels during day trips, predominantly within coastal habitats, with the gear being used changing from day to day, and no marked seasonality in fishing activities.

The vessels tend to be fairly old and operate with a small crew of 2-3 members at most.

The only industrial vessels registered in Mayotte do not operate from or use the port of Mayotte.

SECTION 2 - KEY FINDINGS

- Exploited stocks in Mayotte are all within the EEZ, and are mostly coastal catches.
- Mayotte fisheries are artisanal, opportunistic, and catch a wide range of species.
- Boats are mostly under 10m long, are multigear, and are fairly old and do not venture too far away from coastal habitats.
- The composition of catches is largely dominated by a "marine fishes nei" group, followed by "other species nei".
- Only a small number of large pelagic stocks are assessed, because they are under IOTC mandate.
- Informal and IUU fishing is widespread.
- There is a lack of human and financial resources to properly monitor the recreational fisheries. A new survey should be launched in the near future, with Ifremer as technical advisor.
- The sea cucumber fishery has been closed since 2004, due to stock status concerns.
- There are plans to develop local fisheries away from the overexploited and fragile lagoon/reef stocks to more pelagic resources, such as tuna and tuna-like species.

3 Institutional structures

Data collection in France and its ORs is well structured and there is a national framework in place, with some specificities in ORs depending on the local context (Figure 7). This is a very important aspect of the French data collection framework in the ORs: it is very centralised and harmonised at the national level. Therefore, all national-level processes and institutions are an integral part of what is done at the level of each OR. Virtually nothing in terms of data collection is done in the OR that is not following a process or policy set at the national level.

In Mayotte, landings and biological data is collected following SIH protocols and entered/stored using SIH tools. Paper Fishing logbooks are submitted by fishermen directly to DMSOI Mayotte, then sent to FranceAgrimer for data entry.

3.1 Data collection

The overarching institution related to data collection is the Direction des pêches maritimes et de l'aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation[9]. Its roles are to ensure that France meets its obligation towards EU Common Fisheries Policy (1380/2013)[10], including the data collection framework (Regulation (EU) 2017/1004)[11] and 2017-2019 EU-MAP[12] and the 2020-2021 EU-MAP (consisting of two Commission Decisions) [13].

In-field data collection involves several national institutions and research institutions (only OFB has an implantation in Mayotte):

- Ifremer (*Institut Français de Recherche pour l'Exploitation de la Mer*): organize data collection from samples (biological data), manage fisheries information system (SIH)
- IRD (*Institut de Recherche pour le Développement*): Tuna monitoring
- University of Nantes – LEMNA (*Laboratoire d'Economie et de Management de Nantes-Atlantique*): socio economics data for vessel above 12 m – not involved in Guadeloupe
- FranceAgrimer: in charge of recreational fisheries monitoring and of industries/processing plants/auction houses monitoring in mainland France.
- OFB (Office Français pour la Biodiversité): in charge of data collection in Mayotte.

9 https://agriculture.gouv.fr/

10 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

11 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

12 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

13 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

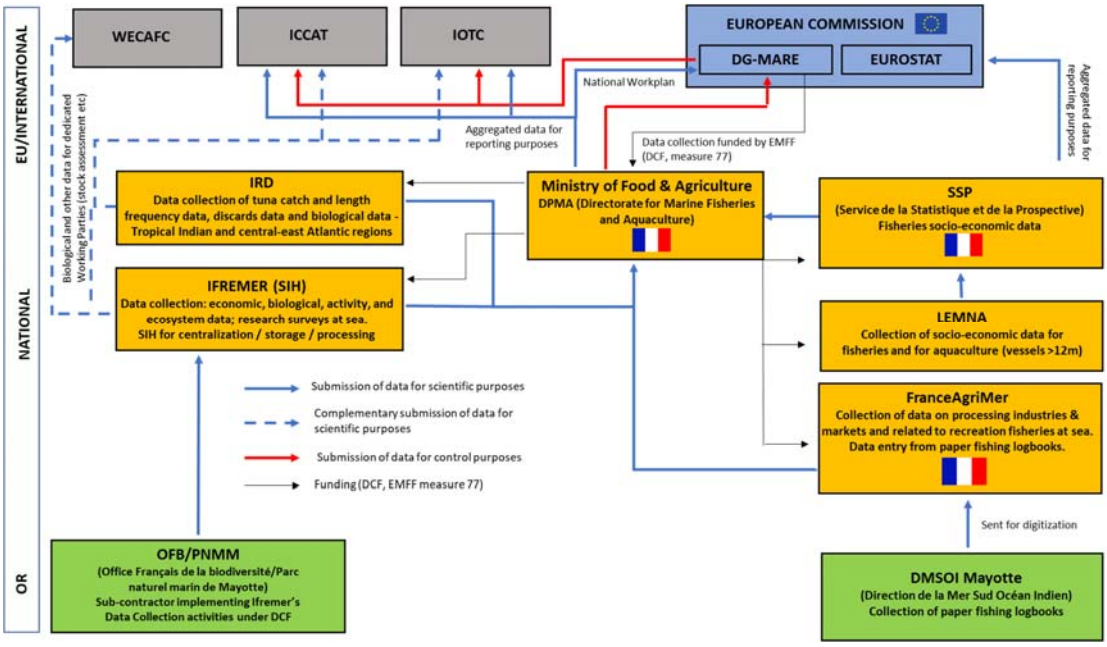

Figure 7: Institutional organisation of fisheries data collection in France and Mayotte

3.1.1 Overall workflow of data collection in France and its ORs

While the DCF provides a legal framework, organisation and general obligations, the EU-MAP establishes the (minimum) data requirements to be collected and at what frequency. For example, biological variables associated with a métier include length and discard data for pre-determined species to allow for quarterly evaluation of length distributions and discard volumes. These data must be recorded to "level 6" which includes data for levels 1 to 5, providing background information on the fleets in question.

Since 2014, the European Maritime and Fisheries Fund (EMFF) provides each MS financial support to implement the DCF. Articles 17 to 20 of the EMFF Regulation (EU) 508/2014 require participating MS to produce an 'operational programme' for the EMFF. The operational programme sets out how each MS intend to spend their EMFF budget and is subject to approval by the EC. In addition, under the DCF each MS must set out a work plan and submit an annual report describing the implementation of the DCF.

DPMA provides the National work plan, revised on an annual basis, as needed. This document describes how France is going to comply with the DCF obligations, while each OR organizes its own fisheries monitoring system.

According to DPMA, the following workflow is in place for catch reporting, following the Control Regulation (EC) 1224/2009[14]:

- Vessels below 10 m (paper logsheets) and vessels 10 to 12m (paper logbooks) send their paper-based catch data to the local Sea Directorates for quality control,

14 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

which then transmit them to FranceAgrimer for data entry in the SACAPTE system, from where they are integrated into the SIH.

- Vessels above 12 m: e-logbooks are directly uploaded into the SIH. VMS data and sales data are also directly uploaded to SIH, but without data relevant to ORs, as there is no sales house or any vessel above 12m.

Ifremer is responsible for 90% of data collection with IRD responsible for collecting data on tuna fisheries (though this is minor for ORs, as IRD is mainly involved with collecting data from high sea fleets).

Ifremer is *de facto* "managing" fisheries data collection issues in ORs for DPMA. Ifremer has strived over the past year (2020) to set up a single focal point for all data-related questions, to make things easier when DPMA requests information from them. DPMA is also pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools. The ultimate goal being one single tool at IFREMER to get all information and statistics on fisheries.

FranceAgrimer are in charge of recreational fisheries monitoring and of industries/processing plants monitoring/auction houses on the mainland. This is done for them by a private subcontractor (BVA).

Service de la statistique et de la prospective (SSP) and LEMNA implement socio-economic surveys on all French vessels on the fleet register, including in the ORs, and report to DMPA.

3.1.2 Data collection and other reporting obligations in Mayotte

In Mayotte, since there is no local Ifremer implantation, data are collected by the Office Français de la Biodiversité (OFB), through the Marine Park staff, following SIH protocols and entered using SIH tools into the SIH database (Harmonie). OFB is only there to collect data and does not have access to SIH data for scientific purposes, except through formal data requests. Activities are compartmentalised and, for example, OFB cannot access fishing logbook data submitted by fishermen to DMSOI.

IRD does some data collection in Mayotte related to depredation of catches by sharks and marine mammals, as part of their observer programmes on board of large-scale fishing vessels.

Paper fishing logbooks are submitted by fishermen directly to DMSOI in Mayotte, which then sends them to FranceAgrimer for data entry, after which data is made available for DPMA. Since 2014, this information hasn't been processed by FranceAgrimer as it seems there have been issues with species code lists used in logbooks compared to what the SIH/DCF mandates. Though this issue has been resolved according to DMSOI and OFB, historical data haven't been corrected and are not entered at this time.

In Mayotte, fishers are willing to collaborate for data collection activities such as self-sampling (as has been implemented in La Réunion) but the data flow process is not in place.

3.1.3 The SIH

The SIH (Système d'Informations Halieutiques or Fisheries Information System) was developed under the framework of the ecosystem-based approach to fisheries, to cover both ecosystem resources and uses. The overarching aim of this system is to gather all

fisheries information in a single system. This system covers collected catch and effort data, as well as existing data. The system was developed to then harmonise the data, store and preserve them, and make the data available to partners.

The SIH was prototyped in 2007 in Martinique. Since 2017, the system has been managed from the Brest office of Ifremer, with regional focal points which serve as a relay for the national SIH people based in Brest. The SIH is organised in 4 modules, all managed by Ifremer:

Ecosystems: Data collection for this module happens mostly in Metropolitan France (i.e., not in the ORs), and can include abundance indices for stock assessments, campaigns etc.

Exploited resources: This module examines population structure and collects the main biological parameters for stocks. This involves biological observation of landings, including in markets and factories. There is some biological sampling in the Ors, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers. Biological sampling on large pelagics under the mandate of RFMOs (ICCAT, IOTC) is considered as generally good. In 2021, Ifremer plans to do more biological sampling in the Ors, mainly based on buying fish in ports, on a larger range of species, as per STECF recommendations.

Landings & effort: In Mainland France, data flow is considered good (e-logbooks etc), but not in ORs. The standard flow of reporting is as follows: fishers send their logbooks or logsheets to the local Direction de la Mer, which sends them after quality control to FranceAgrimer for data entry (in-house or by subcontractors). One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed. The overall reporting rate for the ORs is currently estimated at 50%. In this regard, the role of the local DMs is very important to train fishers, support them etc. for data reporting. To address this issue of reporting, Ifremer developed Observation des Marées au débarquement (OBSDEB), which works by performing sampling at landing sites, to rebuild catches and effort on the last 7 days. For 2021, Ifremer's objective is to improve catch and effort reporting by fishers.

Socio-economic data: Data on activities: month per month reconstitution of activity with metier, species & distance from coast. From there, segmentation of the fleet is derived. This information is used as basis for sampling plans. Availability of such data varies depending on the ORs.

LEMNA collects data from vessels with proper accounting. Ifremer tries and collect data from vessels without such information or refusing to provide them.

Database: SIH uses a central database named HARMONIE. It is used for storage, Quality Assurance, validation, aggregation, anonymisation, processing, statistics, and also for providing data to end users.

The current objective is to compile all available data from Ifremer, IRD and the National Museum of Natural History (MNHN) in the Ifremer Harmonie database used by the SIH, so that all data is already in a single system and format, ready for data calls. Data would be harmonised using the ICES Regional Database and Estimation System (RDBES) data standard, which includes metadata on methodologies, campaigns, processing etc. There is also work on harmonising sampling plans, data collection protocols, Quality Assurance methods, estimation and processing etc.

Harmonie and the related software are mostly developed and maintained in-house (DSI, Direction des services informatiques), with software development partly outsourced to external contractors, based on Ifremer specs.

Data calls: Ifremer is usually in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the caller (DPMA, ICES, IOTC). There is a good collaboration with the Atlas of European Tuna fisheries[15], maintained by IRD to compile all tropical tuna fisheries data (which are not collected by Ifremer). In the case of IOTC, IRD is in charge of compiling requested data.

3.1.4 Reporting to regional/international organizations

DPMA does not report statistics *per se* to the European Commission but provides an Annual Report on the implementation of DCF through the Work Plan (2017-2019, 2020-2021).DPMA reports data related to data calls from EC, ICES, RFBs (WECAFC, SIOFA) and RFMOs (ICCAT, IOTC, GFCM), while SSP sends statistics to Eurostat, FAO, with disaggregation per OR. Lastly, Ifremer and IRD both contribute biological data directly to dedicated regional working groups to which the EU is a participant.

3.2 Scientific advice

Ifremer and IRD play a central role in the production of national scientific advice. Such advice is either requested by local authorities, such as Direction de la Mer (DM), or by central French authorities such as Direction de la Pêche Marine et de l'Aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation.

As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests. However, access to actual SIH datasets is only granted on request, including for internal users.

- Internal users: if granted, they have access to raw datasets. In some cases, SIH staff prepares datasets for internal users (e.g., users who do not need and/or could not use raw data). VMS data is a specific case where access is given after very careful review of the request.
- External users: if granted, they have only access to prepared datasets, properly aggregated and anonymised.

All requests (including access to data or data calls) are reviewed by a dedicated structure, called CREDO (Cellule de Réponse aux appels de DOnnées). The review process includes (i) determining who would prepare/provide the data within Ifremer; and (ii) who will use the data and for what. Importantly, the review process depends on the dataset. Ifremer will review the data before release only with less sensitive datasets, while Ifremer plus DPMA review data such as SACROIS and OBSMER, which include business-confidential information. For these there is a quarterly steering meeting to review requests.

Access to data is mostly free, though Ifremer used to charge when data was requested by private for-profit entities, such as engineering bureaus. But the administrative overhead linked to charging for such information was so high that now they tend to just provide the data for free. In the context of the French Government's policy on access to public data (open data), there is a global review on access to data held in Harmonie, but this is a complex issue. DPMA mentions that in other areas, such as agricultural data, access is done entirely through an online tool (Agreste portal). This is an area where DPMA wants

15 https://sirs.agrocampus-ouest.fr/atlas_thonV5-DEC/index.php?atl_version=0&idlang=uk

to put more work, in order to allow the same sort of self-service access to fisheries data. Overall, Ifremer reviews around 200-300 data requests each year.

Ifremer also publishes fisheries data summaries, in the form of PDF fact sheets on given fisheries, metiers etc. These are published on an annual basis and are accessible to everyone on the Ifremer website. The production of those documents is highly automated, based on procedures and scripts stored in the SIH.

Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (e.g., working parties, scientific committee) to which France participates through the EU.

RFMOs (IOTC and ICCAT) share aggregated data with the public and share fine grained data with their Working Parties according to their data confidentiality policy. They can also grant access on request for fine grained data to external scientists etc, subject to approval by the Members.

RFMOs provide scientific advice based on the work of their scientific working groups and through their Scientific Committee. This scientific advice is made available to the general public on the respective RFMO websites.

3.3 Research institutions

There is no research institute in Mayotte. The scientific activities are conducted by OFB and also on a case-by-case basis by Ifremer or IRD, but mostly focus on data collection.

3.4 Monitoring, control and surveillance (MCS)

3.4.1 MCS workflow

The Control regulation mandates information requirements for fishers. These are received in paper form for smaller vessels (<12 m) by the local Sea directorates, then transferred to FranceAgriMer for data entry. There is an electronic data flow in place for larger vessels (≥12 m). All data then goes into the SIH (including VMS and sales).

At the local level, DMSOI and the Préfet are in charge of regulation implementation and enforcement. MCS activities are programmed as part of a National Biannual plan, which includes declinations at the local level.

In 2018, a global decree gathered all previous separate regulations relevant to Mayotte into one single text. Additional Prefectoral decrees are then taken as needed (rural and fisheries code).

In Mayotte, control is enforced by several structures:

- Brigade nautique (police);
- Gendarmerie maritime;
- Marine Park/OFB (rangers);
- DREAL (environment); and
- Unité littorale des Affaires Maritimes (fisheries code).

There is a convention between prosecutors (parquet) and Affaires maritimes and all infraction reports are forwarded to Affaires maritimes for advice. Confiscation of catches, fishing gear and boats can be done. In Mayotte, the workflow is as follows:

1. The Fisheries police controls a boat;
2. If an infraction is identified, they call DMSOI for authorisation to apprehend;
3. Catches are destroyed (dumped at sea) and fishing gear and the outboard engine/s are confiscated; and
4. If the boat is IUU it can be destroyed following decision by an enforcement judge.

In Mayotte, fisheries policing is not a priority compared to missions related to illegal immigration from neighbouring Comoros, though the fight against illegal fishing is part of the overall illegal immigration issue, as a large number of illegal immigrants work in IUU fishing. There is also confusion of roles in the minds of fishermen who sometime perceive fisheries MCS activities as police activities, which makes it harder to do data collection etc. since OFB has both roles.

At the level of RFMOs, control is enforced by Member States, but the RFMO body in charge of compliance can identify members that are not compliant and ask them to remedy the situation. For IOTC, non-reporting of Nominal Catch (NC) can lead the Commission to ban maintaining catch on board (no data, no catch), but though it has been considered closely for some CPCs, it was never actually applied. In extreme cases, the RFMOs can apply market measures to non-compliant states, but IOTC indicates that this has never happened.

3.4.2 MCS data for scientific purposes

Ifremer obtains administrative and control data from DPMA's SIPA (Système d'information de la pêche et de l'aquaculture)[16], such as vessel registration and characteristics, VMS data. IRD receive VMS data on longline fishing vessels to do cross checks on observer data/self-sampling (activities).

IOTC has estimates of unreported catch, which are available in the NC datasets. Estimates of IUU catches are predominantly for unreported catches. These comprise catches from some flags / fisheries that are reported by third parties (most frequently other CPCs, where landing of the fishing vessels occurs) and are regularly dealt with during IOTC scientific meetings and used for stock assessment purposes.

In the IOTC NC dataset unreported catch are listed as NEIPS / NEICE / NEIFR / NEISU / NEIDN to represent different 'NEI fleets' which are related to the type of vessel (purse seiners, longline fresh vs. deep freezing), to a specific reporting fleet (Indonesia, for vessels flagged by other countries and operating within their EEZ) or some now disappeared old flag (i.e., Soviet Union).

Specifically in Mayotte, no local enforcement or IUU data are supplied to scientists, as there is no local mandate to undertake this type of research.

3.5 Institutional capacity

3.5.1 National level

DPMA considers that the major factor hampering work of Ifremer is a lack of human resources. In particular are the lack of local staff in the ORs, including fisheries experts in

16 http://www.sipa.agriculture.gouv.fr

the field. Although monies can be obtained through EMFF, this does not cover hiring long term staff.

The objective of DPMA is to include under DCF all activities that should be part of regular data collection. In most cases, Ifremer and IRD implement all the activities themselves, but in Mayotte 100% of data collection is done by OFB (with Ifremer tools and protocols)

Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which had not been planned/budgeted. Often requests passed by DPMA through an official request to Ifremer, take priority, which can impact routine and project work. Recruitment within IRD is an issue too, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed.

There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge). Contracts are currently on a 3-year basis, but the next ones will be for 4 years.

3.5.2 Mayotte

Regarding data collection done by OFB, there is a large number of landing sites, so covering them all is difficult with only 4 OFB fisheries agents, especially when landings occur between 3am and 8pm, each day. There is a clear lack of human and equipment resources. One of the reasons behind that is that OFB's overall mission does not include fisheries monitoring: the fact that OFB does this in Mayotte for Ifremer is an exception, as this is not a priority at the level of the institution (OFB has other environmental missions in Mayotte).

The lack of a local Ifremer office in Mayotte is predominantly due to historical reasons. This is a very small island, which has not been a top priority for French authorities, especially since it was disputed by Comoros. OFB has only been on Mayotte since the Marine Park (2010) was created, with Mayotte having been covered from Ifremer Réunion.

One other staff-related limitation is that contracts are 1 year, renewable up to a maximum of 6 years, after which the agent cannot work for OFB anymore, so there is a forced turnover and a loss of expertise.

In terms of observer/sampler coverage, one key problem is that they need to speak the local language/dialects to be able to interact with fishermen, but they also need to have a certain level of education and training to be able to properly collect data, and this proves very hard to reconcile. So collected data is often of questionable quality and requires a lot of verification and correction, increasing the workload of the OFB staff.

DMSOI mentioned in interviews that they have only 26 staff for policing navigation, fisheries, and "lighthouses and beacons" tasks, which can be a limiting factor for MCS activities.

SECTION 3 - KEY FINDINGS

- Data collection in France and its ORs is well structured and there is a national framework in place, with some specificities in ORs depending on the local context.
- The main actor is Ifremer, responsible for 90% of data collection, with IRD focusing on collecting data on tuna catches in the Indian Ocean.
- DPMA is pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools (i.e., one-stop shop for all fisheries information).
- In Mayotte, landings and biological data is collected by OFB following SIH protocols and entered/stored using SIH tools. Paper fishing logbooks are submitted by fishermen directly to DMSOI Mayotte, then sent to FranceAgrimer for data entry.
- Since 2014, paper fishing logbook information hasn't been processed by FranceAgrimer, as there have been issues with species code lists used in logbooks compared to what the SIH/DCF mandates. Though this issue has been resolved according to DMSOI and OFB, historical data haven't been corrected and are not entered at this time.
- DPMA provides fisheries statistics to RFMOs, while Ifremer and IRD contribute scientific expertise and advice to both DPMA and RFMOs.
- Access to fisheries data for 3rd parties is free, but on request. This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data as in other agriculture sectors.
- In Mayotte, fisheries policing is not a priority compared to missions related to illegal immigration from neighbouring Comoros, though the fight against illegal fishing is part of the overall illegal immigration issue as a large number of illegal immigrants work in IUU fishing.
- There is also a confusion of roles in the minds of fishermen who sometime perceive fisheries MCS activities as police activities, which makes it harder to do data collection etc. since OFB has both roles.
- In Mayotte, no local enforcement or IUU data is supplied to scientists, as there is no local mandate for doing this sort of research
- The major hampering factor regarding Ifremer is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF.
- In most cases, Ifremer and IRD implements all the activities themselves, but in specific situations data collection is done by private contractors for Ifremer.
- There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).
- In Mayotte, there is a large number of landing sites, so covering them all is difficult with only 4 OFB fisheries agents, especially when landings occur between 3.00 am and 8.00 pm, each day.
- OFB's overall missions do not include fisheries monitoring: the fact that OFB does this in Mayotte for Ifremer is an exception, so this is not a priority at the level of the institution.

- OFB's staffing regulations also make it difficult to keep expert staff.

4 Funding and funding structures for data collection

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member State funding

DPMA provided a description of how the EMFF process works in France.

Top – down:

1. The European Union votes a global envelope for EMFF. It is the result of a political consensus.
2. A national envelope is scaled according to complex rules including different criteria.
3. A percentage of this envelope is assigned to data collection (Article 77).

Bottom – up:

At the French national level, needs from the different institutions are collected according to the DCF requirements and national priorities (such as for recreational fisheries). A draft of the total budget for DCF data collection is made available. Final negotiation: this draft is assessed against the DCF percentage available in EMFF for France. Discussions starts again to find the correct balance between complex priorities.

EMFF funds 80% of the eligible costs (not all data collection activities are eligible). The remaining 20% is supported by the institution's own budget.

DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. It takes usually 4-5 months to complete the process; DPMA is also a beneficiary of Article 77.

There are some projects related to data collection outside Article 77:

- Article 28: scientific partnership
- Article 39: improvement of gear selectivity
- Article 40: large marine ecosystem knowledge (to be confirmed), and
- Article 76: MCS funding

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.

Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French *Cours Des Comptes*. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

France received under the EMFF 2014-2020 EUR 588 million. In this respect, the EMFF Operational Programme for France 2014FR14MFOP001 (DPMA, 2015) described the proposed use of EMFF by France, including OR:

- Union Priority 1 (UP1): EUR 150.9 million (25.7% of total EMFF allocation) will aim at a better balance fisheries activities and environmental protection and sustainability. It will address (among others) fleet capacity by adjusting fleet capacity to resources, modernisation of the fleet, investments in port infrastructures in line with requirements under the discards ban, and improving traceability of fisheries products and processing.
- Union Priority 2 (UP2): EUR 88.8 million (15.1% of EMFF allocation) will go towards meeting the objectives of the French national strategic plan for aquaculture that aims at boosting competitiveness and sustainability of the French aquaculture sector.
- Union Priority 3 (UP3): EUR 122.3 million (20.8% of EMFF allocation) will go towards compliance with CFP rules regarding control and data collection. This include Article 77 of interest to this study: total budget in the programme is EUR 66 146 872. This is the main source of EMFF funding for DCF data collection at the national and OR level.
- Union Priority 4 (UP4): EUR 22.6 million (3.8% of EMFF allocation) will help ensure better territorial cohesion of fisheries and aquaculture. Foreseen activities include maintaining and creating new jobs, reinforcing the position of fisheries and aquaculture within the development of coastal territories, strengthening the FLAGs network, and increasing added value through innovative projects and research.
- Union Priority 5 (UP5): EUR 163.2 million (27.8% of EMFF allocation) will go towards improving the marketing, diversification and valorisation of seafood products. The French OP gives a central role to producer organisations (PO) that currently place almost 50% of the French production on the market, through the implementation of production and marketing plans and the reinforcement of POs across its territory (both mainland and outermost regions). Please note compensation for additional costs for seafood marketing etc in the six French ORs has more than doubled compared to the 2007-2013 period.
- Union Priority 6 (UP6): EUR 5.3 million (0.9% of EMFF allocation) will go towards strengthening the efficiency of maritime surveillance and widening the network of marine protected areas and improving knowledge on the marine environment and interactions with human activities.
- EUR 34.8 million (5.5% of EMFF allocation) are allocated to technical assistance in order to reinforce the implementation system, ensure efficient administration of the EU funding, including support to reducing burden on beneficiaries, improving administration and publicity and information measures.

Financial information:

- Total OP budget: EUR 774 353 018.
- Total EU contribution: EUR 587 980 173, including EUR 66,146,872 for DCF.
- Total national contribution: EUR 186 372 845.

EMFF is operationally managed by DPMA. Some of the fund management is delegated to sub-national level (*Régions*).

4.1.2 OR funding

No specific budget has been proposed by the EMFF operational programme for French ORs. Nonetheless, use of EMFF funds in the OR can be extracted from France's financial report (Liste des opérations du programme national FEAMP 2014-2020, 2019). This shows that the total use of EMFF funds in Mayotte has been EUR 4 685 541 (as of December 2019), comprising 69% for cost compensation (Article 70) and 15% for data collection (Article 77).

4.2 Other sources of funding

Ifremer has a total annual budget in 2017 of EUR 194.4 million (Cours des Comptes[17], 2019); with the following breakdown: (i) EUR 154.4 million directly supported by the national budget (subsidies for public services support), and (ii) approximately EUR 40 million from contracts and projects; the EUR 40 million includes support from EMFF.

EMFF reimburses 80% of eligible expense, which usually corresponds to 60% of the expenses. The remaining 40% are covered by Ifremer national budget.

The other source of funding is France's regular national budget, which can provide funds under various mechanisms:

- Grant agreement with Ifremer and IRD;
- "*Convention socle halieutique*" with Ifremer: used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan; and
- Triannual agreement with IRD.

IRD mentioned that funding can be allocated by DG MARE or CINEA (formerly EASME) to specific projects for field data collection or meta-analysis. Several examples in recent years include (though these are not Mayotte specific):

- Scientific advice on shark management in RFMOs: data exploration and retrieval and analysis (3 years);
- Shark management in Atlantic about key species (18 month);
- RECOLAP: evaluation of implementation of Electronic Monitoring System (EMS) in small longliners (only Réunion);
- Meta analysis of CMMs in longline fisheries in Atlantic about hook shapes etc.; and
- Pilot study funded by DCF on whitetip ban on retention -> survival rate post release in purse seine and longline fisheries. POREMO.

4.3 OR funding for data collection

Given the centralization of the data collection programme in Ifremer with a global support from SIH in Brest (Bretagne, France Metropolitan), funds under measures on data collection referred to in Article 77 are managed and engaged at the national level. These are then managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and the ORs, including sub-contracting with external vendors for data collection in some ORs.

[17] *Cours des comptes* = Account court, the French National Institution in charge of controlling National Accounts.

The already cited "Liste des opérations du programme national FEAMP 2014-2020, 2019" provides the detail for FEAMP activities under measures on data collection referred to in Article 77.

Table 11: EMFF funds received by the various French institutions under measures on data collection referred to in Article 77

Institution name	Total eligible funds (EUR)	Total funding received (EUR)
Agence Des Aires Marines Protegees	293 416.05	234 732.84
Agence Francaise Pour La Biodiversite	914 730.00	731 784.00
Franceagrimer	44 961.90	35 969.52
Ifremer	41 517 440.00	33 213 492.00
Inra	1 025 238.00	820 190.00
IRD - Institut De Recherche Pour Le Developpement	9 628 639.00	7 702 911.00
Ministere De L'agriculture De L'alimentation Maa	9 670 201.00	7 736 160.00
Museum National D'histoire Naturelle	1 084 263.00	756 113.00
Universite De Nantes	3 049 192.00	2 439 353.00

There is no specific EMFF funding request for Ifremer data collection under DCF for each OR, but Ifremer provided a breakdown for expenses engaged specifically in each of the ORs for the period 2017-2018. For Mayotte, there are no expenses as the only institution involved in data collection in Mayotte is OFB, and they directly applied for EMFF funding, outside of the national DCF allocation. For the EMFF period, OFB received EUR 698 475 for data collection in Mayotte.

Table 12: EMFF funds received by OFB in Mayotte under measures on data collection referred to in Article 77

Operation	Total eligible funds (EUR)	Total funding received (EUR)
2017 Data collection	EUR 293 416.05	EUR 234 732.84
2017 Data collection (transversal data)	EUR 293 416.05	EUR 234 732.84
DCF 2018	EUR 286 262.55	EUR 229 010.04

In discussions with OFB, due to staff constrains, for the next EMFF cycle funding requests have stayed the same, but the following points could use additional funding:

- Collection of new data;
- New DCF data collection obligations for recreational fisheries;
- Coverage of informal fisheries; and
- Extension of biological data collection.

There exist some alternative sources of funding outside of the EMFF, for activities not covered under DCF. Regarding Ifremer, there are two main sources:

- Convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer and not under DCF (Ifremer proposes actions, DPMA funds them). There is less and less activities under this line, as more and more is getting covered by the DCF. For years, the remaining 20% of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining include SACROIS and the data access portal.
- DCSMM: partnership with OFB/Marine parks to provide tools & services. In Mayotte, data are collected following SIH protocols and entered/stored using SIH tools. In other ORs, there is no data collection activities but Ifremer provides summary data for marine parks and Natura 2000 areas, under a pluriannual data provision convention (latest from 2019).

SECTION 4 - KEY FINDINGS

- EMFF funding process is highly centralised in France: DPMA is the single EMFF management authority.
- At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities.
- There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.
- In the current EMFF cycle, administrative issues led to a very late availability of EMFF funds, due to changes in the management structure in France as well as issues with the software developed to manage funding requests.
- France received for EMFF 2014-2020 a total of EUR 588 million.
- Early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities.
- Total use of EMFF funds in Mayotte: EUR 4 685 541 (as of December 2019), with 69% for cost compensation (Article 70) and 15% (EUR 698 475) for data collection (under measures on data collection referred to in Article 77)
- Other sources of funding for data collection come from the national budget, through grant agreements, conventions etc. DG MARE and CINEA (former EASME) can also contribute to funding specific projects or research activities.
- For Mayotte, OFB requests for funding will remain the same for the next EMFF cycle, due to staff constrains that prevented drafting a new proposal. The following point could use additional funding: Collection of new data; New DCF data collection obligation on recreational fisheries; Coverage of informal fisheries; Extension of biological data collection.

5 Current state of data collection obligations

Ifremer mentioned the convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer not covered under the DCF (i.e., Ifremer proposes actions, DPMA funds them). There are less and less activities under this line, as more and more are being funded within the DCF. For years, the remaining 20% of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining that are not funded by the DCF include SACROIS, data access portal. According to IRD, coverage is relatively good overall regarding DCF obligations.

5.1 DCF data obligations

DCF obligations as per Commission Delegated Decision (EU) 2019/910 (EU, 2019) are detailed in Chapter III Data Requirements: Section III.2. lists requirements related to biological data on stocks caught by Union commercial fisheries in Union and outside Union waters and by recreational fisheries in Union waters:

a) *Catch quantities by species and biological data from individual specimens enabling the estimation of:*
   i. *For commercial fisheries, volume and length frequency of all catch fractions (including discards and unwanted catches) for the stocks listed in Tables 1A, 1B* (Table 13, below) *and 1C* (Table 14, below), *reported at the aggregation level 6 as set out in Table 2. The temporal resolution shall be coordinated at marine region level based on end-user needs;*
   ii. *For commercial fisheries, mean-weight and age distribution of catches of the stocks listed in Table 1A, 1B and 1C. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*
   iii. *For commercial fisheries, sex-ratio, maturity and fecundity data for stocks listed in Tables 1A, 1B and 1C of catches at frequencies needed for scientific advice. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs; and*
   iv. *For recreational fisheries, annual volume (numbers and weights or length) of catches and releases for the species listed in Table 3 and/or the species identified at marine region level as needed for fisheries management purposes End user needs for age or other biological data as specified in paragraphs (i)-(iii) shall be evaluated for recreational fisheries at marine region level.*

Table 13 (listed as 'Table 1B' in the regulation) gives the list of stocks that are specifically to be reported for Mayotte under the DCF.

Table 13: DCF Table 1B list of stocks that are specifically to be reported for Mayotte and La Réunion.

List of stocks	Included in 2017-2019 France Workplan	Included in 2020-2021 France Workplan
Snappers (*Lutjanidae*)	Yes	Yes
Groupers (*Serranidae*)	Yes	Yes
Tuna-like fish (*Scombridae*)	No	No
Swordfish (*Xiphias gladius*)	No	No
Other billfishes (*Istiophoridae*)	No	No
Dolphinfish (*Coryphaena hippurus*)	No	No
Bigeye scad (*Selar crumenophthalmus*)	Yes	Yes

Table 14 (listed as Table 1C in the regulation) lists the species under RFMO mandates, IOTC in the case of Mayotte, which have to be reported specifically for this OR. All species listed are covered under the relevant IOTC data reporting requirements. For Mayotte, the IOTC Compliance Committee noted in its 2020 EU Compliance Report, that no data had been provided for France-Mayotte coastal fisheries (handline & troll line), but France indicated that this was due to an issue in the chain of transmission rather than a lack of available data, and that measures had been taken to provide the data as soon as possible.

Table 14: DCF Table 1C list of stocks that are under the mandate of an RFMO and to be reported for Mayotte and La Réunion.

List of stocks	Included in 2017-2019 France Workplan?	Included in 2020-2021 France Workplan?
Yellowfin tuna (*Thunnus albacares*)	Yes	Yes
Bigeye tuna (*Thunnus obesus*)	Yes	Yes
Skipjack tuna (*Katsuwonus pelamis*)	Yes	Yes
Albacore tuna (*Thunnus alalunga*)	Yes	Yes
Swordfish (*Xiphias gladius*)	Yes	Yes
Blue marlin (*Makaira nigricans* or *mazara*)	Yes	Yes
Black marlin (*Makaira indica*)	Yes	Yes
Striped marlin (*Tetrapturus audax*)	Yes	Yes
Indo-Pacific sailfish (*Istiophorus platypterus*)	Yes	Yes
Bullet tuna (*Auxis rochei*)	Yes	Yes
Frigate tuna (*Auxis thazard*)	Yes	Yes
Kawakawa (*Euthynnus affinis*)	Yes	Yes
Longtail tuna (*Thunnus tonggol*)	No (no catches)	No (no catches)
Indo-Pacific king mackerel (*Scomberomorus guttatus*)	Yes	Yes
Narrow-barred Spanish mackerel (*Scomberomorus commerson*)	Y	Y

Both France work plans for data collection in the fisheries and aquaculture sectors for 2017-2019[18] and 2020-2021[19] refer to method of data collection through sample based surveys (Text Box 4A in 2020-2021 workplan for instance). Table 13 shows that, of the 7 stocks to be specifically included under DCF in Mayotte, 4 of them are not included in the French workplan, but they all stocks for which catches are under 200t, so not mandatory under DCF.

The STECF, in 2020, conducted an analysis of the DCF Work Plans and Annual Reports submitted by all EU Member States, focusing in the EU ORs. Regarding France, it concluded that there was a lack of specific mention of the individual ORs in the work plans and national reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds (see complete STECF 2020 for more details).

Specifically about Mayotte, the same report concluded:

"*In 2017 […] According to the 2019 EU-MAP list, 17 species (39 % of the total) were covered, representing respectively 33 % and 28 % of the landings in tons and euros. In terms of species sampled and reported in the 2018 national report, the number of species is lower 11 species (25%) covered. As indicated in the national report, the samples concerned the large pelagic species and not the demersal and benthic species harvested within the Mayotte lagoon. Actually, data collection of demersal and benthic species has begun recently. In the provisional species list, the number of species is lower than in the current list with only 7 species scheduled (16%). A recommendation is to review this list and to include a larger set of species (as recommended for the other ORs) covering not only the large pelagic species but also the relevant species harvested in the lagoon and at the edge of the lagoon. The EWG notes that data collection of biological samples in Mayotte is difficult due to the landings conditions of the small-scale vessels.*"

Section III.3. lists requirements for Data to assess the impact of Union fisheries on marine ecosystems in Union waters and outside Union waters; due to the nature of artisanal fisheries in Mayotte, the impacts listed are considered a non-issue:

1. For all types of fisheries, incidental by-catch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, including the species listed in Table 1D[20], including absence in the catch, during scientific observer trips on fishing ships or by the fishers themselves through logbooks.
2. Data to assist in the assessment of the impact of fisheries in Union waters and outside Union waters on marine habitats.
3. Data for estimating the level of fishing and the impact of fishing activities on marine biological resources and on marine ecosystems, such as effects on non-commercial species, predator-prey relationships and natural mortality of fish species in each marine region.

18 https://datacollection.jrc.ec.europa.eu/documents/10213/1131890/France_WorkPlan_2017-2019.pdf/03a63d30-0e32-4289-a839-47c6b914ae44?version=1.1&download=true

19 https://datacollection.jrc.ec.europa.eu/documents/10213/1283898/FRA_WP_2020-2021_text.pdf/3fcdda81-ae34-4238-a3b3-c9602bb3ae5a?version=1.0&download=true

20 Many of the species listed in Table 1D are not relevant to Mayotte. For example, the list contains sharks and rays, mammals and crustacean species to be reported for certain areas or for all regions / oceans.

Section III.4. lists requirements for Detailed data on the activity of Union fishing vessels ([9]) in Union waters and outside Union waters as recorded under Regulation (EC) No 1224/2009. Data to assess the activity of Union fishing vessels in Union waters and outside Union waters consist of the variables as indicated in Table 4.

Section III.5. lists requirements for Social and economic data on fisheries to enable the assessment of the social and economic performance of the Union fisheries sector.

a) Economic variables as indicated in Table 5A [within the regulation] according to the sector segmentation of Table 5B and according to the supra-regions as defined in Table 5C, and for enterprises making profit.
b) Social variables as indicated in Table 6 [within the regulation]. Social data shall be collected every three years starting in 2018.

The STECF in its 2020 report (op. cit.), concluded that:

"*Before 2018, no data was provided for fleet segments less than 12 metres in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks*."

If some socio-economic data is now provided for these segments in some ORs, there is still no data provided for Mayotte.

5.1.1 Implementation of DCF data collection obligations and potential issues

In terms of landings, data collection is implemented by Ifremer and performed by OFB in Mayotte, with some size distribution data collected in Mayotte line fisheries. In addition, IRD run observer programmes in the Indian and Atlantic oceans to complement biological data under DCF obligations. If an observer is on board, there isn't another observer to monitor the landings. Observers' collection includes data on discards following depredation. Purse seine fishery has logbooks collected for Indian and Atlantic Oceans. However, according to OFB, observer coverage is 4 – 5 % and is not high enough, but there is a lack of human and financial resources. Biological and socio-economic data are the main gaps.

IRD stated that stomach content sampling can produce useful information to understand regime shifts, especially in longline and recreational fisheries.

In Mayotte, there is a lack of skills and knowledge that cannot be addressed with money, due to the local context. There are also the contractual conditions for OFB staffing, plus the fact that OFB is a very young public agency, and recruiting staff is not easy. There is also a salary cap that makes it difficult to recruit without going through a process of calling for tenders with 3rd party contractors. Lastly, the current reduced staff at the OFB Mayotte also makes it difficult to propose new projects. One solution to ensuring adequate logistic support for data collection in Mayotte may be to externalise data collection to make it easier to recruit people and organise (NB, this is already being undertaken in French Guiana and Martinique).

In 2021, the focus was on improving biological data within an Agence française pour le développement/Ifremer project. This project worked to enhance the monitoring of catches and purchasing of fish at landing sites, which is sent to Ifremer for biological assessment.

The aim of this project was to decide which species to include in the national programme of work.

Regarding the new EU-MAP, Ifremer and IRD were consulted on the new DCF species list and mentioned the need to review species of particular interest in the ORs. IRD indicates that, for the Indian and Atlantic Oceans, all new DCF species are covered by the French national data collection scheme.

Ifremer and IRD mentioned that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be extended (see similar recommendation in January 2020 STECF report) so that species important for the ORs can be covered by EMFF.

In Mayotte specifically, the new EU-MAP adds one single species to be covered, Bluefin trevally (*Caranx melampygus*), but the local fisheries are so opportunistic that catches of that species are below the threshold for mandatory biological data collection on variables such as length or maturity (i.e., 200 tonnes annually).

5.1.2 Additional data collected

IRD mentions that data might be collected in anticipation of future requests by RFMOs or DCF. For example, data on anatomical implantation of hooks had been collected for several years in anticipation of potential measures on hooks (see AZURE project on megafauna release survival in longline fisheries). These activities are launched based on the expertise of scientists, on requests or suggestions from WPs in RFMOs etc.

SECTION 5 - KEY FINDINGS

- Coverage of DCF data collection obligations is mostly good, even if gaps exist on biological sampling in the ORs.
- Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be extended
- In Mayotte, some species mentioned in the EU MAP are not part of the French work plan: Tuna-like fish (Scombridae), Swordfish (*Xiphias gladius*), Other billfishes (Istiophoridae) and Dolphinfish (*Coryphaena hippurus*).
- The IOTC Compliance Committee noted in its 2020 EU Compliance Report[21], that no data had been provided for France-Mayotte coastal fisheries (handline & troll line), but that was due to an issue in the chain of transmission rather than a lack of available data, and measures have already been taken to provide the data as soon as possible.
- In 2020, the STECF 19-19 reviewed the French data collection reports, to focus on ORs and made a number of recommendations, including:
    - The absence in the French WP of a section addressing the ORs specifically;
    - The general lack of sampling in the ORs other than collecting length distributions;
    - Severe difficulties encountered in the implementation phase, due to local conditions;

21 IOTC-2020-CoC17-CR06, IOTC Compliance Report for: European Union, https://www.iotc.org/sites/default/files/documents/2020/09/IOTC-2020-CoC17-CR06_E_F-European_Union.pdf

SECTION 5 - KEY FINDINGS

  - A recommendation for Mayotte to include a larger set of species harvested in the lagoon and at the edge of the lagoon;
- According to OFB, observer coverage is 4-5% and is not high enough, but there is a lack of human and financial resources. Biological and socio-economic data are the main gaps;
- In Mayotte, there is a lack of skills and knowledge that cannot be addressed with money, due to the local context; and
- Administrative, staff regulations and salary caps are hindering data collection by OFB staff. One solution could be to externalise the data collection, to make it easier to recruit people, to organise etc (like it is done in French Guiana or Martinique).

6 Fisheries management and conservation measures

6.1 Management and conservation measures

6.1.1 National

At the national level, management and conservation measures are imposed through local regulations. Legal texts in Mayotte encompass regulation for professional fishers, recreational fishers, as well as marine protected areas. In 2018, the *Arrêté préfectoral n°2018/DMSOI/601 du 28/06/18 portant réglementation de l'exercice de la pêche maritime dans les eaux du département de Mayotte* Prefectoral Decree regrouped all fisheries regulations in Mayotte in one single legal instrument (Table 15). The 2018 omnibus version of the regulation does include all local applicable regulations, but the rationale for each measure, including scientific underpinnings, are only available in the original individual regulations, which is why they are presented separately in Table 16.

Table 15: Details of management measures included in the 2018 omnibus Decree, applicable to Mayotte fisheries (Source: Arrêté préfectoral n°2018/DMSOI/601 du 28/06/18 portant réglementation de l'exercice de la pêche maritime dans les eaux du département de Mayotte)

Type of fisheries	Category of measure	Subcategory	Measure
All	Fishing gear and fishing practices		• Fishing on a fish aggregating device (FAD) is carried out within a radius of one nautical mile around the float. • It is prohibited to carry on board a vessel or to use for fishing at any time, in any place, explosives, firearms, soporific or toxic substances of such a nature as to destroy or alter marine animals, plants and their environment. • The holding, making up and use of any creel (or locker) with a mesh size of less than 38 mm is prohibited at all times and in all places. • The practice of underwater fishing is regulated by Articles R921-90 and following of the Rural and Maritime Fishing Code. Underwater fishing is prohibited inside the lagoon, up to the beginning of the outer drop-off of the reef and in the channels. It is also prohibited within a radius of one mile around a fish aggregating device. It is forbidden to use any type of spear for underwater fishing of crustaceans.
	Regulated species and minimum catch size		• List of banned fish, molluscs and coral species; closed period for fishing crustaceans (Green Lobster (*Palinurus versicolor*), Red Lobster (*Palinurus penicillatus*), Porcelain Lobster (*Palinurus omatus*), Slipper lobster (*Scyllarus sp*), Mangrove Crab (*Scylla serrata*)). • Minimum size for spiny lobster, slipper lobster and mangrove crab as well as all fish <10 cm except adults, octopus <10 cm • Octopus fishing closed period. • Ban on fishing spiny lobsters with eggs. • Obligation of safe release of such bycatch.
	Regulated areas		• Plage de Papani: fishing closed between 6PM and 6AM • «passe en S » (passe Longogori): fishing, seashell harvesting and coral harvesting/destruction banned. • Saziley site: only handline and troll line as well as Djarifa fishing allowed. • Ngouja site: Fishing and seashell harvesting banned. • îlot M'Bouzi nature reserve: fishing banned exact handline from non

Type of fisheries	Category of measure	Subcategory	Measure
			mechanized boat
Professional fishing	Fishing vessels		• A licence to operate professional fishing vessels is required for all maritime professional fishing vessels. • The Community professional fishing licence is the authorisation granted to a producer, for each of his vessels.
	Fishing gear and fishing practices	Vessel-based fishing	• *Provisions relating to gear and methods of professional fishing* • Professional fishing is limited to vessels registered in the Dzaoudzi district, • Use of nets is conditioned on: marking of nets; net buoys visible at day and with light/radar reflector at night • nets must have been declared • Net fishing is regulated in the inland waters (lagoon) of Mayotte and limited to the capture of pelagic fish. Demersal species caught must be discarded alive. However, a by-catch rate of 20% of the total catch is authorised. • Use of nets banned in some areas, if tremail, with mesh size<30 mm and larger than 60 mm; above 300 m cumulated length for a boat or gorup of fishermen • Prohibited to set more than two vertical longlines around a FAD, to use purse seines to encircle schools of tuna and similar species in the area of 24 miles off the coast of Mayotte (EU regulation), to trawl within 3 miles off the baselines of Mayotte, to use bottom trawls in the EEZ of Mayotte. • Unmarked traps are prohibited
	Fishing gear and fishing practices	Shore-based	• Professional shore-based fishing (including shellfish, octopus) • Every professional shore-based fisherman must have a fishing licence; possibility of fishing licenses. Fishermen must have followed training. • List of authorised and banned gear. • The fishing of the Giant Clam (*Tridacna gigas*) is strictly reserved to the professional foot fisherman. It is limited to 5 specimens per fisherman per day.
	Reporting obligations and landing sites		• It shall be prohibited, throughout the territory of Mayotte, to market species derived from underwater fishing. • List of mandatory landing sites. • Mandatory reporting by EU vessel captains: logbooks (fishing techniques

Type of fisheries	Category of measure	Subcategory	Measure
			practised each month, the fishing areas frequented and the quantities caught by type of catch) on a monthly basis. • Declarations by registered buyers, by registered auctions or by the bodies responsible for first placing on the market are the sales note and the take-over declaration. The sales note shall be drawn up and forwarded by the first buyer or his representative. (EC regulation 1224/2009) • For imports: products caught by Community fishing vessels outside Community waters: customs document T2M (Articles 325 to 337 and Schedule 43 of Regulation 2454/93), products caught by vessels flying the flag of third countries: catch certificates and applicable declaration • Processed fishery products (Articles 12 to 21 and Annexes Il and IV to Regulation 1005/2008).
	Sales		• Maximum quantities of fish products allowed for sale for each landing. • Mandatory advance declaration of sales and point of sale minimum standards. • Regulation of sales to authorized 3rd party companies only.
Recreational fishing	Fishing gear and fishing practices	Vessel-based	• Recreational Fishing from a Pleasure Craft Registry Ship • Recreational fishing is prohibited for vessels flying the flag of a third State to the European Union. • Powered winches are prohibited. • List of allowed fishing gear per boat: lines with at most 12 hooks; 2 traps; 1 scoop; 2 spearguns per person; 1 gaff; 1 foëne. • Fishing from beach allowed with max 2 lines or poles. • Total amount of catch limited per boat and person, except for some small pelagic species. • FADs: Recreational fishing takes place within a radius of one nautical mile around the fish aggregating devices (float). It is only permitted on Saturdays, Sundays and public holidays even when a professional vessel is already in the area of the fish aggregating device.
	Fishing gear and fishing practices	Shore-based	• Recreational sea fishing on foot • Authorized by means of 2 lines or rod and reels per person with a total of a maximum of 4 hooks and a scoop.

Type of fisheries	Category of measure	Subcategory	Measure
			• The use of fishing devices by attraction by light is prohibited.
	Fishing gear and fishing practices	Underwater	• Recreational underwater fishing • Undewater fishing is prohibited inside the lagoon and around FADs. • All underwater fishing competitions are prohibited in the internal and territorial waters of Mayotte.
	Fishing gear and fishing practices	Marking of catches	• All species fished in the maritime waters of Mayotte must be marked. Marking shall extend to specimens of species fished beyond the maritime waters of Mayotte, provided that the fishery product is landed or intended to be landed in Mayotte. • Except for the tagging operation, the specimens caught shall be retained whole until landing, and the tagging shall not prevent the measurement of their size.
	Regulated species and minimum catch size		• Special provisions for certain species fished in recreational fisheries • Spiny lobster, slipper lobster and mangrove crab: catch limit in number, list of authorised gears, minimum size and ban on female with eggs • Giant Clam fishing is prohibited for recreational fishermen.
Traditional fishing	Fishing gear and fishing practices		• Traditional practices such as walking with the help of a Djarifa are allowed inside the lagoon, with the exception of spawning and nursery areas. • The mahorian pirogue is assimilated to a beach craft. Traditional pirogue fishing is allowed within 300 m of the coast.

Table 16: List of local regulations applicable to Mayotte fisheries

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
Arrêté préfectoral n°481/DAGC - corail et coquillage	1980	Species	Prohibition	Prohibiting the harvesting of coral and the collection of certain shellfish species in Mayotte: - All coral species - *Chariona tritonis*, commonly called Conque - *Cypraecassis rufa*, commonly known as Casque rouge - *Cassis cornuta*, commonly known as Fer a Repasser.	Need to protect fauna in Mayotte lagoon Excessive harvesting of large molluscs led to explosion of coral-destructing starfish
Arrêté préfectoral n°377/AGR du 04 mai 1990 - Passe en S	1990	Spatial	MPA	Establishing a complete fishing reserve in Mayotte at the place known as «Passe en S." Total ban on all fishing techniques, molluscs harvesting & coral destruction.	
Arrêté préfectoral n°518/SG du 08 avril 1991	1991	Spatial	MPA	Creation of the Saziley Protected area. Only some fishing techniques are allowed: hand line, troll line and "pêche au drap" Sea shell and some other species harvesting only allowed for local communities	Advice by the Consultative Commission on environment and heritage protection
Arrêté préfectoral n°396/DAF-SEF - interdiction pêche aux explosifs, de produits chimiques ou de substances	1997	Gear/technique	Prohibition	Prohibiting certain types of fishing as well as the cultivation of URUVA (*Tephrosia sp*.) in the territory of the Territorial Community of Mayotte: • Fishing with explosives, chemical substances or plant	Advice of the Consultative Commission for the Environment and Heritage Protection in Mayotte dated 10 April 1997;

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
ou d'extraits de végétaux (Uruva)				extracts damaging to fish species	
Arrêté préfectoral n°398/DAAF-SPEM - langoustes, cigales de mer et crabes de mangrove	1997	Species Temporal	Closed period Size	Lobster, slipper lobster and mangrove crab fishing prohibited from 1 November to 31 March. Minimum sizes: • Lobsters: 25 cm total length (without antennae) and 18 cm cephalothoracic length; • slipper lobster: 20 cm total length (without antennae), so from the rostrum to the tip of the tail; • Mangrove crab: 12 cm (width of the carapace without the legs).	Advice from the Consultative Commission on environment and need to protect endangered species in the Mayotte lagoon.
Arrêté préfectoral n°347/DAAF/2000 - espèces terrestres et tortues marines protégées	2000	Species	Prohibition	Fixing the list of protected terrestrial animal species (and marine turtles) and the measures for the protection of these animal species represented in the territorial community of Mayotte, supplementing the national lists. The destruction or removal of eggs, the intentional disturbance and possession, destruction. capture or removal, naturalization of amphibians or reptiles of the following species, or, whether alive or dead, are prohibited at any time and throughout the territory of Mayotte, their transport. their peddling, use, offering for sale, sale or purchase: • Green Turtle (*Cheonia mydas*)	CITES convention

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
				• Hawksbill Turtle (*Eretmochelys imbricata*)	
Arrêté préfectoral n°435/AM du 20 septembre 2000	2000	Spatial	MPA	Amending prefectoral decree No. 377 of 04/05/90 creating the integral fishing reserve of the "Passe en S". Amending the sanctions in case of contravention to the decree.	
Arrêté préfectoral n°42/DAF/01 du 11 juin 2001 - N'Gouja	2001	Spatial	MPA	Establishing a protected area in Mayotte at on the remarkable site of Ngouja. Total ban on all fishing techniques, molluscs harvesting & coral destruction, anchoring outside of dedicated moorings, disturbing of sea turtles	
Arrêté préfectoral n°109SG/DAF du 28/12/2004 - pêche au filet	2004	Gear/technique Spatial	Prohibited area Regulation of operations	Regulating net fishing in the inland waters (lagoon) of the Department of Mayotte. The use of netting is prohibited in areas and internal channels of mangroves, grassland areas and areas of live coral reefs. Fishing operations are regulated: length of nets, identification of nets, advance declaration of nets, some types of nets banned Mandatory safe release of protected species bycatch	Decreasing stocks of reef species in the lagoon Widespread use of fishing nets on reefs can degrade them Using nets can endanger protected species such as turtles, dugong and dolphins Need for a more sustainable exploitation of stocks

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
Arrêté préfectoral n°32/SG/DAF/2004 - Holothuries	2004	Species	Prohibition	Fishing, transport, processing, packaging, offering for sale or purchase of all species of holothurians (sea cucumbers) is prohibited throughout the territory (sea and land) of the Department of Mayotte.	Increase of sea cucumber commercial fishing in Mayotte since 2002 Importance of species to ecosystems Vulnerability of species to fishing revealed by several studies Low abundance of species from study conducted by Service des pêches Stock degradation observed in other regions due to commercial fishing
Arrêté préfectoral n°102/05/AM du 26 mai 2005 portant limitation de la pêche dans le lagon de Mayotte	2005	Spatial	Prohibition Vessel size	Restricting fishing in the lagoon and territorial waters of Mayotte. Fishing shall be prohibited for all vessels over 10 m in overall length in the following areas: - Inside the lagoon fishing shall be prohibited for all vessels more than 25 m in length overall. everything in the following areas: - within the 12-mile limit from the base lines.	
Décret n° 2007-105 du 26 janvier 2007 portant création de la réserve naturelle	2007	Spatial	MPA	Creation of an MPA For the protection of its maritime part: Fishing and underwater fishing are prohibited throughout the reserve,	

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
de l'îlot Mbouzi. Legifrance				except for longline fishing from non-motorized vessels (Article 10); The practice of motorized watercraft and water skiing is prohibited (Article 20); Access to the islet is subject to the authorization of the representative of the State at sea, who may also, in the interest of the reserve, make any provision relating to navigation (Article 19); The anchorage of boats and craft is prohibited throughout the maritime part of the reserve, except in the zones reserved for anchorage defined by the management plan of the reserve or by mooring at the installations provided for this purpose; The speed of navigation is limited within the marine perimeter of the reserve to 5 knots.	
Arrêté préfectoral n°01/UTM/2013 - Points débarquement pêche maritime	2013	Spatial	Designated landing sites	List of authorised landing sites for commercial fisheries and aquaculture products in Mayotte.	Need to collect statistics as well as ensuring landing safety and food safety.
Arrêté préfectoral n°37/UTM/2013 portant interdiction de pêche des raies Manta	2013	Species	Prohibition	Professional and recreational fishing for fish of the *myliobatidae* family, subfamily *mobulinae*, commonly known as manta rays, is prohibited all year round, irrespective of fishing	Mobulid rays are protected species for CITES Observations in the Mayotte lagoon show a low abundance population

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
				techniques, in the territorial and inland waters of Mayotte.	
Arrêté préfectoral n°47/UTM/2013 du 23 décembre 2013 : pêche sur les DCP	2013	Gear/technique	Regulation of operations	Regulating the practice of sea fishing around fish aggregating devices (FADs) in the waters of the department of Mayotte 1 mile around FAD Limit to 2 vertical longlines for commercial fishing No vertical or horizontal longline for recreational fishing Recreational fishing only on week-ends and bank holidays Spear fishing banned around FADs	Need to regulate commercial and recreational fishing around FADs Marine park management plans aims at developing a sustainable fishery outside the lagoon
Interdiction de la senne tournante à moins de 24 milles à Mayotte	2013	Gear/technique Spatial	Prohibition	Prohibition of purse seining within 24 miles in Mayotte	Since 01/01/2014, the date of integration of maritime waters into Community waters, these national provisions have been incorporated into Council Regulation (EC) No 850/98 of 30 March 1998 for the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms (Article 34).
Arreté préfectoral n°05-UTM-2014 - Abrogeant la	2014	Gear/technique Spatial	Prohibition	Banning professional spear fishing in the Marine Park area (Mayotte).	Advice from the Marine park WG, protection of CITES species.

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
chasse sous-marine professionnelle à Mayotte					
Arrêté préfectoral n°06-UTM-2014 - Règlementant la chasse sous-marine à Mayotte	2014	Gear/technique Spatial	Prohibition	Underwater spear fishing is forbidden to all in the lagoon of Mayotte, up to the outer limits of the fringing reef and in the passes (straight base lines defined by ministerial decree).	Advice from the Marine park WG, protection of CITES species.
Arrêté préfectoral n°08/UTM/2015 interdiction commercialisation requin	2015	Species Trade	Prohibition	Bans the trade of all sharks from families Carcharhinidae, Hexanchidae and Sphyrinidae, exception made for Prionace glauca, *Carcharinus longimanus* and *Isurus oxyrhynchus*, as well as *Carcharinus falciformis* when caught inside the Mayotte lagoon	CITES convention shark status, endemic status of ciguatera in closeby Reunion island.
Arrêté préfectoral n°10/UTM/2015 du 14/09/2015 fixant dans les eaux maritimes de Mayotte les conditions de marquage des captures effectuées dans le cadre de la pêche maritime de loisir.	2015	Biological	Recreational	Tagging of catches made in the context of recreational sea fishing, covering all species in the maritime waters of Mayotte.	Conservation of marine resources through better control of recreational fisheries Fight against fraud, in particular the sale and purchase of recreational fisheries products. Promote a responsible attitude on the part of restaurateurs, fishmongers and consumers.

6.1.2 International

Being an Outermost region of the EU, all EU regulations apply to Mayotte, through their implementation in the French national regulations.

There is a single piece of EU regulation that specifically applies to Mayotte only: the *Agreement between the European Union and the Republic of the Seychelles on access for fishing vessels flying the flag of the Seychelles to waters and marine biological resources of Mayotte*[22]. This agreement provides that fishing authorisations will be provided sole exploitation rights to highly migratory species (species listed in Annex 1 of the UN Convention on the Law of the Sea, 1982), with the exclusion of the family *Alopiidae*, the family *Sphyrnidae* and the following species: *Cetorhinus maximus*, *Rhincodon typus*, *Carcharodon carcharias*, *Carcharhinus falciformis* and *Carcharhinus longimanus*. The agreement includes an exclusion of endangered species.

A Joint Committee is in charge of monitoring the agreement and more specifically:

- Monitoring the performance, interpretation and application of this Agreement;
- Providing the necessary liaison for matters of mutual interest relating to fisheries;
- Acting as a forum for the amicable settlement of any disputes regarding the interpretation or application of this Agreement; and
- Reassessing, where necessary, the level of fishing opportunities, based on scientific advice, and, consequently, of the financial contribution.

As the EU is a Contracting Party (Member) of the IOTC, all conservation and management measures adopted by this RFMO apply to Mayotte since it became an EU OR in 2014. The National Reports provided by France in 2014, then the EU after that year, indicate that all IOTC CMMs are reflected in EU fisheries regulations and thus are effectively applicable to Mayotte.

All IOTC CMMs are based on the work of the IOTC working parties and Scientific Committee. Their implementation by Members, including the EU, is monitored by the Commission through its Compliance Committee.

SECTION 6 - KEY FINDINGS

- There is an adequate body of fisheries regulations addressing specific local issues in Mayotte.
- All EU regulations apply to Mayotte due to its EUOR status.
- All IOTC regulations apply to Mayotte due to the EU's status of IOTC Contracting Party.

[22] Council Decision of 14 April 2014 on the signing, on behalf of the European Union, and provisional application of the Agreement between the European Union and the Republic of the Seychelles on access for fishing vessels flying the flag of the Seychelles to waters and marine biological resources of Mayotte, under the jurisdiction of the European Union

7 Shortcomings or obstacles to fisheries management

A summary of the main shortcomings or obstacles to sound fisheries management identified through the literature review or interviews with relevant stakeholders is provided for Mayotte (Table 17).

Table 17: Summary of shortcomings or obstacles to fisheries management

Category	Shortcoming or obstacle
Data collection	Very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors.
	There are a range of small pelagic fish species important for SSF that are not covered (or not covered anymore) by the DCF EU-MAP. The list of species covered by the DCF should be extended.
	Several DCF species are not part of the work plan: Tuna-like fish (Scombridae), Swordfish (*Xiphias gladius*), Other billfishes (*Istiophoridae*) and Dolphinfish (*Coryphaena hippurus*).
	General lack of biological sampling, other than size frequency.
	Biological and socio-economic data represent the main gap in data collection.
	There is a large number of landing sites, reducing ability to cover them all
	Since 2014, paper fishing logbook information hasn't been processed by FranceAgrimer, as there are issues with species code lists used in logbooks compared to what the SIH/DCF mandates. This issue has been resolved (DMSOI and OFB), though historical data have still not been entered.
	OFB's overall mission does. not include fisheries. That OFB does this in Mayotte for Ifremer is an exception, so this is not a priority at the level of the institution.
Funding and resources	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection.
	EMFF funding cannot be used to recruit staff in the relevant French institutions.
	There is a lack of human and financial resources to properly monitor the recreational fisheries
	OFB's staffing regulations make it difficult to keep expert staff.
Resource monitoring and assessment	Mayotte fisheries are artisanal, opportunistic, and catch a wide range of species.
	Catch composition is largely dominated by a "marine fishes nei" group, followed by "other species nei".
	Only some large pelagic stocks are assessed, because they are under IOTC mandate.
MCS and IUU	Informal and IUU fishing is widespread.
	In Mayotte, fisheries policing is not a priority compared to missions related to illegal immigration.
	There is also a confusion of roles in the minds of fishermen who sometime perceive fisheries MCS activities as police activities, which makes it harder to do data collection etc, since OFB has both roles.

Note: The report of the TSCF19-19 meeting identified a number of issues with fisheries data collection in the French ORs. Please refer to that report for more details.

8 Recommendations

- Improve knowledge of catch composition landed by artisanal fisheries;
- Apply data-poor assessment methods to key species deemed of local importance and/or subject to high fishing pressure;
- Improve knowledge on IUU fishing;
- Improve human and financial resources allocated to local data collection, to ensure coverage at landing sites. May require switching to a model where data collection is done by a 3rd party private contractor;
- Improve workflow for data entry of paper logsheets;
- Separate "environment and fishery police" roles from fishery data collection roles;
- Find ways to increase staff and expertise retention; and
- Regarding the next cycle of EMFF, allocate enough human resources to propose new activities: collection of new data; new DCF data collection obligation on recreational fisheries; coverage of informal fisheries; Extension of biological data collection.

For reference, here are the main recommendations included in the STECF 19-19 report related to Fishery Data Collection in the EUORs.

- Review the future EU-MAP with an OR perspective, namely considering each OR separately;
- Increase sharing between ORs experts regarding data collection and calculation of indicator methodologies, support developed of expert working group for ORs; (enhance transversal data sharing between economic, social and biologists);
- Member States DCF recreational fisheries coverage should be extended, namely in terms of species;
- Undertake an assessment of IUU by ORs to establish the ecosystem, social and economic impact of such fisheries;
- Undertake an assessment of recreational fisheries by ORs to establish the ecosystem, social and economic impact of such fisheries;
- Undertake an assessment of the capacities in the different ORs (human and financial resources, facilities, equipment) in order to secure the resources necessary to implement the DCF;
- At-sea monitoring should be improved in each ORs, including recreational fisheries;
- Increase the number of species sampled, for (at least) length composition of the fished stocks;
- France WP to include ORs specifically;
- French ORs to improve biological sampling;
- France to collect and report economic data by ORs and metiers;
- French ORs need to improve social data collection; and
- Review data and methods dedicated to the assessment of small-scale multispecific multispecies fisheries in terms of its data limited context, and test several assessment methods in different ORs and compare results – possibly within an existing WG.

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Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory research surveys and thresholds for the purposes of the Multi-Annual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001 (OJ L 145, 4.6.2019, p. 21–26).

Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the Multi-Annual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

Réunion

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Réunion Profile Report

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Acronyms

Term	Description
CITEB	Centre de Recherche et de valorisation des milieux aquatiques
CRPMEM	Comité regional des pêches marines et des élevages marins
DG MARE	Directorate-General for Maritime Affairs and Fisheries
DM	Direction de la Mer
DMSOI	Direction de la mer - sud océan Indien (i.e., local DM)
EASME	Executive Agency for Small and Medium Sized Enterprises
EMFF	European Maritime and Fisheries Fund
EMS	Electronic Monitoring System
EU	European Union
Ifremer	Institut Francais de Recherche pour l'Exploitation de la MER
IRD	Institut de Recherche pour le Développement
LEMNA	Laboratoire d'économie et de management de Nantes-Atlantique
MCS	Monitoring, control and surveillance
NEI	Not elsewhere included
NGO	Non-governmental organisation
OFB	Office français de la biodiversité
OR	Outermost Region
SMEFF	Sustainable management of external fishing fleets
SSF	Small scale fisheries

1 Introduction

1.1 Geographic and economic characteristics

Administrative status: Réunion is a region ("Région", Administrative level 1) of the Republic of France, and department ("Département", Administrative level 2) This entity is an Outermost Region of the European Union (EU)[1] (Figure 1).

Geography: Réunion is located in the Indian Ocean, approximately 600 km east of Madagascar, and is composed of a single island. The land area of Réunion is 2 512 km^2 with a small lagoon that covers about 12 km^2, on the west and south-west coasts (Table 2). Réunion's most prominent geological feature is the Piton de la Fournaise, a very active volcano. The hot spot (volcanic) nature of Réunion combined with its location causes sea floor to drop very rapidly, reaching depths of several thousand metres just a few kilometres offshore.

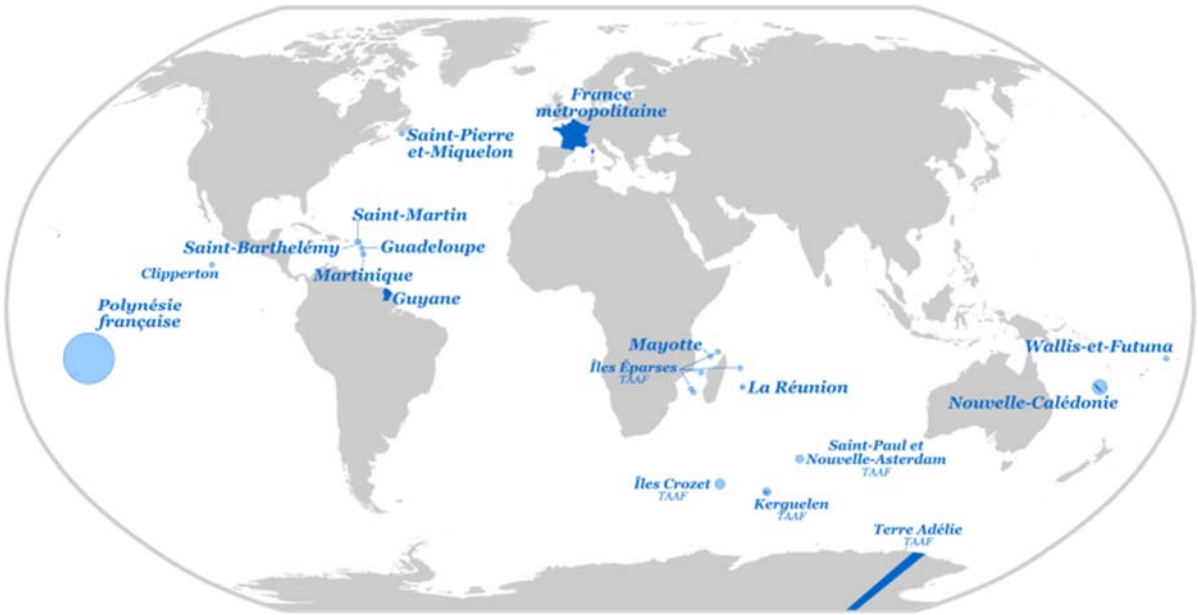

Figure 1: France Metropolitan vs Outermost Regions and French Territories (source: Wikipedia)

1 Note: in this document, the term Metropolitan France ("*France métropolitaine*") will be used to differentiate the mainland French territory in Europe from the Outermost Regions (Guadeloupe, Martinique, St Martin, French Guiana, La Réunion and Mayotte).

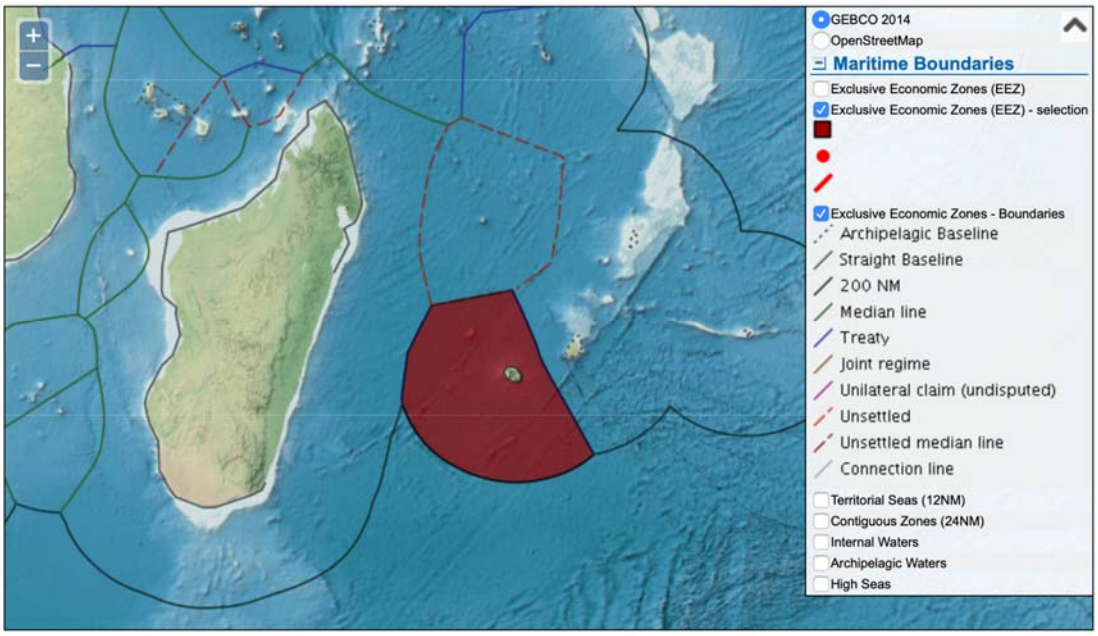

Figure 2: The Exclusive Economic Zone of Réunion (source: www.marineregions.org)

The EEZ of Réunion covers 311 426 km^2, which is approximately 3% of the entire French EEZ of 9 638 369 km^2 (see Figure 2, Table 1)

Table 1: Surface area of the French ORs Exclusive Economic Zone.

Outermost Region	Area
Guadeloupe/Martinique	123 483 km^2
Saint Martin	2 665 km^2
French Guiana	12 1746 km^2
Réunion	**311 426 km^2**
Mayotte	6 6176 km^2
Rest of French EEZ	9 015 873 km^2
TOTAL	9 638 369 km^2

source: https://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies

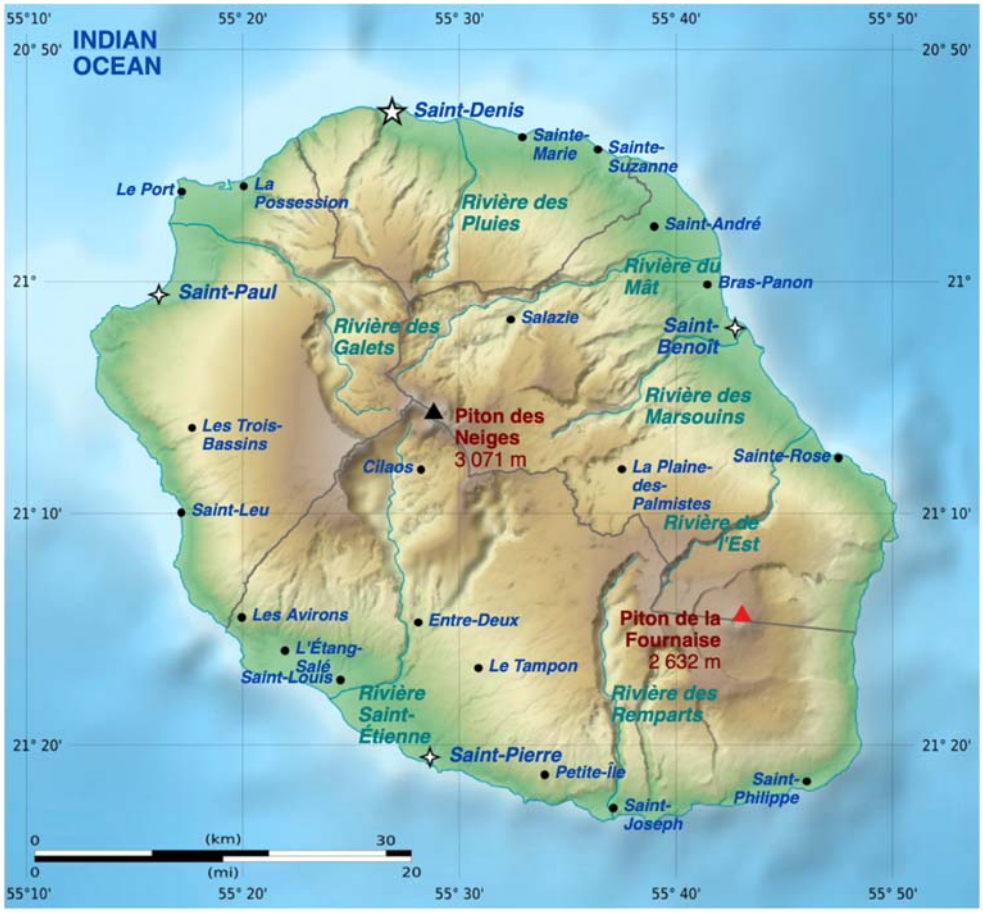

Figure 3: Map of Réunion (source: Wikipedia, 2021)

There are five main landing sites (fishing ports) in Réunion: Le Port, Saint Gilles, Saint Pierre, Étang salé, and Sainte Marie, as well as a number of smaller ports which are only used by a small number of vessels. Le Port is by far the major fishing port, especially in relation to offshore fishing vessels (Figure 3).

Table 2: General indicators

Description	Unit	Source
Island area	2 512 km^2	Wikipedia
Inland water area	Negligible inland waters[2], but with a very large network of rivers	Réunion SDAGE
Population size	855 961	INSEE, 2018[3]
Exclusive Economic Zone (EEZ) area	311 426 km^2	Portail national des limites maritimes[4]

2 Réunion SDAGE: http://www.comite-eau-biodiversite-Réunion.fr/presentation-du-district-hydrographique-r7.html

3 https://www.insee.fr/fr/statistiques/4482473

4 https://limitesmaritimes.gouv.fr/ressources/tableau-des-superficies

1.2 Fisheries statistics

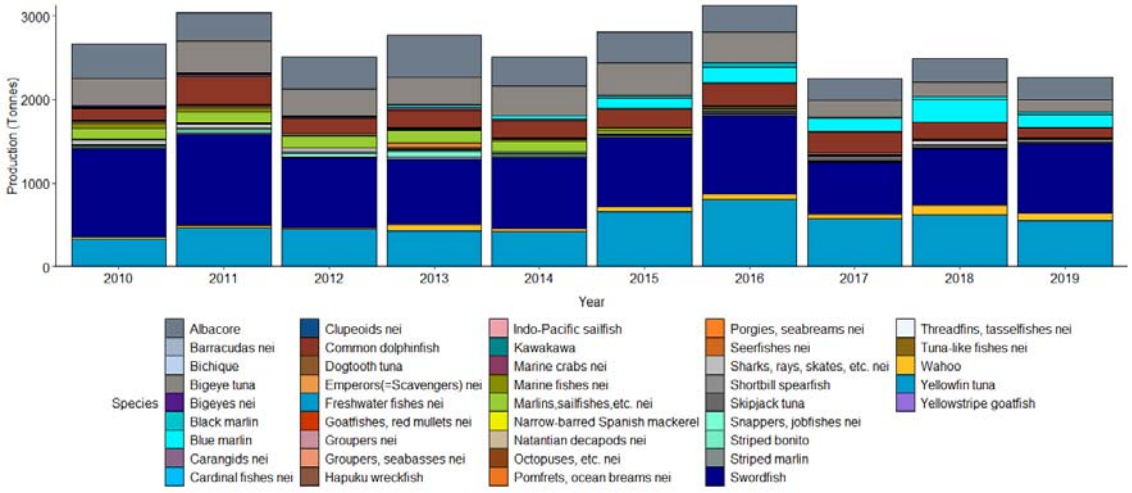

Figure 4: Total capture production for the periods 2010-2019 (data source: FAO FishStat)

Catches within Réunion are dominated by large pelagic species, with swordfish, yellowfin tuna, albacore tuna and bigeye tuna representing the majority of the catch (see Section 2.1).

There is no detailed database that holds information on the trade in seafood products (i.e., import / export) for Réunion. What is available is highly disaggregated data on the French Customs website[5] for all French seafood trade. However, the analysis and assessment of such data to decipher patterns for Mayotte would require in-depth extraction and compilation of data, which is beyond the realm of this study.

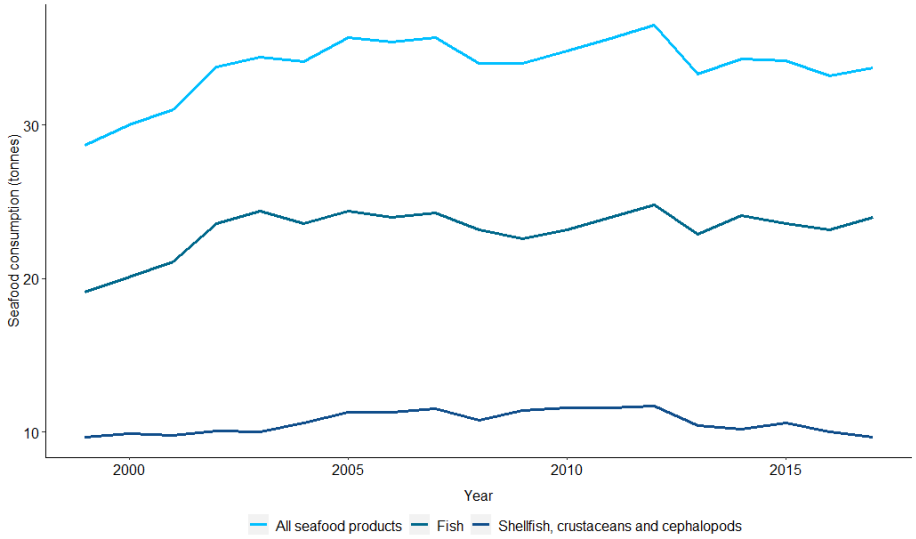

Figure 5: Composition of per capita fish supply for France, including ORs (source: FranceAgrimer).

5 https://www.douane.gouv.fr/la-douane/opendata?f%5B0%5D=categorie_opendata_facet%3A459

Regarding consumption of fish per capita, there are no specific time series for Réunion. The data available is aggregated at the national level (Figure 5), and show that average consumption is 24.2 kg/capita/year for fish, and 35.6 kg[7] for all seafood products[6].

1.3 Regional fisheries management

The European Union is a contracting party of the Indian Ocean Tuna Commission (IOTC[7]) and, as such, represents France (including Réunion) in the IOTC. The IOTC is a tuna Regional Fisheries Management Organization (t-RFMO), with a mandate on tuna and tuna-like species fisheries in the whole Indian Ocean, including Réunion. IOTC Management and Conservation Measures (more specifically its 'Resolutions') are binding on Contracting and Cooperating non-contracting Parties (CPCs).

The European Union is a contracting party of the Southern Indian Ocean Fisheries Agreement (SIOFA[8]) and, as such, represents France (including Réunion) in the SIOFA. SIOFA is a Regional Fisheries Management Organization (RFMO), with a mandate on fishery resources including fish, molluscs, crustaceans and other sedentary species within the area, but excluding highly migratory species (Annex I of UNCLOS) and sedentary species subject to the fishery jurisdiction of coastal states (Article 77(4) of UNCLOS). SIOFA Management and Conservation Measures are binding on Contracting and Cooperating non-contracting Parties (CPCs).

Please note: France is also a Member of the Southwest Indian Ocean Fisheries Commission (SWIOFC), but only on behalf of its overseas territories, which do not include Réunion.

SECTION 1 - KEY FINDINGS

- Réunion is a small volcanic island close to Madagascar.
- Réunion EEZ is fairly small, at 311 426 km^2, holding approximately 3% of the total French EEZ.
- The bathymetry around Réunion, with depth growing very rapidly not too far from shore, has impacts on the types of fisheries undertaken within this OR.
- The vast majority of catches in terms of quantity are tuna and tuna-like species, with swordfish as the main species landed.
- Réunion is covered by two RFMOs: IOTC and SIOFA.

6 https://www.umr-amure.fr/wp-content/uploads/2018/08/situation-peche.pdf

7 https://www.iotc.org

8 http://www.apsoi.org

2 Fish stocks and other marine organisms and associated fishing activities

2.1 Commercial fish stocks

Exploited stocks in Réunion are a mix of a limited number of large pelagic species and a large number of small coastal species.

All reported stocks below are extracted from Blanchard et al., (2018), which compiles all stocks for Réunion and other French ORs. Some information was also taken from Weiss et al., (2019), which provides a summary of catches in Réunion for 2018. Data for 2019 was not yet published at the time of writing this profile.

Table 3: Species captured by Réunion fisheries

ASFIS code	French name	Scientific name	ASFIS name
SWO	Espadon	*Xiphias gladius*	Swordfish
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna
ALB	Germon	*Thunnus alalunga*	Albacore
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish
BET	Thon obèse(=Patudo)	*Thunnus obesus*	Bigeye tuna
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo
BIL	Makaires,marlins,voiliers nca	Istiophoridae	Marlins,sailfishes,etc. nei
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna
EBS	Castagnole commune	*Eumegistus illustris*	Brilliant pomfret
LRI	Colas à bandes dorées	*Pristipomoides multidens*	Goldbanded jobfish
LVK	Vivaneau à raies bleues	*Lutjanus kasmira*	Common bluestripe snapper
HCZ	Marignans nca	Holocentridae	Squirrelfishes nei
BLM	Makaire noir	*Makaira indica*	Black marlin
SFA	Voilier indo-pacifique	*Istiophorus platypterus*	Indo-Pacific sailfish
SMA	Taupe bleue	*Isurus oxyrinchus*	Shortfin mako
GPX	Mérous nca	*Epinephelus spp*	Groupers nei
CGX	Carangidés nca	Carangidae	Carangids nei
MLS	Marlin rayé	*Tetrapturus audax*	Striped marlin
SSP	Makaire à rostre court	*Tetrapturus angustirostris*	Shortbill spearfish
ETA	Vivaneau rubis	*Etelis carbunculus*	Deep-water red snapper
SDX	Comètes nca	*Decapterus spp*	Scads nei
DOT	Bonite à gros yeux	*Gymnosarda unicolor*	Dogtooth tuna
VLO	Langoustes diverses nca	Palinuridae	Spiny lobsters nei
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei
EMP	Empereurs nca	Lethrinidae	Emperors(=Scavengers) nei

ASFIS code	French name	Scientific name	ASFIS name
AVR	Vivaneau job	*Aprion virescens*	Green jobfish
EZR	Mérou zébré	*Epinephelus radiatus*	Oblique-banded grouper
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei
MUX	Rougets nca	*Mullus spp*	Surmullets(=Red mullets) nei
ETC	Vivaneau flamme	*Etelis coruscans*	Deepwater longtail red snapper
VRL	Croissant queue jaune	*Variola louti*	Yellow-edged lyretail
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei
PFM	Colas fil	*Pristipomoides filamentosus*	Crimson jobfish
LRY	Colas orné	*Pristipomoides argyrogrammicus*	Ornate jobfish
RAQ	Ranine dentée	*Ranina ranina*	Spanner crab
ARQ	Vivaneau rouillé	*Aphareus rutilans*	Rusty jobfish
KAW	Thonine orientale	*Euthynnus affinis*	Kawakawa
CLU	Clupéoidés nca	*Clupeoidei*	Clupeoids nei
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei
GBA	Barracuda	*Sphyraena barracuda*	Great barracuda
ALF	Béryx nca	*Beryx spp*	Alfonsinos nei
SBX	Dentés, spares nca	Sparidae	Porgies, seabreams nei
EWU	Mérou plate grise	*Epinephelus multinotatus*	White-blotched grouper
TRI	Balistes nca	*Balistidae*	Triggerfishes, durgons nei
SCS	Rascasses nca	*Scorpaena spp*	Scorpionfishes, rockfishes nei
MUV	Capucin à bande jaune	*Mulloidichthys flavolineatus*	Yellowstripe goatfish
MUI	Murènes nca	Muraenidae	Morays nei
MSK	Requins taupe nca	Lamnidae	Mackerel sharks,porbeagles nei
EEP	Mérou comète	*Epinephelus morrhua*	Comet grouper
SNK	Escolier	*Thyrsites atun*	Snoek
SUR	Chirurgiens nca	Acanthuridae	Surgeonfishes nei
LTQ	Empereur mahsena	*Lethrinus mahsena*	Sky emperor
EFT	Vieille ananas	*Cephalopholis sonnerati*	Tomato hind
AMX	Sérioles nca	*Seriola spp*	Amberjacks nei
BEN	Aiguilles, orphies nca	Belonidae	Needlefishes, etc. nei
LHN	Empereur moris	*Lethrinus nebulosus*	Spangled emperor
NXI	Carangue têtue	*Caranx ignobilis*	Giant trevally
LWX	Colas nca	*Pristipomoides spp*	Jobfishes nei
PWT	Perroquets nca	Scaridae	Parrotfishes nei

ASFIS code	French name	Scientific name	ASFIS name
LWZ	Colas bagnard	*Pristipomoides zonatus*	Oblique-banded snapper
RAJ	Rajidés nca	Rajidae	Rays and skates nei
EFH	Mérou pintade	*Epinephelus chlorostigma*	Brownspotted grouper
NGU	Carangue pailletée	*Carangoides fulvoguttatus*	Yellowspotted trevally
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei
RRU	Comète saumon	*Elagatis bipinnulata*	Rainbow runner
SKX	Requins, raies, etc. nca	*Elasmobranchii*	Sharks, rays, skates, etc. nei
TUN	Thonidés nca	*Thunnini*	Tunas nei
LEC	Escolier noir	*Lepidocybium flavobrunneum*	Escolar
MGS	Mulets spp	*Mugil spp*	Mullets spp
DGX	Squales nca	Squalidae	Dogfish sharks nei
OIL	Rouvet	*Ruvettus pretiosus*	Oilfish
DCP	Décapodes natantia nca	*Natantia*	Natantian decapods nei
BFT	Thon rouge de l'Atlantique	*Thunnus thynnus*	Atlantic bluefin tuna
SQZ	Calmars côtiers nca	*Loliginidae*	Inshore squids nei
ALV	Renard	*Alopias vulpinus*	Thresher
LTA	Thonine commune	*Euthynnus alletteratus*	Little tunny(=Atl.black skipj)
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei
ALS	Requin pointe blanche	*Carcharhinus albimarginatus*	Silvertip shark
EWO	Mérou huit raies	*Epinephelus octofasciatus*	Eightbar grouper
EWC	Mérou taches blanches	*Epinephelus caeruleopunctatus*	Whitespotted grouper
SRX	Raies, pastenagues, mantes nca	*Rajiformes*	Rays, stingrays, mantas nei
IYL	Sicyoptère à bec de lièvre	*Sicyopterus lagocephalus*	Bichique
BSH	Peau bleue	*Prionace glauca*	Blue shark
BON	Bonite à dos rayé	*Sarda sarda*	Atlantic bonito
EMN	Mérou pointillé	*Plectropomus punctatus*	Marbled coralgrouper
EEA	Mérou oriflamme	*Epinephelus fasciatus*	Blacktip grouper

Notes: Species are ordered by highest to lowest catches (source: Weiss et al., 2018).

Fisheries in Réunion catch a large variety of fish: there are 89 species captured in Réunion that are formally monitored (at the least, landing data) (Table 4). Operations are split between small multigear artisanal fisheries (see section 2.2.1 for more details) operating in the coastal areas that do not target specific species, artisanal offshore fisheries catching large pelagic species (such as the longline fishery targeting swordfish), and some large-scale industrial tuna purse seiners operating on the high seas.

Table 4: Species and stocks monitored in Réunion (source: Blanchard et al. 2019 (part II))

Region	Réunion
Species monitored	89
Stocks assessed	16
Stocks not assessed	82%
Landings (tonnes)	1 943
Stocks assessed by landed weight	78%
Value of landings (EUR million)	19.9
Stocks assessed by value	79%

Importantly, there are only a small number of species that are landed within Réunion with a formal stock assessment. Of the 89 monitored species, only 16 are formally assessed: six of these species are small demersal or pelagic species and are assessed by Ifremer, while the remaining 12 are large pelagic species covered and assessed by IOTC (Table 5).

Table 5: Stocks assessed in Réunion (source: Blanchard et al. 2018 (part I)).

Species code	Common name	Scientific name	Assessment	Year	Status
ALB	Albacore tuna	*Thunnus alalunga*	IOTC	2019	Overfishing/Not overfished
YFT	Yellowfin tuna	*Thunnus albacares*	IOTC	2018	Overfishing/Overfished
SWO	Swordfish	*Xiphas gladius*	IOTC	2020	No overfishing/Not overfished
SKJ	Skipjack tuna	*Katsuwonus pelamis*	IOTC	2020	No overfishing/not overfished
SFA	Indopacific Sailfish	*Istiophorus platypterus*	IOTC	2019	Uncertain (2018 status was Overfishing/Not overfished)
KAW	Kawakawa	*Euthynnus affinis*	IOTC	2020	No overfishing/not overfished
ETC	Deepwater red snapper	*Etelis coruscans*	Ifremer	2015	Overfishing/overfished
ETA	Deepwater longtail red snapper	*Etelis carbunculus*	Ifremer	2015	No overfishing/not overfished
EBS	Brilliant pomfret	*Eumegistus illustris*	Ifremer	2015	No overfishing/not overfished
EZR	Oblique-banded grouper	*Epinephelus radiatus*	Ifremer	2015	No overfishing/not overfished
LRI	Goldbanded jobfish	*Pristipomoides multidens*	Ifremer	2015	No overfishing/not overfished
LRY	Ornate jobfish	*Pristipomoides argyrogrammicus*	Ifremer	2015	No overfishing/not overfished
BUM	Blue marlin	*Makaira nigricans*	IOTC	2020	Overfishing/Overfished
BLM	Black marlin	*Makaira indica*	IOTC	2020	Uncertain (2018 status was No overfishing/Not overfished)

Species code	Common name	Scientific name	Assessment	Year	Status
MLS	Striped marlin	*Tetrapturus audax*	IOTC	2020	Overfishing/Overfished
BET	Bigeye tuna	*Thunnus obesus*	IOTC	2020	Overfishing/Not overfished

NB. Data updated with most recent IOTC stock assessment results available on the IOTC website (https://www.iotc.org).

2.1.1 Species and groups captured by Réunion fisheries and covered by an RFMO

The EU being a Contracting Party to IOTC, SIOFA and CCSBT[9], France has to comply with the RFMOs' Conservation and Management Measures and report on fisheries catching species under their respective mandates. In Réunion, the species listed in Table 6 have to be reported to RFMOs.

Table 6: Species captured by Reunion fisheries, covered by an RFMO (source: Weiss et al., 2019).

ASFIS code	French name	Scientific name	ASFIS en Name	RFMO
SWO	Espadon	*Xiphias gladius*	Swordfish	IOTC
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna	IOTC
ALB	Germon	*Thunnus alalunga*	Albacore	IOTC
BET	Thon obèse(=Patudo)	*Thunnus obesus*	Bigeye tuna	IOTC
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin	IOTC
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo	IOTC
BIL	Makaires,marlins,voiliers nca	*Istiophoridae*	Marlins, sailfishes, etc. nei	IOTC
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna	IOTC
LVK	Vivaneau à raies bleues	*Lutjanus kasmira*	Common bluestripe snapper	SIOFA
BLM	Makaire noir	*Makaira indica*	Black marlin	IOTC
SFA	Voilier indo-pacifique	*Istiophorus platypterus*	Indo-Pacific sailfish	IOTC
GPX	Mérous nca	*Epinephelus spp*	Groupers nei	SIOFA
ETA	Vivaneau rubis	*Etelis carbunculus*	Deep-water red snapper	SIOFA
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei	SIOFA
EMP	Empereurs nca	*Lethrinidae*	Emperors(=Scavengers) nei	SIOFA
EZR	Mérou zébré	*Epinephelus radiatus*	Oblique-banded grouper	SIOFA
ETC	Vivaneau flamme	*Etelis coruscans*	Deepwater longtail red snapper	SIOFA
COM	Thazard rayé indo-	*Scomberomorus*	Narrow-barred	IOTC

9 While Southern Bluefin tuna is a species under the mandate of IOTC, it is actually managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), to which the EU is a Member of the Extended Commission since 2015.

ASFIS code	French name	Scientific name	ASFIS en Name	RFMO
	pacifique	*commerson*	Spanish mackerel	
SMA	Taupe bleue	*Isurus oxyrinchus*	Shortfin mako	IOTC
MLS	Marlin rayé	*Tetrapturus audax*	Striped marlin	IOTC
KAW	Thonine orientale	*Euthynnus affinis*	Kawakawa	IOTC
EWU	Mérou plate grise	*Epinephelus multinotatus*	White-blotched grouper	SIOFA
EEP	Mérou comète	*Epinephelus morrhua*	Comet grouper	SIOFA
LTQ	Empereur mahsena	*Lethrinus mahsena*	Sky emperor	SIOFA
LHN	Empereur moris	*Lethrinus nebulosus*	Spangled emperor	SIOFA
EFH	Mérou pintade	*Epinephelus chlorostigma*	Brownspotted grouper	SIOFA
TUN	Thonidés nca	*Thunnini*	Tunas nei	IOTC
LWZ	Colas bagnard	*Pristipomoides zonatus*	Oblique-banded snapper	SIOFA
BFT	Thon rouge de l'Atlantique	*Thunnus thynnus*	Atlantic bluefin tuna	IOTC/CCSBT
ALV	Renard	*Alopias vulpinus*	Thresher	IOTC
KGX	Thazards nca	*Scomberomorus spp*	Seerfishes nei	IOTC
EWO	Mérou huit raies	*Epinephelus octofasciatus*	Eightbar grouper	SIOFA
EWC	Mérou taches blanches	*Epinephelus caeruleopunctatus*	Whitespotted grouper	SIOFA
BSH	Peau bleue	*Prionace glauca*	Blue shark	IOTC
EMN	Mérou pointillé	*Plectropomus punctatus*	Marbled coralgrouper	SIOFA
EEA	Mérou oriflamme	*Epinephelus fasciatus*	Blacktip grouper	SIOFA

Note: Although sharks are not part of the 16 species directly under the IOTC mandate, sharks are frequently caught in association with fisheries targeting IOTC species. Some fleets are known to actively target both sharks and IOTC species simultaneously. As such, IOTC Contracting Parties and Cooperating Non-Contracting Parties are required to report information at the same level of detail as for the 16 IOTC species. Species are ordered by highest to lowest catches.

2.1.2 Catch composition

The composition of catches is dominated by large pelagic species, including swordfish and yellowfin tuna, followed by albacore, dolphinfish, bigeye tuna and blue marlin. The small coastal species represent only a very small fraction of catches, less than 10%, with the main catch being bigeye scad (comprising 4% of the catch). This species is also used as bait in the longline fisheries for large pelagic species). For further details, see Appendix 2 for detailed catch data, including a complete time series.

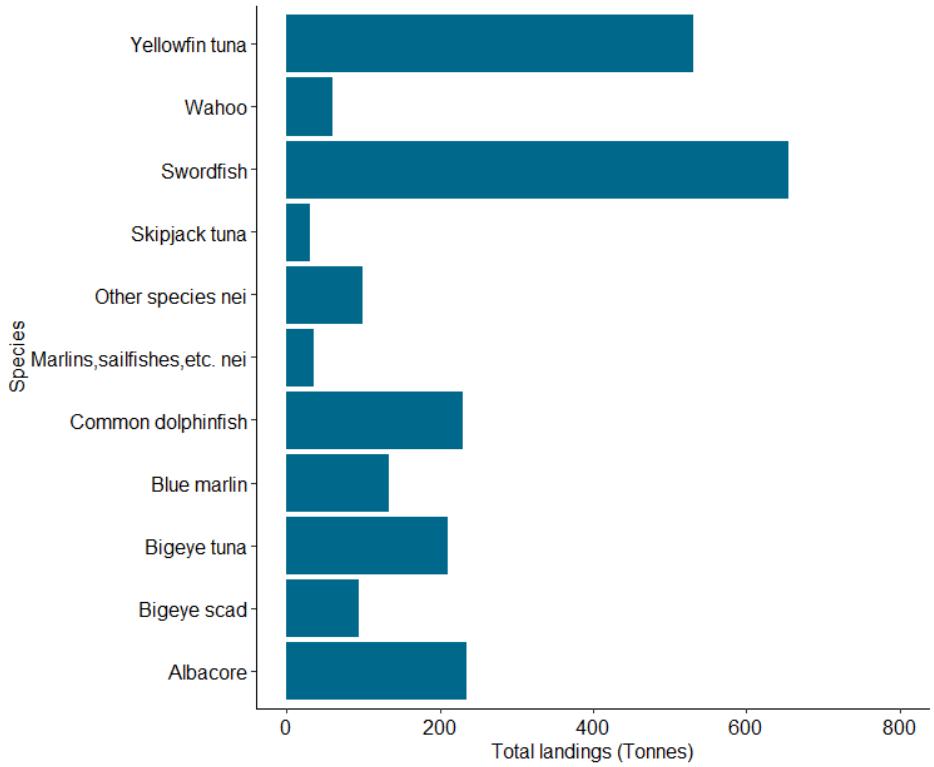

Figure 6: Réunion catch composition in 2017 (metric tonnes) (source: Blanchard et al., 2018)

Ifremer staff stated that a gap exists in data collection on depredation of catches (by sharks, marine mammals, etc). These "lost" catches are not taken into account in landing data, and could represent a significant tonnage of biomass.

2.1.3 Declining and emerging stocks

Declining stocks

No such stocks have been identified in La Réunion.

Emerging stocks or fisheries

According to local stakeholders (Ifremer and DMSOI), there are no new stocks or fisheries that could be developed within Réunion. However, there is a trend towards increasing the use of so-called "mini-longliners" to target large pelagic species, as these vessels are more cost effective than current longliners.

In addition, Ifremer discussed the potential for the development of an octopus fishery (currently mostly recreational/informal), but that there aren't any plans for doing so. DMSOI indicates that the depth around Réunion is an issue, so developing new techniques would be a plus, such as a deep shrimp fishery, but again there are no concrete plans for that.

2.2 Fleet structure

2.2.1 Domestic fisheries

Table 7 below presents the technical characteristics of the average vessel by length category. In 2018, there were 235 boats registered with the Community Fleet Register, with 197 vessels actually active.

Table 7: Technical characteristics of the average vessel by length category (source: Weiss et al., 2019)

Length class	Number of boats	Average length (m)	Average power (kW)	Average age (years)	Average crew (persons)
5-6 m	99	5.7	32	22	1.2
6-7 m	42	6.6	73	18	1.2
7-8 m	26	7.3	96	19	1.4
8-9 m	14	8.6	143	19	1.6
9-10 m	22	9.4	212	20	2.1
10-11 m	1	10.6	162	17	2.3
11-12 m	7	11.8	358	14	2.2
>12 m	24	22.4	561	16	5.2

There are two segments in the fleet: ≤12 m in length, comprised of the artisanal fleet operating in Réunion, in coastal and offshore areas, and boats >12 m in length, composed of industrial vessels fishing on the high seas (Table 8).

Table 8: Number of active vessels per length class in Réunion (source: Weiss et al., 2019).

Length class	Coastal	Mixed	Offshore	Total
5-6 m	81			81
6-7 m	35	1		36
7-8 m	21			21
8-9 m	5	3	4	12
9-10 m	11		9	20
10-11 m			1	1
11-12 m	2		3	5
>12 m			21	21

Note: vessels having carried out more than 75% of their activity within 12 nm are qualified as "Coastal", while those having operated between 25% and 75% of their activity in this zone are qualified as "Mixed". Finally, those having operated more than 75% of their activity outside the coastal area are qualified as "Offshore". Note that the data refer to the 197 active vessels in 2018.

Artisanal fisheries

There are currently approximately 211 professional artisanal boats declared and licensed, with 176 actually active. The average artisanal vessels in Réunion are on average 5-10 m long, 30-200 kW, 20 years old and hold 1-2 crew (Weiss et al., 2019).

The informal sector is almost non-existent in Réunion, so the activity of the artisanal fleet is well known. However, Ifremer mentioned that "recreational" fishermen do sell their catches (multimétier, demersal and pelagic species) and may form an important part of the catch within Réunion. However, this is not monitored so no data is available.

The majority of vessels (79%) operate within the 12 nm limit and are thus considered coastal. However, 19% of vessels operate on a regular basis outside the limit of the 12 miles and are thus fishing offshore, while only a small percentage (2%) operate both in the coastal and offshore areas (Table 8).

Industrial fishery
There are 21 industrial vessels larger than 12 m in length, that operate exclusively on the high seas, using mostly large pelagic drifting longlines, but also tuna purse seines (2 boats).

Sports / recreational fishery
For all of the French ORs, there is very little data on these fisheries, and even their definition is not agreed. In 2008, there was a national survey on recreative fisheries in France (for France Agrimer), including the ORs. It was implemented by a polling company (BVA) through a panel-based survey, but the data collected wasn't of the highest quality (mainly methodology issues, especially in the ORs) and the participation dwindled as the survey progressed. There is a new call for tender to restart this survey, and France Agrimer this time will use Ifremer for technical advice, which should ensure that protocols and methodology are in line with best practices etc.

According to DMSOI and Ifremer, sports fisheries in Réunion are not monitored, but there are projects to do so, particularly for sensitive species (which includes sharks, yellowfin tuna and some locally important species). Similarly, recreational fisheries are not monitored, though there have been ad hoc surveys done in the past. Ifremer has a national project to launch phone surveys for recreational fisheries in the ORs, with a pilot study in Martinique conducted in 2020/2021.

2.3 Foreign fisheries

Tuna and tuna-like species covered by IOTC are exploited by EU vessels, which could have access to the Réunion waters, but this happens outside of the EEZ. There are currently no fishing agreements with foreign, non-EU countries.

2.4 Other non-target marine organisms

2.4.1 Bycatch species

The fisheries in Mayotte an Réunion do not predominantly target specific fish species, and in consequence there is little or no bycatch. No information is available on the level bycatch species.

2.4.2 Endangered, threatened and protected species

Sharks
Fishing, transport, sale etc, is banned for a list of shark species: white tip reef shark (*Carcharhinus albimarginatus*), dagsit or grey reef shark (*Carcharhinus amblyrhynchos*), coral shark (*Triaenodon obesus*), black tip reef shark (*Carcharhinus melanopterus*), tawny nurse shark (*Nebrius ferrugineus*). This ban was based on a request from CRPMEM and advice from Ifremer, the scientific council of the Réserve marine de la Réunion and the Suqli'idées NGO regarding the importance of diversified reef shark populations for reef ecosystems and following issues with bulldog shark attacks (Arrêté préfectoral 185 dated 13/02/2015 Amending arrêté 1742 on professional fishing in Réunion island).

2.5 Summary of fisheries

The main artisanal metiers (gears, vessels and/or fishing techniques) operated in Réunion are presented in Table 9. The most used fishing gear is the handline, followed by longlines and shore-based fishing. The fisheries are multigear, with on average of three metiers practiced per vessel. Overall, 55% of licensed boats operate one gear, 32% operate two, while 12% operate three or more gears (Weiss et al., 2019).

Table 9: Metiers used in Réunion in 2018 (vessels <12 m) (source: Weiss et al., 2019)

French name	English name	Number of boats
Lignes De Traine A Grands Pelagiques	Large pelagics troll lines	130
Lignes Et Cannes Manuelles A Grands Pelagiques	Large pelagics pole-and-lines (manual)	99
Lignes Et Cannes Manuelles A Poissons Demersaux	Demersal fish pole and line (manual)	98
Lignes Et Cannes Mecanisees A Poissons Demersaux	Demersal fish pole and line (mechanized)	66
Lignes Et Cannes Manuelles A Petits Pelagiques	Small pelagics pole and lines (manual)	61
Palangres Derivantes A Grands Pelagiques	Large pelagics drifting longlines	46
Palangres Derivantes A Espadons	Swordfish drifting longline	40
Sennes De Plage	Beach seines	23
Filets Cales	Set nets	13
Balances A Crabes Girafe	Spanner crabs cales	12
Palangres Calees A Poissons Demersaux	Set longline for demersal species	10
Charter De Peche Recreative A Grands Pelagiques	Large pelagic chartered recreational boat	20

Note: Industrial purse seiners, which do not operate in Réunion, are not included.

Table 10 presents the main species caught by the various metiers in Réunion (vessels less than 12 m), based on SIH detailed data for 2018 (see section 9.1).

Table 10: Repartition of species and groups caught by the various metiers in Réunion (in percentage, vessels <12 m)

ASFIS code	French name	Scientific name	English name	Spanner crabs cales	Set nets	Large pelagics troll lines	Large Pelagics pole-and-lines (manual)	Small Pelagics pole and lines (manual)	Demersal fish pole and line (manual)	Demersal fish pole and line (mechanized)	Set longline for demersal species	Large pelagics drifting longlines	Beach seine
YFT	Albacore	*Thunnus albacares*	Yellowfin tuna			30.9	43.6					33.0	
TRI	Balistes nca	*Balistidae*	Triggerfishes, durgons nei						0.4	0.3			
GBA	Barracuda	*Sphyraena barracuda*	Great barracuda			0.3	0.5		1.3	0.1			
BIG	Beauclaires nca	*Priacanthus spp*	Bigeyes nei						0.9	0.8			
BAR	Bécunes nca	*Sphyraena spp*	Barracudas nei				0.1		0.4	0.5			
ALF	Béryx nca	*Beryx spp*	Alfonsinos nei						1.5				
DOT	Bonite à gros yeux	*Gymnosarda unicolor*	Dogtooth tuna			0.1	0.1		0.4	1.2			
BZX	Bonites nca	*Sarda spp*	Bonitos nei										
SQU	Calamrs, encornets nca	*Loliginidae, Ommastrephidae*	Ommastrephidae (Various squids nei)						0.4				
EMP	Empereurs nca	*Lethrinidae*	Emperors(=Scavengers) nei						4.4	1.1	25.0		
MUV	Capucin à bande jaune	*Mulloidichthys flavolineatus*	Yellowstripe goatfish										0.7
CGX	Carangidés nca	*Carangidae*	Carangids nei		1.5		2.4		21.7	7.7			0.3
SUR	Chirurgiens nca	*Acanthuridae*	Surgeonfishes nei		52.3				0.4	0.1			
CLU	Clupéoidés nca	*Clupeoidei*	Clupeoids nei					3.4					93.4
LRI	Colas à bandes dorées	*Pristipomoides multidens*	Goldbanded jobfish						16.0	9.2	25.0		

ASFIS code	French name	Scientific name	English name	Spanner crabs cales	Set nets	Large pelagics troll lines	Large Pelagics pole-and-lines (manual)	Small Pelagics pole and lines (manual)	Demersal fish pole and line (manual)	Demersal fish pole and line (mechanized)	Set longline for demersal species	Large pelagics drifting longlines	Beach seine
PFM	Colas fil	*Pristipomoides filamentosus*	Crimson jobfish						0.9	1.5			
LRY	Colas orné	*Pristipomoides argyrogrammicus*	Ornate jobfish						0.4	1.1			
SDX	Comètes nca	*Decapterus spp*	Scads nei					82.8	0.1	0.1			0.1
DOL	Coryphène commune	*Coryphaena hippurus*	Common dolphinfish			15.2	31,1					11.2	
RAQ	Crabe girafe	*Ranina ranina*	Spanner crab	100.0									
GEP	Escoliers	*Gempylidae*	Snake mackerels, escolars nei							0.3			
ALB	Germon	*Thunnus alalunga*	Albacore			0.2	2.3					51.5	
GRX	Grondeurs, diagrammes nca	*Haemulidae (=Pomadasyidae)*	Grunts, sweetlips nei		0.1				0.1				
VLO	Langoustes diverses nca	*Palinuridae*	Spiny lobsters nei		26.2								
SKJ	Listao	*Katsuwonus pelamis*	Skipjack tuna			2.7	8.0					4.3	
SSP	Makaire à rostre court	*Tetrapturus angustirostris*	Shortbill spearfish			0.2							
BUM	Makaire bleu	*Makaira nigricans*	Blue marlin			31.2							
BLM	Makaire noir	*Makaira indica*	Black marlin			3.4							
BIL	Makaires,marlins,voiliers nca	*Istiophoridae*	Marlins,sailfishes,etc. nei			0.7							
HCZ	Marignans nca	*Holocentridae*	Squirrelfishes nei		4.6				4.2	3.4			
MLS	Marlin rayé	*Tetrapturus audax*	Striped marlin			0.2							

ASFIS code	French name	Scientific name	English name	Spanner crabs cales	Set nets	Large pelagics troll lines	Large Pelagics pole-and-lines (manual)	Small Pelagics pole and lines (manual)	Demersal fish pole and line (manual)	Demersal fish pole and line (mechanized)	Set longline for demersal species	Large pelagics drifting longlines	Beach seine
EZR	Mérou zébré	*Epinephelus radiatus*	Oblique-banded grouper						1.8	2.4			
GPX	Mérous nca	*Epinephelus spp*	Groupers nei						10.7	5.9			
MGS	Mulets spp	*Mugil spp*	Mullets spp		7.7								1.7
MUI	Murènes nca	*Muraenidae*	Morays nei						0.7	0.4			
PWT	Perroquets nca	*Scaridae*	Parrotfishes nei							0.1			
MZZ	Poissons marins nca	*Osteichthyes*	Marine fishes nei		6.2					0.9	1.6		
WRA	Pourceaux, donzelles, etc. nca	*Labridae*	Wrasses, hogfishes, etc. nei						0.2	0.1			
SCS	Rascasses nca	*Scorpaena spp*	Scorpionfishes, rockfishes nei						0.2	0.3			
SKH	Requins divers nca	*Selachimorpha (Pleurotremata)*	Various sharks nei			0.1	0.2			1.7			
MUX	Rougets nca	*Mullus spp*	Surmullets(=Red mullets) nei						1.5	0.5			0.1
BIS	Sélar coulisou	*Selar crumenophthalmus*	Bigeye scad										
SBX	Sparides nca	*Sparidae*	Porgies, seabreams nei					13.8					4.0
WAH	Thazard-bâtard	*Acanthocybium solandri*	Wahoo			14.4	11.7		0.1	0.1			0.1
BET	Thon obèse(=Patudo)	*Thunnus obesus*	Bigeye tuna			0.2	0.1						

ASFIS code	French name	Scientific name	English name	Spanner crabs cales	Set nets	Large pelagics troll lines	Large Pelagics pole-and-lines (manual)	Small Pelagics pole and lines (manual)	Demersal fish pole and line (manual)	Demersal fish pole and line (mechanized)	Set longline for demersal species	Large pelagics drifting longlines	Beach seine
KAW	Thonine orientale	*Euthynnus affinis*	Kawakawa			0.1	0.1						
LVK	Vivaneau à raies bleues	*Lutjanus kasmira*	Common bluestripe snapper						18.4	12.7			
ETC	Vivaneau flamme	*Etelis coruscans*	Deepwater longtail red snapper							4.6			
AVR	Vivaneau job	*Aprion virescens*	Green jobfish						1.3	1.6			
ARQ	Vivaneau rouillé	*Aphareus rutilans*	Rusty jobfish						4.2	0.9			
ETA	Vivaneau rubis	*Etelis carbunculus*	Deep-water red snapper							10.4			
SNA	Vivaneaux nca	*Lutjanus spp*	Snappers nei		0.1				5.5	8.6			
SFA	Voilier indo-pacifique	*Istiophorus platypterus*	Indo-Pacific sailfish			0.2							
EBS	Castagnole commune	*Eumegistus illustris*	Brilliant pomfret							18.5	25.0		

Note: In the source document, the total for "Set longline for demersal species" amounts to 75%, not 100%. Source: Weiss et al., 2019

As a conclusion, the fishery sector in Réunion is a mix of small-scale vessels operating in coastal waters and larger vessels operating offshore, particularly targeting large pelagic species (tuna and tuna like species mostly). The most heavily utilised fishing gear is the handline, followed by longlines and shore-based fishing. The fisheries are multigear, with on average three metiers practiced per vessel. Lastly, the vessels tend to be fairly old and operate with a small crew of 1-2 members on average.

DMSOI indicated that artisanal fishing effort is "organically" limited by the number of professional fishermen the island can "produce".

SECTION 2 - KEY FINDINGS

- Exploited stocks in Réunion are a mix of a limited number of large pelagic species and a large number of small coastal species.
- Operations are split between small multigear artisanal fisheries operating in the coastal areas that do not target specific species, artisanal offshore fisheries catching large pelagic species (such as the longline fishery targeting swordfish), and some large-scale industrial tuna purse seiners operating on the high seas.
- There are 89 species captured in Réunion that are formally monitored (at least landing data).
- On the 89 monitored species, only 16 (or 18%) are formally assessed: a third of them (6) are small demersal or pelagic species and are assessed by Ifremer, while the remaining two thirds (12) are large pelagic species covered and assessed by IOTC.
- Being an Outermost Region of the EU, Réunion stocks are covered by two RFMOs: IOTC and SIOFA.
- The composition of catches is largely dominated by large pelagic species: swordfish and yellowfin tuna, followed by albacore, dolphinfish, bigeye tuna and blue marlin. The small coastal species represent only a very small fraction of catches, less than 10%, with the main one being the bigeye scad.
- Ifremer mentions a gap exists in data collection on depredation of catches (by sharks, marine mammals, etc): these "lost" catches are not taken into account in landing data, and could represent significant amounts.
- There are two segments in the fleet: less than 12 m and more than 12 m. The first segment is composed of the artisanal fleet operating in Réunion, in coastal and offshore areas, while the second segment is composed of industrial vessels fishing on the high seas.
- There aren't really any new stocks or fisheries that could be developed, though there is a trend towards increasing the use of so-called "mini-longliners" to target large pelagic species, as they are more cost effective than the current type of longliners in use.
- The depth around Réunion is an issue, so developing new techniques would be a plus, such as a deep shrimp fishery, but again there are no concrete plans for that.
- The informal sector is almost non-existent in Réunion, so the activity of the artisanal fleet is well known.
- There is a rather important part of the "recreational" fishermen who sell their catches (multimétier, demersal and pelagic species), but it is not monitored so no data is available.

- Sports fisheries in Réunion are not monitored, but there are projects to do so, particularly for sensitive species (sharks, yellowfin, locally important species…). Similarly, recreational fisheries are not monitored, though there have been ad hoc surveys done in the past.
- Ifremer has a national project to launch phone surveys for recreational fisheries in the ORs.
- There are currently no fishing agreements with foreign, non-EU countries.
- Fishing, transport, sale etc. is banned for a list of shark species.
- Artisanal fishing effort is "organically" limited by the number of professional fishermen the island can "produce".
- A gap exists in data collection on depredation of catches (by sharks, marine mammals, etc): these "lost" catches are not taken into account in landing data, and could represent significant amounts.

3 Institutional structures

Data collection in France and its ORs is well structured and there is a national framework in place, with some specificities in the ORs depending on the local context (Figure 7). In Réunion, landings and biological data are collected by Ifremer on most fisheries. IRD manages an observer programme focusing on large pelagic fisheries, with the help of a local contractor. Paper fishing logbooks are submitted by fishermen directly to DMSOI, then sent to FranceAgrimer for data entry.

3.1 Data collection

The overarching institution related to data collection is the Directorate for Marine Fisheries and Aquaculture (DPMA) under the Ministry of Agriculture and Food[10]. Its roles are to ensure that France meets its obligation towards EU Common Fisheries Policy (1380/2013)[11], including the data collection framework (Regulation (EU) 2017/1004)[12] and 2017-2019 EU-MAP[13] and the 2020-2021 EU-MAP (consisting of two Commission Decisions) [14].

The actual data collection field implementation involves several national institutions and research institutions:

- Ifremer (*Institut Français de Recherche pour l'Exploitation de la Mer*, French Research Institute for the Exploitation of the Sea) organizes data collection from samples (biological data) and catches/landings, manages the national fisheries information system (SIH)
- IRD (*Institut de Recherche pour le Développement*, Research Institute for Development) is in charge of large pelagic (tuna fisheries) monitoring
- University of Nantes – LEMNA (*Laboratoire d'Economie et de Management de Nantes-Atlantique*, Economy and Management Laboratory of Nantes-Atlantique) collected socio economic data for vessels above 12 m in length
- FranceAgrimer is in charge of recreational fisheries monitoring and of industries/processing plants/auction houses monitoring in mainland France; also is in charge of digitizing paper logsheets/logbooks from the French ORs.

10 https://agriculture.gouv.fr/

11 Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

12 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

13 Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21)

14 Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001(OJ L 145, 4.6.2019, p. 21–26) and Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

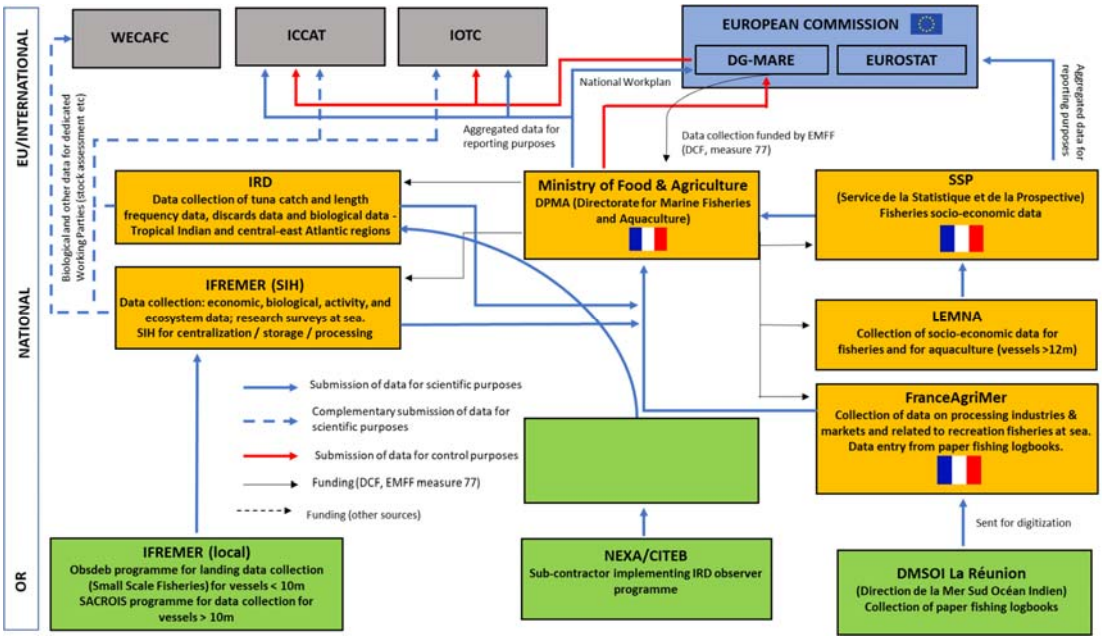

Figure 7: Institutional organisation of fisheries data collection in France, including Réunion

3.1.1 Overall workflow of data collection in France and its ORs

While the DCF provides a legal framework, organisation and general obligations, the EU-MAP establishes the (minimum) data requirements to be collected and at what frequency. For example, biological variables associated with a métier include length and discard data for pre-determined species to allow for quarterly evaluation of length distributions and discard volumes. These data must be recorded to "level 6" which includes data for levels 1 to 5, providing background information on the fleets in question.

Since 2014, the European Maritime and Fisheries Fund (EMFF) provides each MS financial support to implement the DCF. Articles 17 to 20 of the EMFF Regulation (EU) 508/2014 require participating MS to produce an 'operational programme' for the EMFF. The operational programme sets out how each MS intend to spend their EMFF budget and is subject to approval by the EC. In addition, under the DCF each MS must set out a work plan and submit an annual report describing the implementation of the DCF.

DPMA provides the National work plan, revised on an annual basis, as needed. This document describes how France is going to comply with the DCF obligations, while each OR organizes its own fisheries monitoring system.

According to DPMA, the following workflow is in place for catch reporting, following the Control Regulation (EC) 1224/2009[15]:

- Vessels below 10 m (paper logsheets) and vessels 10 to 12m (paper logbooks) send their paper-based catch data to the local Sea Directorates for quality control,

15 Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

which then transmit them to FranceAgrimer for data entry in the SACAPTE system, from where they are integrated into the SIH.

- Vessels above 12 m: e-logbooks are directly uploaded into the SIH. VMS data and sales data are also directly uploaded to SIH, but without data relevant to ORs, as there is no sales house or any vessel above 12m.

Ifremer is responsible for 90% of data collection with IRD responsible for collecting data on tuna fisheries (though this is minor for ORs, as IRD is mainly involved with collecting data from high sea fleets).

Ifremer is *de facto* "managing" fisheries data collection issues in ORs for DPMA. Ifremer has strived over the past year (2020) to set up a single focal point for all data-related questions, to make things easier when DPMA requests information from them. DPMA is also pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools. The ultimate goal being one single tool at IFREMER to get all information and statistics on fisheries.

In Réunion, FranceAgrimer implement one-off surveys on recreational fisheries. They are also in charge of digitizing of paper logsheets and logbooks

SSP and LEMNA implement socio-economic surveys on all French vessels on the fleet register, including in the ORs and report to DMPA.

3.1.2 Data collection and other reporting obligations in Réunion

Regarding data collection, Ifremer undertakes port activities (logbooks, VMS, processing plants data) and IRD undertake on-board activities (observers, discards). In addition, Ifremer undertakes some biological sampling in pelagic fish processing plants (which is easier to implement than at landing sites). Paper fishing logbooks are collected by DMSOI then sent to FranceAgriMer for data entry.

Self-sampling on longliners in Réunion is managed by IRD as part of their observer programme. Data on depredation is collected in Réunion (and Mayotte, see Mayotte OR Profile Report), as part of IRD's observer programmes. Lastly, the Centre de recherche et de valorisation des milieux aquatiques (CITEB), a semi-public structure, is in charge of managing the observer programme for IRD, and collects data for them. In 2021 all data should be centralized in SIH (using the RDBES[16] standard), including IRD data, as well as the Muséum national d'histoire naturelle (MNHN), OFB, etc.

IRD uses data from Ifremer for their scientific work, such as preparing data stock assessment. However, IRD would like universities to be more involved in data collection and analysis.

Collaboration between Ifremer and DMSOI is good, with discussions and concertation on projects and the DCF. However, DMSOI does not have direct access to SIH data, only on demand, with summary data products provided by Ifremer on a routine basis. However, DMSOI indicates that there can be discrepancies between DMSOI and Ifremer data, e.g. on active vessels, but these are usually due to differences in methodology.

16 Regional Database and Estimation System, a standard developed by the International Council for the Exploration of the Sea (ICES).

DMSOI is in charge of coordinating SIH activities for DPMA. This is predominantly an OR process. In all ORs, the Direction de la Mer is in charge of collecting the paper-based logbooks/logsheets from commercial fishers, because they are in charge of all the regulatory aspects (i.e. they are the French authorities) and logbooks are an administrative/control measure. Ifremer has no regulatory role and couldn't enforce this collection. However, this system is described by local stakeholders as a very pyramidal system that doesn't leave room for local initiative in data collection, with no leeway to change methods based on local needs/specificities. It also makes it difficult to promote and use the data at the local level.

3.1.3 The SIH

The SIH (Système d'Informations Halieutiques) was developed under the framework of the ecosystem-based approach to fisheries, to cover both ecosystem resources and uses. The overarching aim of this system is to gather all fisheries information in a single system. This covers collected catch and effort data, as well as existing data. The system was developed to then harmonise the data, store and preserve them, and make the data available to partners.

The SIH was prototyped in 2007 in Martinique. Since 2017, the system has been managed from the Brest office of Ifremer, with regional focal points which serve as a relay for the national SIH people based in Brest.

The SIH is organised in 4 modules, all managed by Ifremer:

Ecosystems: Data collection for this module happens mostly in Metropolitan France (i.e., not in the ORs), and can include abundance indices for stock assessments, campaigns etc.

Exploited resources: This module examines population structure and collects the main biological parameters for stocks. This involves biological observation of landings, including in markets and factories. There is some biological sampling in the ORs, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers. Biological sampling on large pelagics under the mandate of RFMOs (ICCAT, IOTC) is considered as generally good. In 2021, Ifremer plans to do more biological sampling in the ORs, mainly based on buying fish in ports, on a larger range of species, as per STECF recommendations.

Landings & effort: In Mainland France, data flow is considered good (e-logbooks etc), but not in ORs. The standard flow of reporting is as follows: fishers send their logbooks or logsheets to the local Direction de la Mer (DMSOI), which sends them after quality control to FranceAgrimer for data entry (in-house or by subcontractors). One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed. The overall reporting rate for the ORs is currently estimated at 50%. In this regard, the role of the local DMs is very important to train fishers, support them etc. for data reporting. To address this issue of reporting, Ifremer developed OBSDEB, which works by performing sampling at landing sites, to rebuild catches and effort on the last 7 days. In this respect, instead of relying on reporting, OSBDEB (OBServatoire des DEBarquements or landings observatory) sample landings to estimate catches etc, so it does not improve declarations, it supplements them. For 2021, Ifremer's objective is to further improve catch and effort reporting by fishers.

Socio-economic data: Data on activities: month per month reconstitution of activity with métier, species & distance from coast. From there, segmentation of the fleet is derived. This information is used as basis for sampling plans. Availability of such data varies depending on the ORs.

LEMNA collects data from vessels with proper accounting. IFREMER tries and collect data from vessels without such information or refusing to provide them.

Database: SIH uses a central database named HARMONIE. It is used for storage, Quality Assurance, validation, aggregation, anonymisation, processing, statistics… and also for providing data to end users.

The current objective is to compile all available data from Ifremer, IRD and the National Museum of Natural History (MNHN) in the Ifremer Harmonie database used by the SIH, so that all data is already in a single system and format, ready for data calls. Data would be harmonised using the ICES RDBES data standard, which includes metadata on methodologies, campaigns, processing etc.

There is also work on harmonising sampling plans, data collection protocols, Quality Assurance methods, estimation and processing etc.

Harmonie and the related software etc are mostly developed and maintained in-house (DSI, Direction des services informatiques), with software development partly outsourced to external contractors, based on Ifremer specs.

Data calls: Ifremer is usually in charge of consolidating data from various sources (mainly Ifremer and IRD) before sending them to the caller (DPMA, ICES, ICCAT etc.). There is a good collaboration with the Atlas of European Tuna fisheries[17] maintained by IRD to compile all tropical tuna fisheries data (which are not collected by Ifremer). In the case of IOTC, IRD is in charge of compiling requested data.

3.1.4 Reporting to regional/international organizations

DPMA does not report statistics *per se* to the European Commission but provides an Annual Report on the implementation of DCF through the Work Plan (2017-2019, 2020-2021).

DPMA reports statistics related to data calls from EC, ICES, RFBs (WECAFC, SIOFA) and RFMOs (ICCAT, IOTC, GFCM).

SSP sends statistics to Eurostat and FAO, with disaggregation per OR.

Ifremer and IRD both contribute biological data directly to dedicated regional working groups (e.g., WECAFC shrimp and groundfish working groups) to which the EU is a participant.

3.2 Scientific advice

Ifremer and IRD play a central role in the production of national scientific advice. Such advice is either requested by local authorities such as Direction de la Mer (DM) or by central French authorities such as Direction de la Pêche Marine et de l'Aquaculture (DPMA) under the Ministère de l'Agriculture et de l'Alimentation.

17 https://sirs.agrocampus-ouest.fr/atlas_thonV5-DEC/index.php?atl_version=0&idlang=uk

As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests. However, access to actual SIH datasets is only granted on request, including for internal users.

- Internal users: if granted, they have access to raw datasets. In some cases, SIH staff prepares datasets for internal users (e.g., users who do not need and/or could not use raw data). VMS data is a specific case where access is given after very careful review of the request.
- External users: if granted, they have only access to prepared datasets, properly aggregated and anonymised.

All requests (including access to data or data calls) are reviewed by a dedicated structured, called CREDO (Cellule de Réponse aux appels de DOnnées).

The review process includes:

- Determining who would prepare/provide the data within Ifremer.
- Who will use the data and for what.

The review process depends on the dataset:

- Ifremer only for less sensitive datasets.
- Ifremer plus DPMA for data such as SACROIS and OBSMER which include business-confidential information. For these there is a quarterly steerco meeting to review requests.

Access to data is mostly free, though Ifremer used to charge when data was requested by private for-profit entities such as engineering bureaus for impact studies. But the administrative overhead linked to charging for such information is so high that now they tend to just provide the data for free.

In the context of the French Government's policy on access to public data (open data), there is global review on the access to data in Harmonie, but this is a complex issue. DPMA mentions that in other areas, such as agricultural data, access is done entirely through an online tool (Agreste portal). This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data.

Overall, Ifremer reviews around 200-300 data requests each year. Ifremer also publishes fisheries data summaries, in the form of PDF fact sheets on given fisheries, métiers etc. Those are published on an annual basis and are accessible to everyone on the Ifremer website. The production of those documents is highly automated based on procedures and scripts stored in the SIH.

Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (such as working parties and scientific committee) to which France participates through the EU.

RFMOs (IOTC and ICCAT) share aggregated data with the public and share fine grained data with their Working Parties according to their data confidentiality policy. They can also grant access on request for fine grained data to external scientists etc, subject to approval by the Members.

RFMOs provide scientific advice based on the work of their scientific working groups and through their Scientific Committee. This scientific advice is made available to the general public on the respective RFMO websites.

3.3 Research institutions

Réunion hosts a number of research institutions, including Ifremer, IRD, and the Université de la Réunion, as well as a few semi-public institutions involved in marine biology/ecology. The University, through its marine ecology laboratory, undertakes research on marine ecosystems, which touch on areas related to fisheries, such as vulnerable species, ecosystem impacts etc.

3.4 Monitoring, control and surveillance

3.4.1 MCS workflow

The Control regulation mandates information requirements for fishers. These are received in paper form for smaller vessels (<12 m) by the local Sea directorates, then transferred to FranceAgriMer for data entry. There is an electronic data flow in place for larger vessels (≥12 m). All data then goes into the SIH (including VMS and sales).

At the local level, DMSOI and the Préfet are in charge of regulation implementation and enforcement. DMSOI is in charge of coordinating the Regional Fisheries Management Plan for the Préfet: brigade nautique, gendarmerie, Navy on the high seas. MCS activities are programmed as part of a National Biannual plan, which includes declinations at the local level.

DMSOI provides routine training for the various stakeholders regarding regulations, techniques etc.

In 2008, two global decrees gathered all previously separate regulations relevant to Réunion into single texts, respectively on professional and recreational fishing. The same was done in 2019 on Traditional fishing[18]. Additional Prefectorial decrees are then taken as needed (Rural and Fisheries Code).

According to Ifremer and DMSOI, in Réunion, IUU fishing does not seem to be a major issue, as fisheries are well monitored and there are no neighbouring countries from where illegal fishing could come.

At the level of RFMOs, control is enforced by Member States but the RFMO body in charge of compliance can identify Members that are not compliant and ask them to remedy the situation. For IOTC, non-reporting of nominal catch can lead the Commission to ban maintaining catch on board (no data, no catch), but though it has been considered closely for some CPCs, it has never been applied. In extreme cases, the RFMOs can apply market measures to non-compliant states, but IOTC indicates that this has never happened (IOTC Compliance interview.)

[18] This is the term for fishing that is part of the local traditions. This is handled separately from commercial and recreational fishing, and include fishing such as bichique at a certain time of the year, which is part of the local custom.

3.4.2 MCS data for scientific purposes

Ifremer obtains administrative and control data from DPMA's SIPA (Système d'information de la pêche et de l'aquaculture –Fisheries and aquaculture information system)[19], such as vessel registration & characteristics, VMS data. IRD receive VMS data on longline fishing vessels to do cross checks on observer data/self-sampling (activities).

IOTC has estimates of unreported catch, which are available in the Nominal Catch datasets. Estimates of IUU catches are predominantly for unreported catches. These comprise catches from some flags / fisheries that are reported by third parties (most frequently other CPCs, where landing of the fishing vessels occurs) and are regularly dealt with during IOTC scientific meetings and used for stock assessment purposes.

In the IOTC NC (nominal catch) dataset unreported catch are listed as NEIPS / NEICE / NEIFR / NEISU / NEIDN to represent different "NEI fleets" which are related to the type of vessel (purse seiners, longline fresh vs. deep freezing), to a specific reporting fleet (Indonesia, for vessels flagged by other countries and operating within their EEZ) or some now disappeared old flag (i.e., Soviet Union).

In Réunion, control data are not shared with scientists, as there is no local mandate for doing this sort of research. In the marine park, controls are undertaken by park rangers and illegal catches are confiscated and sent to Ifremer, which allows them to have a rough idea of illegal fishing pressure.

3.5 Institutional capacity

3.5.1 National level

DPMA considers that the major factor hampering work of Ifremer is a lack of human resources. In particular are the lack of local staff in the ORs, including fisheries experts in the field. Although monies can be obtained through EMFF, this does not cover hiring long term staff.

The objective of DPMA is to include under DCF all activities that should be part of regular data collection. In most cases, Ifremer and IRD implement all the activities themselves, but in Réunion 100% of data collection is done by Ifremer, with self-sampling and observer data collected for IRD by a semi-private contractor.

Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which had not been planned/budgeted. Often requests passed by DPMA through an official request to Ifremer take priority, which can impact routine and project work. Recruitment within IRD is an issue too, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed.

There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert

19 http://www.sipa.agriculture.gouv.fr

knowledge). Contracts are currently on a 3-year basis, but the next ones will be for 4 years.

3.5.2 Réunion

Ifremer has stated that there is a global problem of insufficient staff for all activities, which also affects some aspects DCF data collection. In 2021-2022, Ifremer plans to hire staff to address the current lack of socio-economic data collection (which is an issue common to all French ORs), as this is expected to be collected under the DCF.

SECTION 3 - KEY FINDINGS

- Data collection in France and its ORs is well structured and there is a national framework in place, with some specificities in ORs depending on the local context.
- The main actor is IFREMER, responsible for 90% of data collection, with IRD on tuna fisheries in the Indian Ocean.
- DPMA is pushing for all fisheries data to flow into the SIH, whatever the institution involved for data collection, to avoid multiplication of tools: one-stop shop for all fisheries information.
- DPMA provides fisheries statistics to RFMOs, while Ifremer and IRD contribute scientific expertise and advice to both DPMA and RFMOs.
- Access to fisheries data for 3rd parties is free, but on request. This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data as in other agriculture sectors.
- The major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF.
- In most cases, Ifremer and IRD implement all the activities themselves, but in specific situations data collection is done by private contractors.
- There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).
- In Réunion, regarding data collection, Ifremer does port activities (logbooks, VMS, processing plants data) and IRD does on board activities (observers, discards, etc).
- IRD observer programme is managed by a local semi-public institution, CITEB.
- IRD would like universities to be involved in data collection and analysis.
- In Réunion, paper fishing logbooks are collected by DMSOI then sent to FranceAgriMer for data entry.
- In Réunion, DMSOI provides routine training for the various stakeholders regarding regulations, techniques etc.
- In Réunion, collaboration between Ifremer and DMSOI is good, with discussions and concertation on projects and the DCF.
- In Réunion, DMSOI is in charge of coordinating SIH activities for DPMA. It is a very pyramidal system that doesn't leave a lot of wiggle room for local initiative. It can be frustrating because there is no leeway to change methods based on local needs/specificities. It makes it also difficult to promote and use the data at the local level.
- In Réunion, DMSOI indicates that there are sometime discrepancies between DMSOI and Ifremer data, e.g., on active vessels, but these are usually due to differences in methodology.
- Ifremer mentions that there is a problem of insufficient staff. In 2021-2022, Ifremer plans to hire staff just for socio-economic data collection.
- According to Ifremer and DMSOI, in La Réunion, IUU fishing does not seem to be a major issue, as fisheries are well monitored and there are no neighbouring countries from where illegal fishing could come.

4 Funding and funding structures for data collection

4.1 European Maritime and Fisheries Fund (EMFF)

4.1.1 Member State funding

DPMA provided a description of how the EMFF process works in France.

Top – down:

1. The European Union votes a global envelope for EMFF. It is the result of a political consensus.
2. A national envelope is scaled according to complex rules including different criteria
3. A percentage of this envelope is assigned to data collection (Article 77)

Bottom – up:

At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities (such as for recreational fisheries). A draft of the total budget for DCF data collection is made available.

Final negotiation: this draft is confronted to the DCF percentage available in EMFF for France. Discussions starts again to find the correct balance between priorities. It is a complex exercise with no magic recipe.

EMFF funds 80% of the eligible costs (not all data collection activities are eligible). The remaining 20% is supported by the institution's own budget.

DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. It takes usually 4-5 months to complete the process.

DPMA is also a beneficiary of measures on data collection referred to in Article 77.

There are some projects related to data collection outside measures on data collection referred to in Article 77:

- Article 28: scientific partnership;
- Article 39: improvement of gear selectivity;
- Article 40: large marine ecosystem knowledge (to be confirmed); and
- Article 76: MCS funding.

There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.

Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French 'Cours Des Comptes' (2019a). DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

France received under the EMFF 2014-2020 EUR 588 million. In this respect, the EMFF Operational Programme for France 2014FR14MFOP001 (DPMA, 2015) described the proposed use of EMFF by France, including OR:

- Union Priority 1 (UP1): EUR 150.9 million (25.7% of total EMFF allocation) will aim at a better balance fisheries activities and environmental protection and sustainability. It will address (among others) fleet capacity by adjusting fleet capacity to resources, modernisation of the fleet, investments in port infrastructures in line with requirements under the discards ban, and improving traceability of fisheries products and processing.
- Union Priority 2 (UP2): EUR 88.8 million (15.1% of EMFF allocation) will go towards meeting the objectives of the French national strategic plan for aquaculture that aims at boosting competitiveness and sustainability of the French aquaculture sector.
- Union Priority 3 (UP3): EUR 122.3 million (20.8% of EMFF allocation) will go towards compliance with CFP rules regarding control and data collection. This include Article 77 of interest to this study: total budget in the programme is EUR 66 146 872 . This is the main source of EMFF funding for DCF data collection at the national and OR level.
- Union Priority 4 (UP4): EUR 22.6 million (3.8% of EMFF allocation) will help ensure better territorial cohesion of fisheries and aquaculture. Foreseen activities include maintaining and creating new jobs, reinforcing the position of fisheries and aquaculture within the development of coastal territories, strengthening the FLAGs network, and increasing added value through innovative projects and research.
- Union Priority 5 (UP5): EUR 163.2 million (27.8% of EMFF allocation) will go towards improving the marketing, diversification and valorisation of seafood products. The French OP gives a central role to producer organisations (PO) that currently place almost 50% of the French production on the market, through the implementation of production and marketing plans and the reinforcement of POs across its territory (both mainland and outermost regions). Please note compensation for additional costs for seafood marketing etc in the six French ORs has more than doubled compared to the 2007-2013 period.
- Union Priority 6 (UP6): EUR 5.3 million (0.9% of EMFF allocation) will go towards strengthening the efficiency of maritime surveillance and widening the network of marine protected areas and improving knowledge on the marine environment and interactions with human activities.
- EUR 34.8 million (5.5% of EMFF allocation) are allocated to technical assistance in order to reinforce the implementation system, ensure efficient administration of the EU funding, including support to reducing burden on beneficiaries, improving administration and publicity and information measures.

Financial information:

- Total OP budget: EUR 774 353 018
- Total EU contribution: EUR 587 980 173, including EUR 66 146 872 for DCF
- Total national contribution: EUR 186 372 845

EMFF is operationally managed by DPMA. Some of the fund management is delegated to sub-national level (*Régions*).

4.1.2 OR funding

No specific budget has been proposed by the EMFF operational programme for French ORs. Nonetheless, use of EMFF funds in the OR can be extracted from France's financial report (Liste des opérations du programme national FEAMP 2014-2020, 2019). Total use of EMFF funds in Réunion has been EUR 28 887 932 (as of December 2019), with 75% for cost compensation (Article 70), 8% for Control and enforcement (Article 76) and no specific direct funding for data collection (Article 77).

4.2 Other sources of funding

Ifremer has a total annual budget in 2017 of EUR 194.4 million (Cours des Comptes, 2019b); with the following breakdown: (i) EUR 154.4 million directly supported by the national budget (subsidies for public services support), and (ii) approximately EUR 40 million from contracts and projects; the EUR 40 million includes support from EMFF.

EMFF reimburses 80% of eligible expense, which usually corresponds to 60% of the expenses. The remaining 40% are covered by Ifremer national budget.

The other source of funding is France's regular national budget, which can provide funds under various mechanisms:

- Grant agreement with IFREMER and IRD;
- "*Convention socle halieutique*" with IFREMER: used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan; and
- Triannual agreement with IRD.

IRD mentioned that funding can be allocated by DG MARE or CINEA (formerly EASME) to specific projects for field data collection or meta-analysis. Several examples in recent years include (though these are not Mayotte specific):

- Scientific advice on shark management in RFMOs: data exploration and retrieval and analysis (3 years);
- Shark management in Atlantic about key species (18 month);
- RECOLAP[20]: evaluation of implementation of Electronic Monitoring Systems (EMS) in small longliners (only Réunion);
- Meta analysis of CMMs in longline fisheries in Atlantic about hook shapes etc; and
- Pilot study funded by DCF on whitetip ban on retention -> survival rate post release in purse seine and longline fisheries. POREMO.

4.3 OR funding for data collection

Given the centralization of the data collection programme in Ifremer with a global support from SIH in Brest (Bretagne, France Metropolitan), funds for Article 77 are managed and engaged at the national level. These are then managed by DPMA and engaged by Ifremer for data collection in Metropolitan France and the ORs, including sub-contracting with external vendors for data collection in some ORs.

[20] MARE 2016-22 - MARE 2016-22 strengthening regional cooperation - European Commission (europa.eu)

The already cited "Liste des opérations du programme national FEAMP 2014-2020, 2019" provides the detail for FEAMP activities under Article 77.

Table 11: EMFF funds received by the various French institutions under Article 77.

Institution name	Total eligible funds (EUR)	Total funding received (EUR)
Agence Des Aires Marines Protegees	293 416.05	234 732.84
Agence Francaise Pour La Biodiversite	914 730.00	731 784.00
Franceagrimer	44 961.90	35 969.52
Ifremer	41 517 440.00	33 213 492.00
Inra	1 025 238.00	820 190.00
IRD - Institut De Recherche Pour Le Developpement	9 628 639.00	7 702 911.00
Ministere De L'agriculture De L'alimentation Maa	9 670 201.00	7 736 160.00
Museum National D'histoire Naturelle	1 084 263.00	756 113.00
Universite De Nantes	3 049 192.00	2 439 353.00

There is no specific EMFF funding request for Ifremer data collection under DCF for each OR, but Ifremer provided a breakdown for expenses engaged specifically in each of the ORs for the period 2017-2018. For Réunion, between EUR 270K and EUR 180K have been used for routine data collection over the last 3 years.

Table 12: Expenditures incurred (EUR) by Ifremer for data collection in Réunion.

Type of data	2017	2018	2019
Biological data	EUR 132 539.99	EUR 97 464.14	EUR 72 327.48
Economic data	EUR 0	EUR 0	EUR 0
Effort and landings data	EUR 138 666.62	EUR 126 264.72	EUR 111 135.63
Grand total	EUR 271 206.61	EUR 223 728.86	EUR 183 463.11

Ifremer mentioned that research projects related to data collection had been funded under Articles 28, 39 and 40. There exist some alternative sources of funding outside of the EMFF, for activities not covered under DCF. Regarding Ifremer, there are two main sources:

- Convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer and not under DCF (Ifremer proposes actions, DPMA funds them). There is less and less activities under this line, as more and more is getting covered by the DCF. For years, the remaining 20 % of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining include SACROIS and the data access portal.

- DCSMM: partnership with OFB/Marine parks to provide tools & services. In Mayotte, data is collected following SIH protocols and entered/stored using SIH tools. In other ORs, there is no data collection activities but Ifremer provides summary data for marine parks and Natura 2000 areas, under a pluriannual data provision convention (latest from 2019).

SECTION 4 - KEY FINDINGS

- EMFF funding process is highly centralised in France: DPMA is the single EMFF management authority.
- At French national level, needs from the different institutions are collected according to the DCF requirements and national priorities.
- There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.
- France received for EMFF 2014-2020 a total of EUR 588 million.
- Early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities.
- Total use of EMFF funds in Réunion: EUR 28 887 932 (as of December 2019), with 75% for cost compensation (Article 70), 8% for Control and enforcement (Article 76) and no specific direct funding for data collection (Article 77).
- For Réunion, between EUR 270K and EUR 180K have been used by Ifremer for routine data collection over the last 3 years.
- In Réunion, some Ifremer research projects related to data collection have been funded under Articles 28, 39 and 40
- Other sources of funding for data collection come from the national budget, through grant agreements, conventions etc. DG MARE can also contribute to funding specific projects or research activities.

5 Current state of data collection and other reporting obligations

Ifremer mentioned the convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer not covered under the DCF (i.e., Ifremer proposes actions, DPMA funds them). There are less and less activities under this line, as more and more are being funded within the DCF. For years, the remaining 20% of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining that are not funded by the DCF include SACROIS, data access portal. According to IRD, coverage is relatively good overall regarding DCF obligations.

5.1 DCF data obligations

DCF obligations as per Commission Delegated Decision (EU) 2019/910 (EU, 2019) are detailed in Chapter III Data Requirements: Section III.2. lists requirements related to biological data on stocks caught by Union commercial fisheries in Union and outside Union waters and by recreational fisheries in Union waters:

a) *Catch quantities by species and biological data from individual specimens enabling the estimation of:*
   i. *For commercial fisheries, volume and length frequency of all catch fractions (including discards and unwanted catches) for the stocks listed in Tables 1A, 1B* (Table 13, below) *and 1C* (Table 14, below), *reported at the aggregation level 6 as set out in Table 2. The temporal resolution shall be coordinated at marine region level based on end-user needs;*
   ii. *For commercial fisheries, mean-weight and age distribution of catches of the stocks listed in Table 1A, 1B and 1C. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*
   iii. *For commercial fisheries, sex-ratio, maturity and fecundity data for stocks listed in Tables 1A, 1B and 1C of catches at frequencies needed for scientific advice. The selection of stocks from which these variables have to be collected and the temporal resolution shall be coordinated at marine region level based on end-user needs;*
   iv. *For recreational fisheries, annual volume (numbers and weights or length) of catches and releases for the species listed in Table 3 and/or the species identified at marine region level as needed for fisheries management purposes End user needs for age or other biological data as specified in paragraphs (i)-(iii) shall be evaluated for recreational fisheries at marine region level.*

Table 13 (listed as 'Table 1B' in the regulation) gives the list of stocks that are specifically to be reported for La Réunion under the DCF.

Table 13: DCF Table 1B list of stocks that are specifically to be reported for Mayotte and La Réunion.

List of stocks	Included in 2017-2019 France Workplan?[21]	Included in 2020-2021 France Workplan?[22]
Snappers (*Lutjanidae*)	Yes	Yes
Groupers (*Serranidae*)	Yes	Yes
Tuna-like fish (*Scombridae*)	No	No
Swordfish (*Xiphias gladius*)	No	No
Other billfishes (*Istiophoridae*)	No	No
Dolphinfish (*Coryphaena hippurus*)	No	No
Bigeye scad (*Selar crumenophthalmus*)	Yes	Yes

Both France work plans for data collection in the fisheries and aquaculture sectors for 2017-2019[23] and 2020-2021[24] refer to method of data collection through sample based surveys (Text Box 4A in 2020-2021 workplan for instance). Table 13 shows that, of the 7 stocks to be specifically included under DCF in La Réunion, 4 of them are not included in the French workplan for these catches are under the 200 tonne threshold established by the EU-MAP (Commission Implementing Decision 2019/909).

An analysis of the national work plans and annual reports submitted by all EU Member States with ORs has been conducted by STEFC (2020a). Regarding France, it concluded that there was a lack of specific mention of the individual ORs in the work plans and national reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds.

Specifically about Réunion, the same report concluded:

" *In 2017 […], According to the 2019 EU-MAP list, 13 species (13% of the total) were covered representing respectively 89% and 85% of the landings in tons and euros. In terms of species sampled and reported in the 2018 national report, the number of species is quite similar with 12 species (24%) covered. The situation is quite good compared to other French ORs. Most of the samples are for large pelagic species which are the main component of the landings in Réunion. However the data are provided with information from Mayotte and Réunion together so the sampling effort cannot be properly evaluate at ORs level. Additionally, deep water species have also been sampled in other projects[11] but have not been reported in the EU-MAP until now. Considering the provisional species list, the number of species is increased but the landings ratios decrease to 82% and 79% respectively. This is because dolphinfish (Coryphaena hippurus) is no more included in the list. A recommendation is to include this species in the list as well as wahoo and groupers*

21 French Annual Report for data collection in the fisheries and aquaculture sectors 2017-2019

22 FRANCE - Work Plan for data collection in the fisheries and aquaculture sectors 2020-2021

23 https://datacollection.jrc.ec.europa.eu/documents/10213/1131890/France_WorkPlan_2017-2019.pdf/03a63d30-0e32-4289-a839-47c6b914ae44?version=1.1&download=true

24 https://datacollection.jrc.ec.europa.eu/documents/10213/1283898/FRA_WP_2020-2021_text.pdf/3fcdda81-ae34-4238-a3b3-c9602bb3ae5a?version=1.0&download=true

nei if necessary. The difference between the 2019 EU-MAP list and the future list is the inclusion of deep water demersal species like brilliant pomfret (Eumegistus illustris), deep-water red snapper (Etelis carbunculus) and other deep water species. The EWG notes that data collection of biological samples in Réunion region is not so easy for small-scale vessels. Most of the small scale vessels operate from many landings sites where the vessels landings are directly sold to consumers "

Table 1C adds to that list the species under RFMO mandates, IOTC in the case of Mayotte and La Réunion, which have to be reported specifically for Mayotte and La Réunion (Table 14). All covered stocks are included in the French workplan, except one for which there are no catches.

Table 14: DCF Table 1C list of stocks that are under the mandate of an RFMO and to be reported for Mayotte and La Réunion.

List of stocks as per Table 1C	Included in 2017-2019 France Workplan?	Included in 2020-2021 France Workplan?
Yellowfin tuna (*Thunnus albacares*)	Yes	Yes
Bigeye tuna (*Thunnus obesus*)	Yes	Yes
Skipjack tuna (*Katsuwonus pelamis*)	Yes	Yes
Albacore tuna (*Thunnus alalunga*)	Yes	Yes
Swordfish (*Xiphias gladius*)	Yes	Yes
Blue marlin (*Makaira nigricans* (or *mazara*))	Yes	Yes
Black marlin (*Makaira indica*)	Yes	Yes
Striped marlin (*Tetrapturus audax*)	Yes	Yes
Indo-Pacific sailfish (*Istiophorus platypterus*)	Yes	Yes
Bullet tuna (*Auxis rochei*)	Yes	Yes
Frigate tuna (*Auxis thazard*)	Yes	Yes
Kawakawa (*Euthynnus affinis*)	Yes	Yes
Longtail tuna (*Thunnus tonggol*)	No (no catches)	N (no catches)
Indo-Pacific king mackerel (*Scomberomorus guttatus*)	Yes	Yes
Narrow-barred Spanish mackerel (*Scomberomorus commerson*)	Yes	Yes

All these species are covered under the relevant IOTC data reporting requirements. For Réunion, the IOTC Compliance Committee in its 2020 EU Compliance Report[25], didn't note any compliance issues.

Regarding chapter III section 2.a.ii and section 2.a.iii on commercial fisheries related to mean-weight and age distribution of catches, limited data are reported. Generally speaking, there is a need for more research on biological parameters to conduct stock assessment except for some large pelagics. In addition, no reporting is done for chapter III section 2.a.iv on recreational fisheries.

25 IOTC-2020-CoC17-CR06, IOTC Compliance Report for: European Union, https://www.iotc.org/sites/default/files/documents/2020/09/IOTC-2020-CoC17-CR06_E_F-European_Union.pdf

The STECF in its 2020 report (op. cit.), concluded that:

"*Before 2018, no data was provided for fleet segments less than 12 meters in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks.*"

Section III.3. lists requirements for data to assess the impact of Union fisheries on marine ecosystems in Union waters and outside Union waters:

a) For all types of fisheries, incidental by-catch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, including the species listed in Table 1D, including absence in the catch, during scientific observer trips on fishing ships or by the fishers themselves through logbooks.
b) Data to assist in the assessment of the impact of fisheries in Union waters and outside Union waters on marine habitats.
c) Data for estimating the level of fishing and the impact of fishing activities on marine biological resources and on marine ecosystems, such as effects on non-commercial species, predator-prey relationships and natural mortality of fish species in each marine region.

Many of listed species in table 1D are not relevant to Réunion. The list contains sharks and rays, mammals and crustacean species to be reported for certain areas or for all regions / oceans. Due to the nature of fisheries in Réunion, which include the use of large pelagic longlines and purse seines, there can be interactions with seabirds, mammals and sea turtles. As these fisheries are also covered by IOTC, which has specific CMMs covering the same issues, this information is routinely collected and reported, notably through the on-board observer and reporting programmes managed by IRD.

Section III.4. lists requirements for Detailed data on the activity of Union fishing vessels ([9]) in Union waters and outside Union waters as recorded under Regulation (EC) No 1224/2009. Data to assess the activity of Union fishing vessels in Union waters and outside Union waters consist of the variables as indicated in Table 4.

SIH provides information per métier on vessel activity, such as average vessel size, tonnage and power, as well as total landing and value. Average number of crew is also mentioned. High level information on effort (days at sea for instance) is available, but no detailed information. Compliance to III.4 is considered good.

Section III.5. lists requirements for '*social and economic data on fisheries to enable the assessment of the social and economic performance of the Union fisheries sector*'.

a) Economic variables as indicated in Table 5A according to the sector segmentation of Table 5B and according to the supraregions as defined in Table 5C, and for entreprises making profit; and
b) Social variables as indicated in Table 6. Social data shall be collected every three years starting in 2018.

The STECF in its 2020 report (op. cit.), concluded that:

"*Before 2018, no data was provided for fleet segments less than 12 meters in French ORs, knowing that the context of the ORs is mainly characterized by small scale fleets with one day trips, direct sales to consumers and no logbooks*."

5.1.1 Implementation of DCF data collection obligations and potential issues

Landings: data collection is implemented by Ifremer in Réunion.

IRD runs observer programmes in the Indian and Atlantic oceans to complement biological data under DCF obligations. If an observer is on board, there isn't another observer to monitor the landings. Observers data collection includes discards following depredation. For the purse seine fleet within the Indian Ocean and Atlantic, data collection is in logbooks.

According to IRD, the Covid pandemic did have some impacts on data collection in relation with observer programmes, but they were minimal, as the regulation is for 10 % or trips to be observed, while in the Indian Ocean the coverage in 2020 was 86 %.

In Réunion observers on board the SAPMER vessels (local based industrial tuna fishing company) are mostly local, so there were no issues in terms of coverage.

Overall, according to Ifremer and IRD, biological data collection is good, and this is reflected in the annual reports to the EU, analysed by the STECF.

Ifremer mentioned that the new EU-MAP adds quite a number of demersal species (including some that were proposed by Ifremer at the local level – in this respect both Ifremer and IRD were consulted on the new DCF species list and mentioned the need to add species of particular interest in the ORs). That adds a lot of work, but collection on a number of these species was already done through ad-hoc projects, so the new EU-MAP will allow those to be covered under routine DCF funding.

IRD mentioned that stomach content sampling is not yet included in the DCF, but that it can produce useful information to understand regime shifts, especially in longline and recreative fisheries.

IRD indicates that, for the Indian and Atlantic Oceans, all new DCF species are covered by the French national data collection scheme.

Ifremer and IRD mentioned that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP, and that the list of species should be extended (see similar recommendation in January 2020 STECF report (STEFC, 2020b)) so that species important for the ORs can be covered by EMFF.

Ifremer mentioned that no socio-economic data are collected but DMSOI is pushing to start. This is mostly due to a lack of staff, but Ifremer will recruit in 2021 to address this issue.

Ifremer also explained that there is a bad history in terms of socio-economic data collection in Réunion. In the 1990s, Ifremer collected data on cost-effectiveness. Later, there were controls by fiscal authorities for vessels that were under-declaring their catches/revenues. Ifremer was then seen as having "snitched" on the fishermen and trust was lost.

DMSOI mentioned that there is a gap in socio-economic data collection because it is only collected by LEMNA for vessels >12 m. There is work currently planned by the various relevant actors to improve collection on vessels <12 m.

There is a need to make DCF socio-economic data collection a routine process, and this will start in 2021 with a collaboration between Ifremer and LEMNA, with EMFF funds.

In addition, some ad hoc programmes/survey could be made routine under other EMFF Articles such as 28 or 40.

5.1.2 Additional data collected

IRD mentioned that there might be data collected in anticipation of future requests by RFMOs or DCF, e.g., data on anatomical implantation of hooks had been collected for several years in anticipation of potential measures on hooks (see AZUR project on megafauna release survival in longline fisheries, to study survival rates after discard to improve gears/tools in order to improve survival rate). These activities are launched based on the expertise of scientists, on requests or suggestions from WPs in RFMOs etc.

SECTION 5 - KEY FINDINGS

- Coverage of DCF data collection obligations is mostly good, even if gaps exist on biological sampling in the ORs.
- Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be should be extended.
- Ifremer mentioned that the new EU-MAP adds quite a number of demersal species (including some that were proposed by Ifremer at the local level). That adds a lot of work, but collection on a number of these species was already done through ad-hoc projects, so the new EU-MAP will allow those to be covered under routine DCF funding.
- In 2020, the STECF19-19 reviewed the French DCF data collection in the ORs and made a number of recommendations, including:
    - The absence in the French WP of a section addressing the ORs specifically;
    - The general lack of sampling in the ORs other than collecting length distributions.
    - Severe difficulties encountered in the implementation phase, due to local conditions.
    - Regarding Réunion specifically, the report concluded that "*The situation* [in Réunion] *is quite good compared to other French ORs. Most of the samples are for large pelagic species which are the main component of the landings in Réunion*".
- Ifremer mentioned that no socio-economic data are collected but DMSOI is pushing to start. This is mostly due to a lack of staff, but Ifremer will recruit in 2021 to address this issue.
- Ifremer also mentioned the sensitivity of collecting socio-economic data, as fishers can be suspicious and wary that this information could be used for fiscal controls.
- In 2021, a collaboration between Ifremer and LEMNA, with EMFF funds, will be started to improve socio-economic data collection for vessels <12 m.

6 Fisheries management and conservation measures

6.1 Management and conservation measures

6.1.1 National

At national level, management and conservation measures are imposed through local regulations (Table 15). Legal texts in Réunion encompass regulations for professional fishers, recreational fishers, as well as Marine Protected Areas. In 2008, the *Arrêté nº1742* dated 15 July 2008 *Réglementant l'exercice de la pêche maritime professionnelle dans les eaux du départemen de la Réunion* regrouped all Professional Fisheries regulations in Réunion in one single legal instrument. It has been updated on a regular basis and the most recent version dates from 2017. The same exercise was done in 2008 for recreational fisheries in *Arrêté n°1743 du 15 juillet 2008 réglementant l'exercice de la pêche maritime de loisirs dans les eaux du département de La Réunion*. In 2019, a similar regulation was adopted, targeting specifically traditional fishing: *Arrêté préfectoral n°3416 du 31 octobre 2019 portant réglementation des pêches traditionnelles exercées à titre de loisir à l'intérieur de la réserve naturelle maritime de La Réunion.*

The compiled versions of the regulations do not always include the exact scientific underpinnings, though they are usually adopted based on advice from Ifremer, the local CRPMEM and the Réunion Marine Park scientific council.

According to DMSOI, all measures proposed are based on scientific evidence (e.g., bans on fishing bichique 7 months a year, or peskaval fishery closure period proposed by CRPMEM based on Ifremer advice). There is always the issue of scientific data/advice uncertainty, and it's the policymaker's responsibility to decide.

The usual process of providing advice is that DMSOI or CRPMEM send a request to Ifremer for scientific advice, then there is a discussion based on the advice provided. Overall, Ifremer confirms that the regulations do take scientific advice into account.

DMSOI mentions that, regarding reef, coastal and demersal species, some sanitary measures could be useful in relation to ciguatera, which is quite common in certain areas of Réunion waters.

Regarding large pelagic species, DMSOI indicates that IOTC CMMs are in place and well implemented in EU regulations, and that the level of compliance is good, as evidenced by IOTC's EU Compliance Reports. Additional local regulations targeting these species are also in place, but they are more oriented towards ensuring a peaceful cohabitation between different fisheries (including professional vs recreational) rather than the conservation of the resources.

DMSOI provides routine training for the various stakeholders regarding regulations, techniques etc.

Table 15: List of local regulations applicable to Réunion fisheries

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
Professional fishing: Décret n°2014-542 du 26 mai 2014 modification du Décret n°2007-236 du 21 février 2007 portant création de la Réserve Naturelle Nationale Marine de La Réunion	2008, amended on several occasions	Species	Prohibition	Fishing or harvesting all corals alive or dead is prohibited. Fishing seashell is prohibited, except mussels. Venomous fish species	
		Administrative	Permits	Fishing from boat or on foot requires a permit/license	
		Gear/technique	Prohibition	Underwater commercial fishing is prohibited	
		Gear/technique	Prohibition	Ban on use of explosives, electricity or substances to attract, intoxicate or kill species	
		Gear/technique	Prohibition	Ban on some gear: trawls, dredges, net<25 mm mesh size, driftnets, gear made of plant fibers	
		Gear/technique	Regulation	1 mile around an anchored FAD: limit to 2 vertical longlines for commercial fishing;	
		Species	Size	Minimum commercial sizes: ban on eggs, fish<10 cm (unless adults), spiny lobsters<23 cm	
		Species	Closed periods	Bichique: closed between new and full moon in March Yellowstripe goatfish: closed from May to January included, as well as on week-ends. Closed between 9 AM and 4 AM. Spiny lobster: closed between December 1st and March 31st	
		Species	Regulation	Bichique: Specific permit conditions: history of professional fishing	
		Species	Authorized areas	Yellowstripe goatfish: list of authorized areas, with specific zones (channel)	

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
		Species	Gear/technique	Bichique: gear construction material, gear dimensions, gear deployment zones, gear must be declared. Sardine, bankloche and bigeye scad: minimum mesh size Yellowstripe goatfish: maximum length and height, and minimum mesh size of net. Spanner crab: authorized gear (scale and trap)	
		Species	Bycatch	Yellowstripe goatfish, Sardine, bankloche and bigeye scad: all bycatch must be discarded immediately.	
		Spatial	MPA	All lagoons are fishing reserves where only Yellowstripe goatfish and shore-based no-reel line fishing are permitted. A fishing permit is required.	
Professional fishing: Arrêté 749 dated 30 March 2010 Amending arrêté 1742 on professional fishing in Réunion island	2010	Spatial	Prohibition	Ban on fishing within 50 m around artificial reefs except small handline fishing for baitfish, at certain hours	
Professional fishing: Arrêté 31 dated 6 January 2012 Amending arrêté 1742 on professional fishing in Réunion island Arrêté 2 dated 2 January 2013 Amending arrêté 1742 on professional fishing in Réunion island	2012 2013	Species	Bycatch and discards Reporting	Handling of bycatches and discards; data reporting	evaluation of impacts of fisheries on the resource by Ifremer and propositions of management measures, as required; based on advice from Ifremer and Réserve marine de la Réunion
Professional fishing: Arrêtés 2 dated 27 december 2013, 5402 dated 30/12/2014,	2013 2014 2015 2016	Temporal	Authorised periods	Changes Authorised fishing periods	based on request from CRPMEM and advice from Ifremer and scientific council of the Réserve marine de la Réunion

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
2490 dated 16/12/2015, 2567 dated 28/12/2016 , and 2765 dated 21/12/2017 Amending arrêté 1742 on professional fishing in Réunion island					
Professional fishing: Arrêté 185 dated 13/02/2015 Amending arrêté 1742 on professional fishing in Réunion island	2015	Species	Prohibition	Bans fishing, transport, sale etc. for a list of shark species: white tip reef shark (*Carcharhinus albimarginatus*), dagsit or grey reef shark (*Cacharhinusa mblyrhynchos*), coral shark (*Triaenodon obesus*), black tip reef shark (*Carcharhinus melanopterus*), tawny nurse shark (*Nebrius ferrugineus*)	Based on request from CRPMEM and advice from Ifremer, the scientific council of the Réserve marine de la Réunion and the Suqli'idées NGO regarding the importance of diversified reef shark populations for reef ecosystems and following issues with bulldog shark attacks.
Recreational fishing: Arrêté n°1743 du 15 juillet 2008 réglementant l'exercice de la pêche maritime de loisirs dans les eaux du département de La Réunion	2008	Trade	Prohibition	Sale of recreational fishing products is prohibited	
		Gear/technique	Prohibition Regulation	Boat based fishing. Prohibited or regulated gear: limit to number of hooks, maximum number of electric winches, traps etc. Shore based fishing: list of authorized gear Specific regulation on electric winches (must be declared, catch recording mandatory...)	
		Species	Minimum size	Minimum size of catch, based on species	Based on the biology of the various species and the need to ensure adequate levels of reproduction
		Gear/technique Spatial	Prohibition Regulation	Regulation on fishing around anchored FADs: authorised period (only week-end); prohibited	

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
				techniques (to prevent conflict with professional fishing)	
		Species	Closed/authorized periods	bichiques, spiny lobster, spanner crab, Yellowstripe goatfish	
		Species	Gear/techniques	bichiques, spanner crab, Yellowstripe goatfish	
		Species	Prohibition	Fishing or harvesting all corals alive or dead is prohibited. Fishing seashell is prohibited, except mussels. Venomous fish species	
		Species	Authorized areas	Spanner crab, Yellowstripe goatfish	
		Spatial	MPA	All lagoons are marine reserves, only Yellowstripe goatfish and gaulette (rod without reel) fishing are authorised, limits on total catches (5 kg/person/day	
		Spatial	MPA	Fishing in the Marine Park: ban on night fishing; only shore based or free diving fishing is authorised; fishing is prohibited in reinforced protection areas. Traditional fishing can be authorised (see dedicated regulation); spearfishing is prohibited in the marine reserve. Catches in the marine reserve must be declared."	
Traditional fishing: Arrêté préfectoral n°3416 du 31 octobre 2019 portant réglementation des pêches traditionnelles exercées à titre de loisir à l'intérieur de la réserve naturelle maritime de La Réunion	2019	Spatial Gear/technique	Prohibition	Recreational Fishing on foot is prohibited on the reef platforms of the Marine Nature Reserve of Réunion, commonly called "lagoons", from the beach to the coral reef	
		Gear/technique Species	Authorisation	The following traditional fisheries may be authorised inside the lagoons, within the framework of the prescriptions defined by the present decree: fishing for the Yellowstripe goatfish (Mulloïdichtys flavolineatus);	

Measure	Year of adoption	Category of measure	Subcategory	Management occurring	Science underpinning each management
				fishing for the zourite (*Octopus* sp.); gaulette fishing (rod without reel).	
		Regulation	Permits	Only fishermen holding a traditional fishing licence issued by the South Indian Ocean Directorate of the Sea may engage in traditional fishing	
		Species	Quota	Yellowstripe goatfish are limited to four kilograms (4 kg) per card holder per day; zourites are limited to five (5) individuals weighing at least one kilogram (1 kg) each, per card holder per day; gaulette fishing is limited to five kilograms (5 kg) per card holder per day. For multi-species fishing, the total catch of all species is limited to five kilograms (5 kg) per day and per licence holder, with a limit of four kilograms (4 kg) for Yellowstripe goatfish.	
		Spatial	Prohibition	Fishing is strictly forbidden in the integral protection zone of the Reserve."	
Décret n°2007-236 du 21 février 2007 portant création de la Réserve Naturelle Nationale Marine de La Réunion Décret n°2014-542 du 26 mai 2014 modification du Décret n°2007-236 du 21 février 2007 portant création de la Réserve Naturelle Nationale Marine de La Réunion	2007 2014	Spatial	MPA	Creation of the Marine Park	Marine Park Charter, scientific advice by Ifremer, University of la Réunion, OFB…

6.1.2 International

Being an Outermost region of the EU, EU regulations apply to Réunion, through their implementation in the French national regulations.

As the EU is a Contracting Party (Member) of the IOTC and SIOFA, all conservation and management measures adopted by these RFMOs apply to Réunion. The National Reports provided by the EU indicate that all IOTC and SIOFA CMMs are reflected in EU fisheries regulations and thus are effectively applicable to Réunion.

Their implementation by Members, including the EU, is monitored by the RFMOs through their Compliance Committee.

DMSOI mentions that there are some pelagic species not covered by IOTC that could benefit from CMM, such as dolphinfish (*Coryphaena hippurus*) and seerfishes (*Scomberomorini*).

6.2 Science and management

IOTC started a process of science-management dialog, as there was a huge gap between the science-based information, such as stock assessment results, and its understanding by fisheries managers. This has led to the creation of the TCMP (Technical Committee on Management Procedures). The overall dialogue has improved through training courses, simulation software, regular meetings. Ifremer and IRD participate to this dialogue and confirms that is very positive.

In Réunion, IRD organises meetings with fishermen (CRPMEM) to present information, results of RFMO meetings or CMMs. They provide opportunities for awareness and capacity building, as well as showing what benefits fishermen can reap from the data they are asked to provide (e.g., MSC certification requires good data coverage and monitoring of fishery); there is generally good feedback on such activities. IRD explains that there is a strong generational effect at play, with the Maritime school making efforts to raise awareness by students. Some of these activities are funded by EMFF. DMSOI provides routine training for the various stakeholders regarding, e.g., regulations, techniques. Ifremer concurs that collaboration with DMSOI is good, with discussions and concertation on various projects as well as the DCF.

6.3 Potential improvements

Ifremer mentions that it would be useful to have location data for small fishing boats, to have a spatial understanding of the small-scale fisheries (logbooks only use 4 major areas). There are plans for using tablet-based software for small boat logbooks.

A gap exists in data collection on depredation of catches by sharks, marine mammals, seabirds etc. These "lost" catches are not taken into account. Research on this topic could help alleviate this uncertainty.

SECTION 6 - KEY FINDINGS

- There is an adequate body of fisheries regulations addressing specific local issues in Réunion.
- All EU regulations apply to Réunion due to its EUOR status.
- All IOTC and SIOFA regulations apply to Réunion due to the EU's status Contracting Party.
- Additional local regulations targeting large pelagic species are also in place, but they are more oriented towards ensuring a peaceful cohabitation between different fisheries (including professional vs recreational) rather than the conservation of the resources.
- All local measures proposed are based on scientific evidence: DMSOI or CRPMEM send a request to Ifremer for scientific advice, then there is a discussion based on the advice provided.
- DMSOI mentions that, regarding reef, coastal and demersal species, some sanitary measures could be useful in relation to ciguatera, which is quite common in certain areas of Réunion waters.
- There is a good dialogue between science and management, both at the local level (DMSOI, CRPMEM, Ifremer, IRD, Marine Park, Maritime school) and at the regional level (IOTC formal science-management dialogue).
- Ifremer mentions that it would be useful to have location data for small fishing boats, to have a spatial vision of the small-scale fisheries.
- A gap exists in data collection on depredation of catches: these "lost" catches are not taken into account. Research on this topic could help alleviate this uncertainty.

7 Shortcomings or obstacles to fisheries management

Table 16 below provides a summary of the main shortcoming or obstacles to sound fisheries management identified through the literature review or interviews with relevant stakeholders. Given the predominance of small scale multigear fisheries in Reunion, the issues identified apply broadly to all metiers and resources.

Table 16: Summary of shortcomings or obstacles to fisheries management

Category	Shortcoming or obstacle
Data collection	There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors.
	There are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be should be extended
	There is a general lack of sampling other than for size frequency.
	The major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF.
	SIH activities for DPMA are managed through a very pyramidal system that doesn't leave a lot of wiggle room for local initiative. It can be frustrating because there is no leeway to change methods based on local needs/specificities.
	In Réunion, biological and socio-economic data represent the main gap in data collection, mostly due to staffing issues.
	A gap exists in data collection on depredation of catches (by sharks, marine mammals, etc): these "lost" catches are not taken into account in landing data, and could represent significant amounts.
	Sport and recreational fisheries are not fully monitored in Réunion, so very little data is available
	There are sometime discrepancies between DMSOI and Ifremer data, e.g., on active vessels, but these are usually due to differences in methodology.
Funding and resources	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection.
	EMFF funding has been unable to recruit staff in the relevant French institutions for long-term data collection.

	There is a lack of human and financial resources to properly monitor the recreative fisheries.
	There is a lack of staff to properly collect, biological and socio-economic data.
MCS and IUU	There is a rather important part of the "recreational" fishermen who sell their catches (multimétier, demersal and pelagic species), but it is not monitored so no data are available
	There is no location data available for small fishing boats, so it is not possible for Ifremer to have a spatial vision of the small-scale fisheries.

Note that the report of the STECF19-19 meeting identified a number of issues with fisheries data collection in the French ORs. Please refer to that report for more details.

8 Recommendations

- Improve knowledge of composition of catch landed by artisanal fisheries;
- Try to apply data-poor assessment methods to key species deemed of local importance and/or subject to high fishing pressure;
- Improve knowledge on IUU fishing;
- Improve human and financial resources allocated to local data collection, to be able to better cover all landings. This might require switching to a model where data collection is done by a 3rd party private contractor;
- Find ways to increase staff and expertise retention;
- Implement research to collect data on depredation of catches (by sharks, marine mammals, etc);
- Implement research to collect data on "informal" sector: recreational fishermen who sell their catches;
- Implement monitoring of recreational and sport fisheries;
- IRD would like to recommend universities to be involved in data collection and analysis;
- Allow more local flexibility in local SIH activities, to better reflect local needs/specificities;
- Harmonize methodologies between Ifremer and DMSOI to ensure consistent data; and
- Implement collection of socio-economic data.

For reference, here are the main recommendations included in the STECF19-19 report related to Fishery Data Collection in the EUORs.

- Review the future EU-MAP with an OR perspective, namely considering each OR separately;
- Increase share between ORs experts on data collection and on calculation of indicators methodologies - Expert Group(s) on ORs (more transversal between economic, social and biologists);
- MSs DCF Recreational fisheries coverage should be extended, namely in terms of species;
- An assessment of IUU by ORs is fundamental to establish the ecosystem, social and economic impact of fisheries;
- An assessment of recreational fisheries by ORs is fundamental to establish the ecosystem, social and economic impact of fisheries;
- An assessment of the capacities in the different ORs (human and financial resources, facilities, equipment) should be carried out in order to secure the resources necessary to implement the DCF;
- At-sea monitoring should be improved in each ORs including recreational fisheries;
- Increase the number of species sampled, for a least length composition;
- France WP to include ORs specifically;
- French ORs to improve biological sampling;
- France to collect and report economic data by ORs and metiers;
- French ORs need to improve social data collection; and
- Review data and methods dedicated to the assessment of small-scale multispecific multispecies fisheries on data limited context & test several assessment methods in different ORs and compare results – possibly within an existing WG.

9 Information sources

9.1 References

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9.2 EU Legislation

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1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006 (OJ L 343, 22.12.2009, p. 1–50).

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC (OJ L 354, 28.12.2013, p. 22).

Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (OJ L 157, 20.6.2017, p. 1–21).

Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory research surveys and thresholds for the purposes of the Multi-Annual Union programme for the collection and management of data in the fisheries and aquaculture sectors C/2019/1001 (OJ L 145, 4.6.2019, p. 21–26).

Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the Multi-Annual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors C/2019/1848 (OJ L 145, 4.6.2019, p. 27–84).

ANNEX 3: OUTERMOST REGIONS SWOT ANALYSES

Macraronesia

- Azores
- Madeira
- Canary Islands

Caribbean

- Martinique
- Guadeloupe
- Saint Martin
- French Guiana

Indian Ocean

- Mayotte
- Réunion

Azores

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Azores SWOT Report

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Acronyms

Term	Description
CFP	Common Fisheries Policy
DCF	Data Collection Programmes
DOP	Departamento de Oceanografia e Pescas da Universidade dos Açores
DRP	Direcção Regional das Pescas
EAF	Ecosystem Approach to Fisheries
EEZ	Exclusive Economic Zone
EMFF	European Maritime and Fisheries Fund
EU	European Union
ICES	International Council for the Exploration of Sea
IMAR	Instituto do Mar
IUU	Illegal, unreported, and unregulated fishing
LOTAÇOR	Serviço de Lotas dos Açores, S.A.
MAP	Multiannual Plans (DCF)
MoniCo	Programa de Monitorização de Recursos e Ambientes Costeiros dos Açores
MONIZEC	Monitorização de biodiversidade e habitats litorais dos Açores
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
NEAFC	North East Atlantic Fisheries Commission
IPMA	Instituto Português do Mar e da Atmosfera
ICCAT	International Commission for the Conservation of Atlantic Tunas
MLS	Minimum Landing Sizes
MSP	Marine Spatial Planing
OR	Outermost region
PO	Producers Organization
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
STECF	Scientific, Technical and Economic Committee for Fisheries
SWOT	Strengths, weaknesses, opportunities and threats
TAC	Total Allowable Catch
VME	Vulnerable Marine Ecosystems
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e., EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities, and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities, and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for Azores OR, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for the Azores

	Positive	Negative
Internal	**STRENGTHS** • Main target species and métiers are known • Relevant data collected • DCF sustainable and implemented with onboard observers and scientific surveys • Long tradition of scientific projects and programmes • Several monitoring programs or studies outside DFC • Good capacity and high skill level • Clear roles and responsibilities • Local management measures • Space for new fisheries • Good collaboration between scientific bodies and Macaronesia area • The fishing sector is organised at local and regional level • Space to introduce innovative tools for data collection • By-catch of endangered species is considered low • Large number and regulated MPA • Recreational fishing is described, well segmented, and regulated • Scientific bodies are prompt to translate science into regulation • Azores fleets prohibit the use of less selective and more damaging gears such as trawls and bottom gillnets	**WEAKNESSES** • No biological information, assessment and TAC for some commercial important species (risk of overfishing) • No sufficient skilled staff • Limited involvement of producers in management • Recreational and small-scale fisheries constitute a challenge for data collection • There are no coordination tools/platforms in place to facilitate communication amongst institutions, scientists and managers • Centralization and bureaucracy in the management of the EMFF for data collection • Fisheries management does not always take into account the specific socio-economic characteristics of ORs • Monitoring resources are not enough in fisheries and marine protected areas • Social and economic data not included in the work plan

	Positive	Negative
External	**OPPORTUNITIES** • Potential for increased presence at ICCAT and ICES scientific WG to better represent OR priorities • Development of cooperation in the region in data collection • Use of drones to control marine protected areas • Structural funds other than EMFF • New communication and information technologies for improved data collection/articulation • Improved data collection and assessment may allow to implement TACs • Climate change effect on stocks	**THREATS** • Foreign commercial fleets activity does not enter local statistics • Unknown number of foreign vessels operating • Increasing IUU fishing • Limited regional representation in scientific bodies • Reduction of catch opportunities • Climate change effect on stocks

3 SWOT Definition

The following four sections identify individual Strengths, Weaknesses, Opportunities and Threats identified for Azores.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc.

In the Azores there is a high scientific background and expertise of scientists and technicians working in the research labs and the Directorate of Fisheries. There is a clear divide of responsibilities between the several institutions involved in data collection, monitoring and fisheries management. The fishing sector is well organised in Producers Organizations (POs) that are represented at regional/island level and members of Advisory Councils. There are some good examples of cooperative governance between administration, POs and other local stakeholders within the region and between Macaronesia OR´s.

Azores have a lot of biological and ecological information collected over several government/scientific projects and/or programmes. The region has a long and effective tradition in the use of financing from other European programmes (e.g., LIFE, INTERREG) and the DCF (EMFF) and the European Union's Cohesion Policy funds are undoubtedly the key instrument to ensure the continuity of financial resources and fisheries management. Data collection is available at a network of landing sites present in archipelago islands and the auctions are mandatory in all landing sites (distributed in all islands) and thus brings an advantage of catch and census-like information. There are scientific observer onboard programmes and a well-established annual scientific survey.

The Regional Government has been presenting a series of legislative initiatives aimed at promoting the sustainable exploitation of resources. The OR implements several regulations that ban fishing gears with large physical (e.g., abrasion) and biological impact on the sensitive seabed habitats characteristic of the Azores EEZ. Fishing fleet has remained stable or even reduced due to management measures and support under the EMFF. The region has a large network of protected areas and programs to create ecologically coherent networks representing natural values and ecological processes, allowing continuity between important areas for the conservation of species and habitats, ensuring resilience and promoting the sustainability of uses. The Marine Strategy Framework Directive is also developing in collaboration with mainland and other Macaronesia islands.

Table 2: Summary of Strengths Identified for Azores OR

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Some knowledge of population structure/parameters of some DCF and regional relevant target species. Main demersal *(P. bogaraveo*) and small pelagic species (*T. picturatus*) are assessed/information (with data limited approaches)	Twelve stocks are classified as ICES category 5, i.e., stocks for which landings or catches are available, and 10 stocks are classified as ICES category 3, i.e., stocks for which survey-based assessments or exploratory assessments indicate trends. Four stocks are assessed using data limited approaches*: P. bogaraveo*, A. carbo, and *R. clavata* (category 3) and *T. picturatus* (category 5). Additional details on other species for which data is collected under DCF and regional information through studies and scientific surveys is available on section 6 Azores have a lot of biological, ecological information over several government/scientific projects/programmes). Details on the several projects/programmes are available in the profile report (Annex 2).
Large pelagic migratory stocks assessed by ICCAT	Large pelagics are assessed by ICCAT, where Portugal is represented by national-based scientists using data collected at the national and regional level to produce the assessments for the relevant large pelagic species
Discards and bycatch assessments	DiscardLess project (http://www.discardless.eu/), discards from all fisheries occurring in the OR, including bottom longline and handline fisheries were estimated, by species. Discards increased from the 1950s until the turn of the century, from 240 ton/year in the 1950s and 1960s to 450 ton/year in the 1970s and 1980s and 2080 ton/year in the 1990s. Over the last 15 years, total rejects have fallen and stabilised at 1070 ton/year (Fauconnet *et al*., 2019).

Strength	Description and evidence
	Bycatch occurrence rate of species available from studies (e.g., Fauconnet *et al*., 2019) and additional information from the regional Directorate of Fisheries. The probability of survival of released (or rejected) individuals remains unknown for most species caught in the Azores. Collaborative projects with PO´s to protect endangered species bycatch (turtles). https://costaproject.org/en/
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
Knowledge of the environmental ecosystem.	Priority for the Regional Government, and is expected to contribute to regional, national and international marine conservation policies. Program/projects to create ecologically coherent networks representing natural values and ecological processes, allowing continuity between important areas for the conservation of species and habitats, ensuring resilience and promoting the sustainability of uses.
Marine Strategy Framework Directive is developing in collaboration with mainland	MSFD directives are consider appropriate and a way to move forward in the ecosystem knowledge in the region. Marine Strategy Framework Directive is developing in collaboration with mainland and other Macaronesia islands, examples of advances and collaboration with projects Mistic Seas I (https://mistic-seas.madeira.gov.pt/), II (https://mistic-seas.madeira.gov.pt/pt-pt/content/mistic-seas-ii), III (https://www.misticseas3.com/pt-pt)

Strength	Description and evidence
Large network of Marine Protected Areas. Information on VME is available. Marine Spatial Planning in place	Marine protected areas (MPAs) in the autonomous region of the Azores are composed of 15 MPAs included in the Azores Marine Park and 35 coastal MPAs integrated in the island natural parks. These areas also include 19 Natura 2000 sites, 11 OSPAR areas, 2 wetlands of international importance (RAMSAR) and 4 Biosphere reserves. There are also 13 areas restricted to fisheries and 5 underwater archaeological parks which constitute important spatial measures for the protection of marine ecosystem.
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
Knowledge of the gears and fishing activities operating inside the 100 nm	Azores: information and studies are available of gears operating in the Portuguese ORs (e.g., Santos *et al.*, 2019, Morato *et al.*, 2012, ORFISH).
Main fishing activities are considered highly selective	The OR implements several regulations that ban fishing gears with large physical (e.g., abrasion) and biological impact on the sensitive seabed habitats characteristic of the Azores EEZ.
Possibility of developing new fisheries	Coastal species (grouper, moray eel, grouper, squid, mackerel, lobster, *Pontinus kuhlii*) are identified as critical for improvement in scientific knowledge and development of sustainable fisheries. Algae harvesting is also developing for food, cosmetics and reducing gases (methane) in cow feed.
No industrial fishery	There are no records of industrial fishery in this OR.
IUU fishing (estimates of illegal and unreported local overfishing)	
Fish Auctions	The auctions are mandatory in all landing sites (distributed in all islands) and thus this brings an advantage of catch and census-like information for the regional vessels. No records of IUU fishing occurring inside the 100nm.

Strength	Description and evidence
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
A divide of responsibilities on marine fisheries is established: i) Autonomous governmental authorities for data collection and management. ii)Regional Inspectorate recently improved their ability to enforce management measures iii)Fisheries science support from IMAR/DOP iv)PO´s organized gear/island level	Fisheries are under the responsibility of the regional government (autonomous Secretariat and Directorate collaboration with mainland) and are currently managed under the CFP. IMAR - scientific support to management, surveys, bycatch assessment, VME, occasional assessment of IUU (not used in management). The Regional Fisheries Inspection oversees, in partnership with other authorities, the maritime activities All islands have several fishing ports/auctions, managed by LOTAÇOR, where the captured fish is landed.
The fishing sector is organised at local and regional level overall collaborating and contributing to science	In Azores the fishing sector is organised in Producer Organisations (POs). There are PO´s representing the islands of the archipelago and the several fishing activities (tuna, demersal,…). Gender equality is also an example with PO representing the women working in fisheries ("Mulheres na Pesca - Ilhas em Rede") The purpose of the fishers and shipowners associations is to take appropriate measures to ensure the rational exercise of fishing, to improve the conditions of sale or recovery of the fish caught by its members and, in general, and to take all appropriate measures to improve the income of its members. Socio-economic aspect of fisheries (EAF) are a concern for the regional Secretariat/Directorate and several initiatives are funded to improve knowledge, education and collaboration by local fishermen Fisheries organisations allow coordination and may facilitate cooperation with scientists in data collection. The fishing sector is also represented in the South Western Waters and Outermost Advisory Councils and thus its insights concerning data collection needs can be channelled to the EC.

Strength	Description and evidence
Familiarity	People know each other and in the same island (Faial)
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
Examples of cooperative governance between administration, POs and other local stakeholders within the OR and between Macaronesia OR´s	There are studies and several projects dealing with Portuguese ORs governance issues that involves all the relevant stakeholders e.g., GPS AZORES, ORFISH, BEST, MarSP. ; These are also good examples of coordination among OR´s in the Macaronesia (ORFISH – Macaronesia). MSFD cooperation between OR in Mystic Seas I, II and III.
Good cooperation and communication and knowledge exchange between institutions inside the OR. WG, meetings are organized	Most of the institution are located in Faial island and managers, scientists, know each other. Several WG, meetings are organized for improvement of regional issues and knowledge sharing.
To improve governance on the basis of networks between administration, POs and other local stakeholders	There are studies and several projects dealing with Portuguese ORs governance issues that involves all the relevant stakeholders GPS AZORES, ORFISH, BEST, MarSP.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
Academia contributes to the knowledge base in the region	Even though IMAR/DOP is now beyond the DCF circuit (exception of scientific surveys), these institutions are making a substantial contribution to fisheries knowledge in the form of projects, papers and thesis. IMAR - scientific support to management, surveys, bycatch assessment, VME, occasional assessment of IUU. DOP is more focused on knowledge and education. The University of Azores have conduced relevant research on fisheries socioeconomic aspects. Which is an EAF objective of the regional administration.

Strength	Description and evidence
More articulation with other sea related activities (biotechnology)	The Research Centre in Biodiversity and Genetic Resources (CIBIO) in the Department of Biology of the University of the Azores produce high end research in blue biotechnology.
Good infrastructure in Science Institutions	The IMAR has fully equipped oceanic research vessels and a wide array of equipment, facilities and diving support adapted to the region and research infrastructures of strategic Interest under the European Multidisciplinary Seafloor and Water Column Observatory and European Marine Biological Resource Centre – Portugal.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
Coordination of data collection mainland-OR.	Coordination between General Directorate of fisheries and the Regional Directorate regarding DC issues. ICCAT data coordinated with mainland (IPMA).
Integration of participatory decision making into management structure where applicable	
PO´s involved in some data collection	PO´s involved in some data collection and socio-economic aspect are taken into account by the regional administration in management. Educational and sensibilization initiatives are present in the region.
Special attention in the OR for EAF, namely the socio-economic impacts of fisheries regulations	The Regional Directorate of Fisheries of the Azores has been developing a series of initiatives to characterize the socio-economic conditions of the fishing sector and providing e.g., education, health conditions to the local fishing communities that is crucial for the sustainability of resource under the EAF (e.g., https://portal.azores.gov.pt/web/drp/bem-estar-socio-economico-e-financeiro-para-pescadores-na-pesca-de-pequena-escala)
Clear MCS organisation and assessment of IUU fishing	
MCS organisation recently improved	Regional Inspectorate recently improved their ability to enforce management measures (although lacking).

Strength	Description and evidence
IUU Assessment	There is occasional assessment of IUU by science institution although not used for management as not regularly assessed.
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
Some representation in ICES WGDEEP and ICES WGHANSA	Regional scientists participate in some ICES WG.
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Scientific, managers staff with good knowledge and adequate infrastructure at science institutions.	IMAR - scientific support to management, surveys, bycatch assessment, VME, occasional assessment of IUU (not used in management). The annual spring bottom longline survey (ARQDAÇO) in R/V Arquipelago is established since 1995, targeting demersal and deep-water species up to 1200 m depth in the areas near all the nine islands of the archipelago, and various seamounts in the Azores.
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection	
The EMFF (DCF) and the European Union's Cohesion Policy funds	Key instruments to ensure the continuity of financial resources and collection of fisheries data.
Management model of EMFF funds (e.g., managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	
There are managing, certifying, paying and audit authorities to improve control of EMFF funding (weakness also)	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
Other structural funds also offer funding for scientific purposes	See profile report project/programmes for detailed list (Annex 2).

Strength	Description and evidence
Long and effective tradition in the use of financing from other European programmes (LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac)	Lots of projects/programmes contribute to the large scientific knowledge in the region. The MAC programme, which belongs to INTERREG (funded by the European Regional Development Fund) has three 3 axes which could be relevant for data collection and fisheries management: research, environment conservation and institutional capacity enhancement. In addition, Pilot Actions funded by the EU like the project ORFISH make a substantial contribution to fisheries scientific knowledge in the ORs. Lots of financial resources are used for nature conservation and biodiversity studies provided by the regional authorities, and there is also a long and effective tradition in the use of financing from European programmes such as LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac are excellent demonstrations of cooperative projects involving Madeira, the Azores (Portugal) and the Canary Islands (Spain) (BEST project Regional ecosystem profile–Macaronesia Region. 2016).
Sustainability of funding (long-term to OR)	
The programme RIM through DCF is sustainable through the years. EMFF and the European Union's Cohesion Policy funds	The DCF (EMFF) and the European Union's Cohesion Policy funds are undoubtedly the key instrument to ensure the continuity of financial resources.
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Data collection at network of landing sites present in archipelago islands	All islands have several fishing ports/auctions, managed by LOTAÇOR, where the captured fish is landed.

Strength	Description and evidence
	The auctions are mandatory in all landing sites (distributed in all islands) and thus this brings an advantage of catch and census-like information. Auction market length sampling and interviews (mostly small scale and recreational).
Scientific Surveys	The annual spring bottom longline survey (ARQDAÇO) in R/V Arquipelago is established since 1995, targeting demersal and deep-water species up to 1200 m depth in the areas near all the nine islands of the archipelago, and various seamounts in the Azores.
Scientific- observers onboard programme	There were some constraints to data collection during the period of transition of DCF data collection from DOP-University of Azores to the Regional Directorate of Fisheries. Data collection seems to have stabilized now. Azores at-sea sampling was not carried out under the DCF due to non-contracting of the service. Alternatives were found in the remit of the DiscardLess, SponGES and COSTA projects, which, although based on previous work carried out within the DCF, did not consider planned targets. (PNRD national report, 2019). The Azores at sea observer scheme collects comprehensive data on species composition and length composition of all retained and discarded components of the catch on a haul-by-haul basis. All interactions with vulnerable fauna (e.g.,, sea-birds, sea-turtles and marine mammals) are recorded, as well as the conditions when they are released.
Collection of biological data	There is collection of biological data (from surveys and auctions samples) for several species.
Species relevant for the OR are identified and some data are already collected	Species relevant for the OR are identified and some data are already collected in surveys and auction markets. The new EU-MAP list of DCF species probably does not impact the current data collection processes significantly.

Strength	Description and evidence
Compliance with data requirements and status of submission for RFMO / RFB data collection	
ICCAT regional data collected and submitted at a national level.	At-market sampling for ICCAT (tunas) is performed at Azores.
Data submitted to ICES	Data submitted to ICES in several WG (WGDEEP, WGHANSA).
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
Monitoring of some of marine protected areas in the Azores	Monitoring and regulations restricting fishing activity was established under the project MONIZEC-ARP of the regional Government.
Monitoring of endangered species	Azores Fisheries Observer Program (POPA) for data collection from the regional fisheries and MSC requirements to pole-and-line tuna fishery. COSTA monitoring programs to COnsolidating Sea Turtle conservation in the Azores.
Monitoring of Coastal activities	In 2019, to support a new monitoring program for coastal resources (MoniCo) help to assess their conservation status and thus impose more consciously measures that allow the sustainability of these fisheries.
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
IUU occasional assessment by science studies (not used in management)	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
The auctions are mandatory in all landing sites advantage for collection of transversal data	The auctions are mandatory in all landing sites and thus this brings an advantage of census-like information for recreational and small-scale fisheries.
VMS available for the applicable vessels	
Fishing sector is a contributor to data collection	

Strength	Description and evidence
Availability of new technologies to aid data collection	
Fish size sampling techniques	Fishmetrics.pt is developed in Azores (Faial Island).
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
Information from the academic and scientific institution is used in management	Scientific support to management with surveys, bycatch assessment, VME, occasional assessment of IUU.
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	
There is a lot of data in the OR although some might not be adequate for stock assessment.	The OR collects several types of data, although some might not be adequate for an ICES type assessment and it is also mentioned the lack of manpower (experts also) to scientifically analyse the amount data.
Knowledge of the limitation in data mainly for recreational, small scale métiers	Although there are severe limitations, the OR collects and analyzes landings data on commercial and recreational fisheries (in pilot DCF studies). Data on the activity of this fleet is also collected, as well as social and effort data with questionnaires and interviews at landings sites (with reported reduced sampling and typical problems of recall and non-response bias).
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	

Strength	Description and evidence
Highly regulated fisheries in internal waters. Revision of management is occasionally subjected to scientific knowledge.	Fisheries are currently managed under the CFP and implemented primarily through Total Allowable Catches (TACs) for example the main pelagic species blue jack mackerel (*Trachurus picturatus)* and main demersal blackspot bream (*Pagellus bogaraveo)* have a TAC which is shared with quotas among the archipelago islands fleet. Technical measures are also present such as MLS or weights, minimum mesh sizes, allowable percentage of bycatch species, area ban since 2000 of longlines in the coastal areas on a range of 6 miles from the islands coast and temporal spawning closures. Endangered species fishing is prohibited (e.g., mako). There are, specifically for the Azores, several regulations that regulate the exercise of fishing in several areas / marine areas of the region and on several islands, based either on the minimization of biological and physical nature disturbances or adaptation of regulations to restrict/allow new areas or expansion of fishing areas. Azores has more than 60 MPA´s. In 2006, the Regional Government introduced a quota system by island and vessel. Fishing with trawl gears and bottom gillnets are forbidden.
Selection of appropriate controls and measures at correct levels of coverage	
ORs enjoy exclusivity to fish under 100 nautical miles	Since 2003, deep-water fishing in Azores within 100 miles is restricted to local vessels registered under the management of fishing effort of the common fishery policy for deep-water species (EC. Reg. 1954/2003).Access to waters until 100 nautical miles can be restricted to fleets based on ORs, with some exceptions. This is not *per se* a management measure aimed at scientific purposes but can bring advantages for data collection since scientific analysis would not require data from third parties.

Strength	Description and evidence
Protection of some coastal areas	Since 2000, the use of bottom longlines in the coastal areas has been significantly reduced as a result of the interdiction by the local authorities of the use of longlines in the coastal areas on a range of 6 miles from the islands coast. Large vessels (>24 m) are restricted to seamount areas outside 30 miles from the islands. As a consequence, the smaller boats that operate in the islands coast area have changed their gears to several types of handlines, which may have increased the pressure on some species. 35 coastal MPAs integrated in the island natural parks. These areas also include 19 Natura 2000 sites, 11 OSPAR areas, 2 wetlands of international importance (RAMSAR) and 4 Biosphere reserves.
Recreational marine fishing activities are described, well segmented, and with some regulations	The main recreational fishing activities in the Azores are described. These activities are regulated and licensed under several "Decreto Legislativos Regional" with specific legislation for: i) Recreational fishing, ii) Sport fishing, iii) Touristic fishing, iv) Spearfishing, v) Hand collecting.
Fishing fleet has remained stable or even reduced due to management measures and support under the EMFF	Although the number of vessels was reduced since 1992 the overall fishing capacity (in kW) increased from 2000-2010 but remained stable afterwards. Fleet is relatively of small-scale nature in which small vessels (~90% of the total fleet are <12 m) predominate using mainly traditional "stone/buoy" bottom longline and several types of handlines nearby the islands and seamounts. See profile report for effort time series by vessel length and kW (Annex 2).
Extension to regulation for managing other activities related to fisheries: fishing tourism, aquaculture tourism and marine tourism	There are several laws to apply for other activities relating fishing tourism and marine tourism in both OR´s.

Strength	Description and evidence
Some LO exemptions are based on knowledge of species behaviour	The exemptions for OR´s are included in the Southwestern waters regulation COMMISSION DELEGATED REGULATION (EU) 2018/2033. De minimis exemptions for relevant species in OR´s are: • alfonsinos caught with hooks and lines in ICES subarea 10, • great forkbeard caught with hooks and lines in ICES subarea 10, • mackerel caught with gillnets in ICES subareas 8, 9 and 10 and CECAF areas 34.1.1, 34.1.2, 34.2.0. • horse mackerel caught with gillnets in ICES subareas 8, 9 and 10 and Fishery Committee for the Eastern Central Atlantic (CECAF) areas 34.1.1, 34.1.2, 34.2.0. Survivability exemption: • red seabream (Pagellus bogaraveo) caught with hooks and lines in ICES subarea 10.
Regulation of Marine Reserves of Fishing Interest	Azores has more than 60 regulated MPA´s. These MPAs are also undergoing reevaluation and reorganization to develop an ecologically coherent network of protected areas.
Non-abrasive gears	Azores fleets are prohibited from using less selective and damaging gears such as trawls and bottom gillnets.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
ICCAT relevant stocks are nationally managed within the ICCAT framework	
Restriction of fishing opportunities within an OR to vessels from that OR only	

Strength	Description and evidence
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
Knowledge for establishment of MCRS (MLS) have been conducted The Regional Government has been presenting a series of legislative initiatives aimed at promoting the sustainable exploitation of resources	Since 2012, the Regional Government has been presenting a series of legislative initiatives aimed at promoting the sustainable exploitation of resources. The initiatives mentioned are essentially based on the diversification of fishing techniques, limitations on access to certain fishing grounds, prohibition of the use of certain fishing gear, limitation of fishing possibilities for some species, etc. for a complete list visit the directorate. ITQ´s are available from historical records of catches for island´s specific commercial vessel. Legislative management and conservation measure in the OR most of them are supported by scientific evidence as for example the LO exemption and protected areas. From literature review and personal communications, it was not possible to identify concrete evidence on scientifically based MLS. However, it is known that the MLS of blackspot bream (*Pagellus bogaraveo*), the main Azorean demersal species) was established as that of the Mediterranean Sea stock.
Use of science to determine management measures	Scientific bodies are prompt to translate science into regulation. There are many studies on the biology, ecosystem, economic impact and management measures that could be readily incorporated to the regulations.
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

Some demersal resources of the Azores are intensively exploited (the main target *Pagelus bogaraveo* is the most striking). Regional institutions report a lack of sufficient skilled staff for improving fisheries management, with gaps in knowledge for some important stocks in the region with no available assessment which can also contribute to overfishing. Fisheries management does not always take into account the specific socio-economic characteristics of ORs. There is a large number of islands and landing sites separated by three main islands groups (East, Central, West) which can present a problem for sampling of specific species. The great depths between the groups requires more studies on stock connectivity to clearly understand the stock structure of regional species and also on the large migratory species (e.g., black scabbard fish) occurring in the area.

While the large network of protected areas and fisheries conservation measures are considered to be appropriate, the main difficulty within the islands is the practical implementation and enforcement as well as local monitoring of the measures and protected areas. Recreational and small-scale fisheries also constitute a challenge for data collection and monitoring. Despite an available monitoring program for the small-scale fleet and coastal resources more data are needed at metier level to improve knowledge of these fisheries.

The maritime management in the region is complex and advice for fisheries in the Azores are managed under the EU (ICES), with some fisheries managed by NEAFC, ICCAT, and the regional government. Scientific fisheries advice is provided by ICES, the European Commission's Scientific Technical and Economic Committee for Fisheries (STECF). There are no clear regional membership and representation to some of the RFMO bodies.

Table 3: Summary of Weaknesses Identified for Azores OR

Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Overfishing has been identified	Some demersal resources of the Azores are intensively exploited (the main target *pagelus bogaraveo* is the most striking). Commercial landings seem to exhibit a decreasing pattern for almost all the important commercial species.

Weakness	Description and evidence
	Since 2000, the use of bottom longlines in the coastal areas has significantly been reduced, as a result of the banning by of its use in the coastal areas on a range of 3 miles from the shore. As a consequence, the smaller boats that operate in this area have changed their gears to several types of handlines which may have increased the pressure on some coastal species. Weakness is increased with shortages in the monitoring of coastal species (small scale fleet).
The majority of stock boundaries unknown. Stock connectivity (island and seamounts level) mostly unknown in the region	Islands are separated by three main groups (East, Central, West) with great depths between. Studies (e.g.,, stock connectivity, tagging, and body morphometrics) should be developed to clearly understand the stock structure of species in the North-East Atlantic. Some present a relatively sedentary behavior, supporting the possibility of the existence of local populations constituting different management stocks in the Azores islands. Large migratory species occur in the area. Black scabbard fish connectivity with other areas (mainland and Madeira).
Gaps in knowledge in some important stock for the region Key resources lack stock assessment	The Azores stocks have no resources with validated analytical assessment category 1 and/or biological reference points within the ICES framework. Twenty-two species were selected as priority stocks for local assessment and monitoring according to the FAO and ICES criteria. Half of the selected stocks have their distribution inside the Azores EEZ (ICES Subdivision 27.10.a.2) but the other half has no clearly defined distribution. Twelve stocks were classified as ICES category 5, i.e.,, stocks for which only landings or a short series of catches are available, and 10 stocks were classified as ICES category 3, i.e., stocks for which survey-based assessments or exploratory assessments indicate trends. Among all these, only four stocks are assessed using data limited approaches. Species list details in profile report (Annex 2).

Weakness	Description and evidence
	The probability of survival of released (or rejected) individuals remains unknown for most species caught in the Azores.
Mainly coastal species, *patella's* were identified as relevant socio-economic fisheries and identified as critical for improvement in scientific knowledge	Coastal species (grouper, moray eel, grouper, squid, mackerel, lobster), *Pontinus kuhlii* were also identified as critical for improvement in scientific knowledge. *Patella* spp. unknown status (relevant recreational, socio-economic).
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
Data on VME	OR has large number of ecological studies although still some more information is lacking to map VMEs.
Data availability for different fishing gears and activities (at relevant metier level e.g.,, recreational)	
Small scale fisheries (catch and effort by metier)	Despite monitoring program for small scale fleet and coastal resources (e.g.,, MoniCo) more data are need by metier level to allow the sustainability of these fisheries. Information would need further revision, for example, the number of vessels by metier (e.g.,, small scale and recreational).
Unknown stock boundaries and state of exploited resources: from the fishing point of view,	The Azores are at the southern limit of the areas covered by OSPAR, ICES and NEAFC and at the north of the CECAF area, this transitional area includes border limit (north and south) of the distribution of some resources such as tuna. Studies (e.g.,, stock connectivity, tagging, and body morphometrics) should be developed to clearly understand the stock structure of species in the North-East Atlantic. Some present a relatively sedentary behavior, supporting the possibility of the existence of local populations constituting different management stocks in the Azores islands (Santos *et al.*, 2019).

Weakness	Description and evidence
Gaps in knowledge of resource status and awareness may lead to overfishing	Even though several management measures (e.g., closed areas, TACs, and minimum landing sizes) have been implemented, indications of depletion or over-exploitation of some demersal fish populations highlight that the scientific and management processes are not fully understood.
Recreational fishing information (catch and effort data missing)	Although efforts are being made by the regional DCF they are still lacking info. Some studies are available but no regular monitoring. Typical problems of recall and non-response bias in recreational fisheries gathering of data. Recreational fisheries catch is believed to be more than 20% of the commercial landings.
Discarding is thought to occur	Observers report discarding from the longline fishery for species such as deep-water sharks. Commercially valuable species, including blackspot sea bream, wreckfish and alfonsinos, are also now increasingly discarded.
Gaps in sport fishing data	Little data on the total fish removal by the sport fisheries.
IUU fishing (estimates of illegal and unreported local overfishing)	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
Coordination for fisheries management and data collection could be burdensome between EU and OR level	In the Macaronesia ORs the diverse layers of decision-making in fisheries management and data collection requires intensive coordination between the State, regional administrations, and scientific entities at state and international level.
Guilt cycle ("ciclo da culpa")	The blame (between the several fishing sectors (Small-scale - Commercial fishing - recreational fishing – foreign/IUU fishing) for e.g overfishing, degradation of resources.
Transition in the process of data collection	May have caused gaps in the data and some collection methods and programmes were reduced during the transition phase.

Weakness	Description and evidence
	There were also some limitations in responsibility during the transition period.
Data collection by academic, scientific and other non-government bodies (e.g.,, academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e.,, bilateral and through RFB / RFMO) and national (i.e.,, with mainland) cooperation on data collection, scientific advice, research and MCS	
Several RFB / RFMO have jurisdiction in the area that can increase the burden of management in fishing activities and maritime management overall	The maritime management in the region is complex and advice for fisheries in the Azores are managed under the EU (ICES), with some fisheries managed by NEAFC, ICCAT, and the regional government. Scientific fisheries advice is provided by ICES, the European Commission's Scientific Technical and Economic Committee for Fisheries (STECF), the South West Waters Advisory Council (SWWAC), and the Long Distance Advisory Council (LDAC). For large pelagic fish (tuna and tuna-like species) fisheries advice is provided by ICCAT. Environmental policy advice is managed by national agencies and OSPAR, with advice being provided by national agencies, OSPAR, the European Environment Agency (EEA), and ICES. International shipping is managed under the International Maritime Organization (IMO) and whaling is managed by the International Whaling Commission (IWC) (ICES, 2019).
There are no coordination tools/platforms in place to facilitate communication amongst scientists and managers	
There is jurisdiction overlap across different RFMOs due to ICCAT oversees migratory resources in the Atlantic (ICCAT- Mauricio Ortiz)	
Integration of participatory decision making into management structure where applicable	
Scarce coordination of managers and sector to organize the fishing activity	Some examples of cooperation although occasional and should be improved.
Clear MCS organisation and assessment of IUU fishing	
Lack of MCS in coastal fishing activities and protected areas	
Roles and requirements of regional bodies (e.g.,, RFMOs, RFBs) with clear membership and representation to these bodies	

Weakness	Description and evidence
No clear regional membership and representation to RFMO bodies	Some exception in ICES WG.
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Understaff with expertise also needed to evaluate data collected in the region	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Centralization and bureaucracy in the management of the EMFF Shortcomings of the accessibility and utilisation of EMFF	There is a need to create a fund for fisheries like the one that already exists for the agricultural sector. Although the EMFF already exists for the operational period 2014-2020, it is necessary to bear in mind that it ends in 2020 and the post-2020 review of this instrument will lead to the interruption of the allocation of support to the sector as has already happened previously. Shortcomings (delays, underutilization) of the EMFF, as in the case of the lack of financial support for support for fishermen in region between 2014 and 2016. More funding for data collection. The majority of funding is used (not always well) for ports and infrastructure.
Management model of EMFF funds (e.g.,, managed regionally, centrally)	
Centralization and excess bureaucracy in the management of the EMFF for data collection.	There are quite a few institutions involved in the management of EMMF funding in Portugal mainland and the ORs (high administrative burden). The managing, certifying, paying and audit authorities are national-based and the regional local application, quality control, administrative validation of investments and measures using EMMF funding is performed by regional intermediate bodies. There is a need to simplify the support measures and instruments from the EMFF. There is also a lack of adaptation of EMFF measures to the local context.
Opaque information at national and regional level	
Collaboration between organisations in OR and MS	
None identified	

Weakness	Description and evidence
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Recreational fisheries constitute a challenge for data collection	Recreational activities are increasing in the three regions and means to collect data seem insufficient to address these needs. For example, in the Portuguese ORs recreational data is collected in the framework of a pilot programme (STECF, 2020). Recreationally fisheries are considered very important in the area (~20% of the commercial total). No regular information on fishing mortality by recreational fisheries. Typical problems of recall and non-response bias in recreational fisheries gathering of data.
Difficulties in monitoring the small-scale fleet	Most of the ORs vessels are small in size and this may lead to important limitations to the possibility of having onboard observers to collect scientific data.
Data required for sustainability of stocks and fishing activity is only partially collected	Data necessary for analytical stock assessment not always available. Fishing effort/mortality by métier/species is difficult due to nature of mixed/polyvalent and small-scale fleet in the region.
Gaps in biological and fisheries data for some important stock for the region	The Azores stocks have no resources with validated analytical assessment category 1 and/or biological reference points within the ICES framework.

Weakness	Description and evidence
	Twenty-two species were selected as priority stocks for local assessment and monitoring according to the FAO and ICES criteria. Half of the selected stocks have their distribution inside the Azores EEZ (ICES Subdivision 27.10.a.2) but the other half has no clearly defined distribution. Twelve stocks were classified as ICES category 5, i.e.,, stocks for which only landings or a short series of catches are available, and 10 stocks were classified as ICES category 3, i.e., stocks for which survey-based assessments or exploratory assessments indicate trends. Among all these, only four stocks are assessed using data limited approaches. Species list details in profile report (Annex 2).
Socio-economic data	Socio-economic data not available at regional levels, some questionnaires interviews are made at auction site. Fisheries management, especially at European level, does not always take into account the specific socio-economic characteristics of ORs.
Large number of landing sites	The large number of landing sites revealed low levels of sampling due to a lower availability of some species at the landing sites which are covered by samplers (STECF, 2020).
Species and geographical limitations	In Azores, there are problems to collect data for some specific species since these are not present in landing sites where samplers conduct their activities (STECF, 2020).
Species relevant for the OR are identified and some data are already collected but it is not specific to the OR.	EU does not always take into account the specific artisanal fishery characteristics of the OR.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
Inability to quantify IUU uptakes	IUU fishing are present in the archipelago and thus constitute a source of fishing mortality not accounted under the DCF.

Weakness	Description and evidence
Monitoring of marine protected areas	Not sufficient. although some monitoring and regulations restricting fishing activity was established under the project MONIZEC-ARP of the regional Government. More data/targets needed to identify Vulnerable Marine Ecosystems.
Monitoring of Coastal activities	Not sufficient, although monitoring program for coastal resources like MoniCo.
Recreational fishers	Recreational fisheries are difficult to control due to the enormous number of fishermen and the diverse modalities that take place. It imposes a challenge for data collection and MCS.
Transversal data collection to aid fisheries management (e.g.,, sales notes, VMS data, etc. collected under the control system)	
VMS not always available	The small-scale nature of the regional fleet hampers the utilization of VMS data. Gaps in cross-referencing VMS/AMS BDs vs. auction landings to spatially characterize catch by length.
No standardisation of information between the transversal data.	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
Databases are shared on request.	Data is not fully available on a common platform between relevant institutions and has to be requested.
Are data sufficient for stock assessment? – If not where are the gaps, e.g.,, catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	
Data necessary for analytical stock assessment not always available.	Fishing effort/mortality by métier/species is difficult due to nature of mixed/polyvalent and small *Pagelus bogaraveo* scale fleet in the region.
Fishing and biological data not analysed	Fishing and biological data that sometimes lack proper scientific analysis due to the understaff of specialized personnel.

Weakness	Description and evidence
No comprehensive data collection for all species	What characterises the fisheries in the Outermost Regions is the predominance of local fisheries of artisanal, subsistence or recreational nature. Many of the species that sustain those fisheries, e.g., small neritic tunas are not subject to comprehensive data collection under regular programs (ICCAT).
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
Large and complex body of legislation	Management and conservation system of the Azores' fishing resources is complex and is still in progress, partly also due to the status of Autonomous Region and as an OR, with limited powers to legislate in some areas and matters related to fisheries and marine conservation.
Contradictions in regulation and arbitrariness that reduces legitimacy before the administered	Even though several management measures (e.g.,, closed areas, TACs, and minimum landing sizes) have been implemented, indications of depletion or over-exploitation of some demersal fish populations highlight that the scientific and management processes are not fully understood.
Contradictions in regulation: recreational fisheries are considered to overcome professional fisheries in some islands and are paradoxically poorly monitored	Although efforts are being made by the regional DCF they are still lacking info. Some studies are available but no regular monitoring. Typical problems of recall and non-response bias in recreational fisheries gathering of data. Recreational fisheries catch is believed to be more than 20% of the commercial landings. Pham et al. (2010) estimated recreational catches for the period 1950-2010 in Azores, the most important species in terms of volume: the white seabream with a total catch of 6,484 tonnes accounted for 222% of landings of the commercial fleet.
Low levels of monitoring and enforcement	While fisheries conservation measures are thought to be appropriate, the main difficulty within the islands is the practical implementation and enforcement as well as local monitoring of the measures.

Weakness	Description and evidence
Regulation and that increases overexploitation of some coastal resources	Since 2000, the use of bottom longlines in the coastal areas has significantly been reduced, as a result of the banning by of their use in the coastal areas for a range of 3 miles from the shore. As a consequence, the smaller boats that operate in this area have changed their gears to several types of handlines which may have increased the pressure on some coastal species.
Selection of appropriate controls and measures at correct levels of coverage	
Limited TACs are in use only for some for large pelagics (ICCAT)	In Macaronesia TAC is only in use for bluefin tuna, bigeye tuna and from 2020 for three billfish species. All these are ICCAT species. (STECF 2020; ICCAT). ICCAT stock evaluation can be improved with abundance indexes but alike other scientific bodies, such as ICES, these indexes are less available due to the strong dependency of tuna data on fisheries dependent data. The majority of the Azores stocks have not undergone an analytical assessment, therefore do not have biological reference points.
European regulations, by defining rules (fleets, minimum catch sizes, prohibiting the use of certain gears or banning certain species) does not always take into account the specific artisanal fishery characteristics of the ORs.	Micro management at the regional level exists with the "Decretos regionais" but EU legislation hampers fisheries management and data collections of regional important species. New EU-MAP already addresses some of these issues.
Management measures and support from EMFF not available or with shortcomings (subsidies not in time)	There is a need to simplify the support measures and instruments from the EMFF to reduce fishing capacity. Despite the existence of support instruments to reduce the total fishing capacity of vessels in the OR, support for diversification of fishermen's professional activities, the lack of investment in professional training is a barrier to be taken into account. The need to create more incentives from EMFF for the adoption of fishing gears that is less damaging to stocks, such as reducing by-catches of unwanted species.

Weakness	Description and evidence
Some species need to be regulated	Conservation measures such as catch limits, minimum landing size and seasonal bans have to be introduced for mainly coastal species.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
Management and control of Fisheries Marine reserves and MPA´s is poorly supported by any monitoring	Fisheries regional conservation measures can be considered appropriate (also under the CFP and MSFD directives) but the main difficulty is the practical implementation and enforcement. Local monitoring of coastal fisheries is also very difficult.
Monitoring	Monitoring is not enough to assure accomplishing with the management regulations.
MCS for recreational fisheries	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
no regional representation in ICCAT scientific WG	Representation in ICCAT scientific WG could improve cooperation on data collection and approaches to management. Although there is no regional representation in ICCAT, IPMA scientists participate in the ICCAT working groups and in the assessment of the large migratory pelagic species.
Restriction of fishing opportunities within an OR to vessels from that OR only	
Large number of closed fishing areas may trigger spill over effects of fishing in other areas	
Scientific basis for decision making and the science / management nexus – i.e.,, How does science get turned into management advice?	
Scientific analysis is lacking	Although the Azores has a lot of information, scientific analysis is lacking because of a lack of manpower.
Management measures to counteract external impacts (third country) e.g.,, IUU, damaging practices, damaging fisheries agreements	
Numerous vessel (unknown number) operating outside the 100nm. Foreign commercial fishing activity unknown	This foreign fishing activity is not regionally monitored and do not enter the local statistics hampering fishing mortality/effort estimates.
Commercial fishing activity not entering local statistics.	Commercial fishing activity not entering local statistics are the catch of pelagic longliners landed outside the Azores by some regional vessels and other Portuguese mainland and foreign fleets.

Weakness	Description and evidence
Local management measures will have a residual impact	Local management measures will have a residual impact because the exploited stocks are widely distributed species/stock.

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As Opportunities are external, an Outermost Region cannot easily 'create' Opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any Opportunities that appear. For example, an Opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

Improvements in data collection include taking advantage of new communication and information technologies to facilitate observation on board of fishing activities. The standardisation of available VMS/AMS information and auction market databases could result in a significant improvement in the knowledge of fishing activities in the area. The good cooperation of governmental/research institutions with PO and Advisory Councils should also be considered an opportunity for enhancing data collection.

Cooperation between national, regional and other Macaronesia OR institutions could be reinforced with common access to data, mainly for highly migratory stocks. Improving the regional participation in e.g.,, ICCAT and ICES meetings would help to better represent OR priorities and monitoring of relevant stock in the area. This provides opportunities for a more regional approach to data collection. Better data collection and management may allow further regional important stock assessments to be conducted. TACs may be expanded to other resources and may lead to improved control and allocation of resources.

The good science in the region, prone to engage in alternative funding projects/programmes other than EMFF, provide opportunities for research initiatives. The occurrence of hydrothermal vents in the area also resent opportunities in studying new resilient species with application to e.g.,, medicine.

Table 4: Summary of Opportunities Identified for Azores OR

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g.,, Stock status, biology, population structure, delineation	
Climate change effects on stocks	May be beneficial effects on current stocks or new stocks able to be exploited.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
Hydrothermal vents (State of the art studies in new resilient species)	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
None identified	
2. Institutional structures	

Opportunities	Description and evidence
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
New communication and information technologies	The standardisation of available VMS/AMS information and auction market databases could result in a significant improvement in management of large migratory species occurring in mainland and other OR.
Data collection by academic, scientific and other non-government bodies (e.g.,, academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
Development of cooperation in the region in data collection	Research institutes in the diverse Macaronesia's ORs have been conducting research initiatives in the framework of projects funded by the EU for years. They also participate in working groups in DCF-Regional expert groups, STECF, diverse ICES working groups, ICCAT and CECAF (note: Azores is not a contracting party of ICCAT or CECAF). Thus, networking and cooperation is already in place even tough steady funding for cooperation in data collection and management is not in place for these initiatives. It is noted that the DG MARE has recently launched a call for proposals for the elaboration of regional DCF work plans. This call is addressed to the different Regional Coordination Groups. There is scope for addressing a regional DCF workplan in Macaronesia. https://ec.europa.eu/fisheries/press/call-proposals-mare202008-strengthening-regional-cooperation-area-fisheries-data-collection_en
Cooperation within Macaronesia area	Tradition of participation in research projects involving Macaronesia region (Madeira and Canaries under projects described above and programs such as Interreg and Interreg MAC.
Integration of participatory decision making into management structure where applicable	
None identified	

Opportunities	Description and evidence
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g.,, RFMOs, RFBs) with clear membership and representation to these bodies	
Regional representatives in scientific working groups relevant for the area	Need local representation on the delegation to the RFMO working groups.
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection	
The EU legislation for the fisheries sector needs a revision in the in the field of simplification of measures and rules for the sector. It is divided in a vast number of regulations, which makes it difficult to fully application and interpretation	
The need to create more incentives for the adoption of fishing gears The need to create more incentives for the adoption of fishing gear less harmful to the stocks as the case The need for more incentives to adopt fishing gear that is less damaging to stocks, such as reducing by-catches of unwanted species	
There is a need to simplify the support measures and instruments from the EMFF to reduce fishing capacity. Despite the existence of support instruments to reduce the total fishing capacity of vessels vessels in the OR, aimed at reducing the effort of fishing activities, such as the case of support for diversification of fishermen's professional activities, the lack of investment in professional training is a barrier to be taken into account.	
Management model of EMFF funds (e.g.,, managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	

Opportunities	Description and evidence
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g.,, national funding)	
Structural funds other than EMFF provide opportunities for funding research initiatives	The MAC programme provides funding for initiatives at the level of Macaronesia, where also Western Africa countries and Cape Verde can cooperate with the ORs in research. Very few projects have been implemented for fisheries. Most of the projects concerning the marine environment are related to aquaculture.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g.,, recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g.,, monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
Use of drones to control marine protected areas	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
Standardisation of information (DB of auction-markets vs VMS/AMS info)	

Opportunities	Description and evidence
Pilot study in IPMA based on an innovative framework of combining species sales notes by commercial size category, the length and age composition of commercial sizes from onshore sampling and the fishing ground and fishing effort from vessel monitoring system records it is possible to obtain high resolution mapping of daily landings. This type of data is also available at the OR level	
Availability of new technologies to aid data collection	
New technologies could be employed to facilitate observation on board of fishing activities.	REM technologies could be employed as a substitution of scientific observers' programmes which are difficult to implement in large fleets where very small vessels predominate, making these programmes technically complicated. Observer programmes are very useful to know and characterize the fleet activities, gears used for capturing each species, fishing areas, discards, etc.
Use of smartphone apps to collect data taking advantage of younger fisherman	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	

Opportunities	Description and evidence
Create basic regulations for fisheries and their interpretation and transposition adapted to the regions concerned. This would allow for a approach to the fisheries sector which is more regionalised and therefore more specific. Within the framework of a decentralised vision of the fisheries sector, new regional ordinances and decrees would have the approval of the EU and they would directly influence any another EU Member State, which traditionally fished in the waters of the region	
Selection of appropriate controls and measures at correct levels of coverage	
Improved data collection and assessment may allow to implement TACs	TAC as a management tool can facilitate the allocation of resources amongst fleets and can help in the framework of the landing obligation. This may allow diverse means to compensate for quota surpasses. Thus, TACs are desirable tool for management. In Macaronesia, the implementation of TACs is only in place for ICCAT's BFT, BET and billfish (from 2020). *Trachurus* spp will have a precautionary TAC to be established in 2020. Improved data collection systems and thus enhanced assessment may allow to implement TACs gradually in the Macaronesia region.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
Regional networking may allow a more holistic approach to data collection	Participation of the Macaronesia actors in international fisheries bodies allow realising needs for data collection on transboundary and highly migratory stocks. This provides opportunities for a more regional approach to regional data collection.
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	

Opportunities	Description and evidence
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

The extensive oceanic area of the 9-island archipelago of Azores reduces the capacity of monitoring all the activities from external foreign activities offshore. The MCS is limited at this range and this could result in overfishing of some migratory high valued stocks (e.g., tuna species) in the waters around the region but also in other areas where these species occur. The inability to quantify these catches could hamper the stock assessment done at ICCAT. A reduction of catch opportunities in these high-valued stocks could also reduce the income of the local fishermen with detrimental socio-economic impact in the region.

Other Threats for the fishing activity include factors that need a global or third-party action such as climate change. Global warming is expected to have detrimental effects on the current exploited stocks.

Table 5: Summary of Threats Identified for Azores OR

Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Portuguese mainland and foreign fleets commercial fishing activity does not enter local statistics. Unknown number of vessels operating >100nm. MCS limited at this range	
Reduction of catch opportunities because of overfishing of some relevant migratory high valued stocks in other regions	
Climate change effects on stocks	There may be detrimental effects on current stocks or new stocks may not be able to exploited.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
Climate change	There may be detrimental effects on current stocks or new stocks may not be able to exploited.
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	

Threat	Description and evidence
Portuguese mainland and foreign fleets commercial fishing activity does not enter local statistics. Unknown number of vessels operating >100nm. MCS limited at this range	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
Inability to quantify IUU uptakes	IUU fishing are present. Unknown number of foreign vessels operate offshore that do not enter the local statistics and thus constitute a source of fishing mortality not accounted under the regional management.
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	

Threat	Description and evidence
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
Increasing IUU fishing	Illegal practices impose a risk to the sustainability of professional fisheries and a risk to fishing resources. This requires a large MCS and compliance effort and monitoring at all levels of the value chain.
There are numerous vessels (unknown number) from foreign fleet outside the 100nm	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	

Threat	Description and evidence
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
Uneven application of the law across actors	Lack of application of law to foreign fleets operating offshore due to a lack of control and monitoring.
Selection of appropriate controls and measures at correct levels of coverage	
Foreign fishing activity mostly outside the 100nm) is not regionally monitored and do not enter the local statistics.	Local management measures will have a residual impact because the exploited stocks are widely distributed species / stock.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
ICCAT stock assessment	ICCAT stock evaluation seems sufficient for the main five tuna stocks. It can be improved with abundance indexes but, alike other scientific bodies, such as ICES, these indexes are less available due to the strong dependency of tuna data on fisheries dependent data.
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for the Azores. This goes further than a traditional SWOT analysis and looks to match individual strengths, weaknesses, opportunity and threats together to help identify recommendations that could be implemented to improve data collection in the Azores. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the Opportunity to be realised. An external opportunity may occur when an external Threat (e.g., climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • New technology and communication platforms to strengthen collaboration between local, national and regional levels • Use MSP to protect Vulnerable Marine Ecosystems (VMEs) and associated high risk species	**"Attractive Options"** • Alternative funding sources (outside of EMFF) to support data collection • Improve regional collaboration to increase OR representation at the regional level • Exploit new communication platforms and technologies to improve data collection and collaboration
Threats	**"Threats that can be defended"** • Improve knowledge of foreign vessels and those from the mainland within 100nm • Utilise knowledge of the environmental ecosystem to help predict impacts of climate change on stocks • Utilise existing scientific infrastructure and MCS organisation to quantify IUU	**"High Risk Scenarios"** • Risk of overfishing due to knowledge gaps and increasing IUU fishing.

	Threats
Opportunity	**"External Opportunities"** • Climate change may be beneficial to current stocks or allow new stocks able to exploited

	Weakness
Strength	**"Internal Opportunities"** • Alternative funding to support data collection (outside EMFF) • New MoniCo System • Regional assessments to support national assessments • Mandatory auctions at landing sites could help increase data collection for the artisanal fleet

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

The main 'Natural Opportunities' identified for the Azores relate to the use of new communication and technology to strengthen local and regional collaboration as well as the use of Marine Spatial Planning (MSP) to protect Vulnerable Marine Ecosystems (VMEs) and associated high risk species.

Table 7: Summary of Strength and Opportunity Combinations Identified for Azores

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Marine Spatial Planning (MSP) in place	Hydrothermal vents (State of the art studies in new resilient species)	MSP could take location of hydrothermal vents into account to protect Vulnerable Marine Ecosystems (VMEs) and associated high risk species.
•	The fishing sector is organised at local and regional level overall collaborating and contributing to science	New communication and information technologies	Utilise new communication and information technologies to strength collaboration between local and regional levels (e.g., enhanced and more timely logbook and other data submissions).
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		

#	Strength	Opportunity	Description and evidence
5. Fisheries management and conservation measures			
•	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing threats the current skills, funding and administrative requirements may already be in place to be able to meet these threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address threats in limited situations.

In the Azores, the main 'Threats that can be defended' refer to improving knowledge of foreign fleets and Portuguese mainland vessels fishing within 100nm of the Azores and to support quantification of IUU.

Table 8: Summary of Strength and Threat Combinations Identified for Azores

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Knowledge of the gears and fishing activities operating inside the 100 nm	Portuguese mainland and foreign fleets commercial fishing activity does not enter local statistics. Unknown number of vessels operating >100nm. MCS limited at this range.	There is knowledge of gears and activity within 100 nm but this should be extended to include foreign vessels and those from mainland.
•	Knowledge of the environmental ecosystem.	Climate change	Strong knowledge of the environmental ecosystem may help Azores prepare for changes in stock distributions. Enhanced monitoring may be needed to establish baselines and to track changes.
2. Institutional structures			
•	There is occasional assessment of IUU by science institutions although not used for management	Inability to quantify IUU uptakes	Assessments by science institution should be used to support management regarding IUU from foreign vessels and target MCS resources.
•	Good infrastructure in science institutions	Inability to quantify IUU uptakes	Good infrastructure in science institutes should be utilised to further study IUU risks from foreign vessels and inform MCS.

#	Strength	Threat	Description and evidence
•	MCS organisation recently improved	Inability to quantify IUU uptakes	MCS is being improved which could lead to quantification and reduction of IUU from foreign vessels.
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an Opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

Several 'Attractive Options' exists for the Azores which include exploiting alternative funding sources to fill gaps in knowledge and data collection. Increased regional collaboration and use of new communication and technology platforms could also help ensure appropriate OR representation at the regional level as well as providing new opportunities to collect data (e.g., for the small-scale fleet).

Table 9: Summary of Weakness and Opportunity Combinations Identified for Azores

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	The majority of stock boundaries unknown. Stock connectivity (island and seamounts level) mostly unknown in the region	Regional networking may allow a more holistic approach to data collection	Develop collaboration within the Macaronesia area to study stock boundaries and shared stocks using genetic analysis where available.
•	Mainly coastal species, *patella's* were identified as relevant socio-economic fisheries and identified as critical for improvement in scientific knowledge	Structural funds other than EMFF provide opportunities for funding research initiatives	Alternative funding sources to improve knowledge of coastal species.
•	Gaps in knowledge in some important stock for the region	Structural funds other than EMFF provide opportunities for funding research initiatives	Use alternative funding sources to fill gaps in resource knowledge and mitigate risk of overfishing.
•	Recreational fishing information (catch and effort data missing)	Structural funds other than EMFF provide opportunities for funding research initiatives	Use alternative funding sources to fill gaps in knowledge (SSF, recreational fishing etc).

#	Weakness	Opportunity	Description and evidence
2. Institutional structures			
•	Coordination for fisheries management and data collection could be burdensome between EU and OR level	New communication and information technologies	Utilise communication platforms and technology to improve collaboration and communication between different levels.
•	There are no coordination tools/platforms in place to facilitate communication amongst scientists and managers	New communication and information technologies	Utilise new communication platforms and technology to improve collaboration and communication between scientists and managers. E.g., Simple dashboard of current stock status, catch and effort etc.
•	Several RFB / RFMO have jurisdiction in the area that can increase the burden of management in fishing activities and maritime management overall	New communication and information technologies	Utilise new communication platforms and technology to improve collaboration and communication between international and national management.
•	Several RFB / RFMO have jurisdiction in the area that can increase the burden of management in fishing activities and maritime management overall.	Development of cooperation in the region in data collection	Cooperation in regards to regional data collection could help reduce the burden when it comes to international management at the RFMO level.
•	No clear regional membership and representation to RFMO bodies	Regional representatives in scientific working groups relevant for the area	OR representatives need to be present in RFMO meetings
•	EU does not always take into account the specific artisanal fishery characteristics of the OR.	Regional representatives in scientific working groups relevant for the area	ORs should have more significant presence in regional meetings to enhance knowledge and input from regional artisanal and recreational fisheries.
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	No standardisation of information between the transversal data.	Standardisation of information (DB of auction-markets vs VMS/AMS info)	Opportunities to standardise transversal data collection.

#	Weakness	Opportunity	Description and evidence
•	Large number of landing sites	Fishmetrics.pt	Remote length sampling available for auctions to respond to large number of landing site and isolated islands in the archipelago
•	Data required for sustainability of stocks and fishing activity is only partially collected	Fishmetrics.pt	Remote length sampling at auction market to respond to isolated fishing ports
•	Difficulties in monitoring the small-scale fleet	New technologies could be employed to facilitate remote observation on board of fishing activities.	e.g., REM could be used where use of scientific observers is difficult.
•	Gaps in biological and fisheries data for some important stock for the region	Use of smartphone apps to collect data taking advantage of younger fisherman	Employ new technology to assist in data collection. (Recreational and artisanal)
•	Inability to quantify IUU uptakes	Use of drones to control marine protected areas	Use of drones to help identify IUU in MPAs.
5. Fisheries management and conservation measures			
•	Large and complex body of legislation	Create basic regulations for fisheries and their interpretation and transposition adapted to the regions concerned.	This would allow for an approach to the fisheries sector which is more regionalised and therefore more specific. Within the framework of a decentralised vision of the fisheries sector, new regional ordinances and decrees would have the approval of the EU and they would directly influence any another EU Member State, which traditionally fished in the waters of the region.
•	Limited TACs are in use only for some for large pelagics (ICCAT)	Improved data collection and assessment may allow to implement TACs	Improved data collection may allow implementation of more TACs locally and better management.
•	No regional representation in ICCAT scientific WG	Regional networking may allow a more holistic approach to data collection	Regional networking and representation may help to improve management of OR fisheries.

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

There are a few 'High-Risk Scenarios' that the Azores should be aware of including the risk of overfishing certain stocks due to limited availability in data in combination with IUU fishing.

Table 10: Summary of Weakness and Threat Combinations Identified for Azores

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	The majority of stocks boundaries are unknown. Stock connectivity mostly unknown in the region	Climate Change	Lack of baseline information on stock boundaries where there may be high impacts from climate change could lead to high risk of stock extinction.
•	Gaps in knowledge for important stocks for the region	Overfishing of some relevant high value stocks is occurring	Limited data available to understand which stocks are being overfished or are at risk of being overfished.
•	Gaps in knowledge for important stocks for the region	Portuguese mainland and foreign fleets commercial fishing activity does not enter local statistics. Unknown number of vessels operating >100nm. MCS limited at this range	Limited data available to understand which stocks are being overfished or are at risk of being overfished.
•	Gaps in knowledge for important stocks for the region	Increasing IUU fishing	Limited data available to understand which stocks are being overfished or are at risk of being overfished.

#	Weakness	Threat	Description and evidence
•	Key resources lack stock assessment	Overfishing of some relevant high value stocks is occurring	Limited data available to understand which stocks are being overfished or are at risk of being overfished.
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the Opportunity to be realised.

In regards to 'Internal Opportunities' for the Azores, there are several existing strengths that could be exploited to combat current weaknesses. Although gaps in knowledge and assessments of various stocks exist, there are assessments at the regional level and studies on discards and bycatch that could be used to provide data or support national stock assessments. Alternative funding sources have been identified which could be used to support data collection and provision of scientific advice if the EMFF is not the most suitable option. The new MoniCo system can be used to better assess coastal resources and aid scientific advice and mandatory auctions at landing sites could help increase data collection for the artisanal fleet.

Table 11: Summary of Strength and Weakness Combinations Identified for Azores

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Discards and bycatch assessments	Gaps in knowledge for important stocks for the region	Better estimate of removals
•	Large pelagic stocks assessed by ICCAT	Gaps in knowledge for important stocks for the region	Wider range data collection and assessment
•	Main demersal and small pelagic species are assessed/ informed with data limited approaches	Gaps in knowledge for important stocks for the region	Recognise gaps in data and using alternative approaches, where alternative approaches are a viable option.
•	Discard and bycatch assessments	Key resources lack stock assessment	Discard and bycatch assessments provide further data to conduct stock assessments.
•	Discard and bycatch assessments	Mainly coastal species, *patella's* were identified as relevant socio-economic fisheries and identified as critical for improvement in scientific knowledge. Coastal species (grouper, moray eel, grouper, squid, mackerel, lobster), *Pontinus kuhlii* (Offshore rockfish)	Provides another source of data collection.

#	Strength	Weakness	Description and evidence
•	Discards and bycatch assessments	Discarding is thought to occur	Data collection is occurring to monitor discarding.
•	Discards and bycatch assessments	Gaps in knowledge of resource status and awareness may lead to overfishing	Data collection is occurring to get a better estimate of removals.
•	Main demersal and small pelagic species are assessed / informed with data limited approaches	Gaps in knowledge of resource status and awareness may lead to overfishing	Assessments provide further data to conduct stock assessments.
•	Knowledge of the gears and fishing activities operating inside the 100 nm	Recreational fishing information (catch and effort data missing)	Knowledge of the gears and fishing activities within 100 nm should be extended to cover recreational and sports fishing.
•	Knowledge of the gears and fishing activities operating inside the 100 nm	Gaps in sport fishing data	Knowledge of the gears and fishing activities within 100 nm should be extended to cover recreational and sports fishing.
•	Knowledge of the gears and fishing activities operating inside the 100 nm	Small scale fisheries (catch and effort by metier)	Information is known about gears and fishing activities but needs to be extended to cover catch and effort for SSF.
•	No industrial fishery	Small scale fisheries (catch and effort by metier)	As there is no industrial fishery, efforts can be focussed on to the SSF.
•	Knowledge of the environmental ecosystem and information on VME is available.	Data lacking to map VMEs	This is a priority for the Regional Government and data do exist on the ecosystem but more is needed to map VMEs.
•	Marine Spatial Planning in place	Data on VME	MSP could be used to help map and protect VMEs.
2. Institutional structures			
•	Examples of cooperative governance between administration, POs and other local stakeholders within the OR and between Macaronesia OR´s	Guilt cycle ("ciclo da culpa")	Build on good collaboration to remove blame between sectors.

#	Strength	Weakness	Description and evidence
•	Examples of cooperative governance between administration, POs and other local stakeholders within the OR and between Macaronesia OR´s	Coordination for fisheries management and data collection could be burdensome between EU and OR level	Use existing examples of good cooperation to reduce burden.
•	MCS organisation recently improved	Lack of MCS in coastal fishing activities and protected areas	The Regional Inspectorate has improved ability to enforce management measures and this should be built upon.
•	Good infrastructure in science institutions	Data lacking to map VMEs	Science institutions could support the mapping of VMEs.
•	Some representation in ICES WGDEEP and ICES WGHANSA	No clear regional membership and representation to RFMO bodies	Regional scientists should also be present in RFMOs.
3. Funding and funding structures for data collection			
•	Long and effective tradition in the use of financing from other European programmes (LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac).	Shortcomings of the accessibility and utilisation of EMFF	If EMFF is not the most suitable funding source then other funding is available and accessible to the OR.
•	Other structural funds also offer funding for scientific purposes	Shortcomings of the accessibility and utilisation of EMFF	If EMFF is not the most suitable funding source then other funding is available and accessible to the OR.
4. Current state of data collection obligations			
•	Data collection at network of landing sites present in archipelago islands	Lack of socio-economic data	Auctions are mandatory at all landing sites and could be utilised to also collect further socio-economic data.
•	Scientific- observers onboard programme	Data required for sustainability of stocks and fishing activity is only partially collected	Although there was limited data collected during transition of responsibilities this is thought to have stabilised and observers should now be able to collect data.

#	Strength	Weakness	Description and evidence
•	Scientific Surveys	Data required for sustainability of stocks and fishing activity is only partially collected	Scientific studies should be utilised to ensure sufficient high quality data on stocks are collected.
•	Data collection at network of landing sites present in archipelago islands	Data required for sustainability of stocks and fishing activity is only partially collected	Auctions are mandatory at all landing sites and should be used to collect data for all fish landed.
•	Data collection at network of landing sites present in archipelago islands	Recreational fisheries constitute a challenge for data collection	Some recreational data are already collected at auction sites and should be further utilised and collected.
•	Recreational marine fishing activities are described, well segmented, and with some regulations.	Recreational fisheries constitute a challenge for data collection	The recreational fishery is well regulated and licensed and therefore a framework may exist to ensure sufficient data collection.
•	Scientific Surveys	Species and geographical limitations	Where species are not present at landings site, scientific surveys could be used to support data collection. On-board observers could also be utilised where possible.
•	Data collection at network of landing sites present in archipelago islands	Difficulties in monitoring the small-scale fleet	Auctions are mandatory at all landing sites and should be used to collect data for all fish landed.
•	The auctions are mandatory in all landing sites advantage for collection of transversal data	No standardisation of information between the transversal data.	The use of auction sites to collect transversal data should be standardised.
•	Information from the academic and scientific institution is used in management	Data required for sustainability of stocks and fishing activity is only partially collected	Utilise data from other sources to inform management
•	Information from the academic and scientific institution is used in management	No comprehensive data collection for all species	Utilise data from other sources to inform management

#	Strength	Weakness	Description and evidence
•	Main demersal and small pelagic species are assessed/ informed with data limited approaches	Data necessary for analytical stock assessment not always available.	Data limited approaches are available for stocks where data are limited.
•	Monitoring of coastal activities	Data required for sustainability of stocks and fishing activity is only partially collected	The new MoniCo system can be used to better assess coastal resources and aid scientific advice.
•	Monitoring of coastal activities	Monitoring of marine protected areas	The new MoniCo system can be used to improve management of MPAs.
•	Monitoring of some of marine protected areas in the Azores	Monitoring of marine protected areas	Some monitoring is occurring under projects (e.g., MONIZEC-ARP) which should be further exploited.
•	Monitoring of endangered species	Discarding is thought to occur	Several programmes which monitor endangered species could help inform interactions / discarding of ETP species.
5. Fisheries management and conservation measures			
•	The Regional Government has been presenting a series of legislative initiatives aimed at promoting the sustainable exploitation of resources.	Gaps in knowledge for important stocks for the region	The Regional Government is pushing for sustainable exploitation of resources which should put help to prioritise fisheries.

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an Opportunity could be occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

In regards to 'External Opportunities' for the Azores, climate change may result in the shifting of stocks which allow new resources to potentially be exploited.

Table 12: Summary of Opportunities and Threats Combinations Identified for Azores

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Climate change	Reduction of catch opportunities	There may be beneficial effects on current stocks or new stocks able to exploited.
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

Madeira

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Madeira SWOT Report

MRAG Europe MRAG Limited azti tecnalia Cefas

DTU Technical University of Denmark

Marine Institute Feras na Mara

IPMA THÜNEN WAGENINGEN UNIVERSITY & RESEARCH

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Acronyms

Term	Definition
AIS	Automatic Identification System
ARM	Autonomus Region of Madeira
BET	Bigeye Tuna
BFT	Bluefin Tuna
CECAF	Fishery Committee for the Eastern Central Atlantic
CFP	Research Centre in Biodiversity and Genetic Resources
DCF	Data Collection Framework
DRM	Regional Directorate of the Sea
DRP	Regional Directorate of Fisheries
EEZ	Exclusive Economic Zone
EMFF	European Maritime and Fisheries' Fund
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IFCN	Institute of Forests and Nature Conservation
IUU	Illegal, Unreported and Unregulated Fishing
MAP	Multi-Annual Plan
MCRS	Minimum Conservation Reference Size
MCS	Monitoring, Control and Surveillance
MLS	Miniumum Landing Size
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning
NGO	Non Governmental Organization
REM	Remote Electronic Monitoring
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
VMS	Vessel Monitoring System
WGDEEP	ICES Working Group on Biology and Assessment of Deep-sea fisheries resources

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e., EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities, and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities, and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for Madeira, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

	Positive	Negative
Internal	**STRENGTHS** • Main target species and métiers are known • Relevant data collected • DCF sustainable and implemented • Good capacity and high skill level • Clear roles and responsibilities • Good management measures • Space for new fisheries • Good collaboration between scientific bodies and Macaronesia area • No IUU fishing products within ARM • The fishing sector is organised at local and regional level • Space to introduce innovative tools for data collection • By-catch of endangered species is considered low • MPA's exist and are regulated • Recreational fishing is described and regulated. • Gear bottom trawling and trammel nets are not allowed to fish in Madeira below 200 m. • Regulation of fisheries agreements in the Macaronesia Region	**WEAKNESSES** • No biological information, assessment and TAC for some commercial important species (risk of overfishing) • No regular scientific surveys and on-board observer programme • No sufficient skilled staff • So far NGOs don't work with fisheries related issues • Limited involvement of producers in management • Deep and low productivity waters limits potential catch, fishing activity biased towards tunas and black scabbardfish • Recreational and small scale fisheries constitute a challenge for data collection • There are no coordination tools/platforms in place to facilitate communication amongst institutions, scientists and managers • Centralization and bureaucracy in the management of the EMFF for data collection • Fisheries management does not always take into account the specific socio-economic characteristics of ORs • Lack regulations • Monitoring is not enough • Social and economic data on the processing industry is not included in the work plan

	Positive	Negative
External	**OPPORTUNITIES** • Development of cooperation in the region in data collection • New communication and information technologies • Structural funds other than EMFF • New communication and information technologies for improved data collection/articulation • Use of drones to control marine protected areas • Regional representatives in scientific working groups relevant for the area • More articulation with other sea related activities (biotechnology) • Improved data collection and assessment may allow to implement TACs • Climate change effect on stocks	**THREATS** • No regional representation in RFMO bodies • Increasing IUU fishing • Reduction of catch opportunities • Climate change effect on stocks

3 SWOT Definition

The following four sections identify individual strengths, weaknesses, opportunities and threats identified for Madeira.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc.

In Madeira there is a high scientific background and expertise of scientists and technicians working in marine research. Personnel working in the management framework also have high qualifications and experience. The scientific parties have characterised fisheries, resources and the knowledge base for fisheries management is sound and comprehensive. There is a clear division of responsibilities in terms of competences in Madeira's waters. The fishing sector is well organised in Producers Organizations (POs) that are represented at national and EU level, for example in the Advisory Councils.

The data collection framework conducted by the regional government has been in place for several years and there is good cooperation between the regional and the national government. The Regional government complies with the requirements of the National Program of Basic Fisheries Data, including those having an international component such as CECAF and ICCAT where national scientists participate, and beyond EU-MAP in collection of additional data and participating in international EU funded projects. In the same way the role of the academia is relevant in data collection beyond the EU-MAP.

Funding is an important Strength for data collection and fisheries research in general in the region. The EU-MAP activities are funded by the EMFF as well as in other ORs. Another source of funding is the Interreg's MAC program which is devoted to the Macaronesia region even including non-EU countries in the region such as Cape Verde.

Management in the region is very comprehensive and includes regional and national management measures. Biological knowledge of the resources has been incorporated into management measures such as the ban of the use of nets that could have a negative impact on ground habitats and species such as trawling. Bilateral agreements are in place with Spain to exploit stocks in each other's waters. An exclusive economic area of 200 m is in place for the activities of the regional fleet which allows better control since fleets from other countries and even from other regions in Portugal need special permits to operate in those waters. Regulations are also in place for Marine Protected Areas (MPAs) and other means of biodiversity conservation to reduce the impact of fisheries on the environment. By-catch of endangered species and species in general are considered low. There is still space for new fisheries, namely deep shrimp fisheries, and no IUU fishing products have been recorded within ARM. Recreational fishing is also described and regulated.

Table 1: Summary of Strengths Identified for Madeira.

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Knowledge of population structure/parameters of some target species	Research on population structure and population parameters of target species within the DCF have been conducted in Madeira, such as *Patella aspera* (e.g., Sousa *et al*., 2017) and *Patella candei* (Henriques *et al*, 2011); *Trachurus picturatus* (e.g., Vasconcelos J. 2017, Vasconcelos *et al., 2018*) or *Scomber colias* (e.g., Vasconcelos *et al*, 2012), black scabbardfish (e.g., Delgado et al, 2018). List of references available in profile report (Annex 2). Stock-specific analysis for some species is undertaken in the laboratory.
Large pelagic migratory stocks assessed by ICCAT	Large pelagics are assessed by ICCAT, where Portugal is represented by national-based scientists using data collected at the national and regional level to produce the assessments for the relevant large pelagic species.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
Knowledge of marine ecosystem	Scientific projects such as BIOMETORE (http://biometore.ipma.pt/inicio/inicio) have acquired physical, chemical and biological data, in selected areas of the Autonomous Region of Madeira (ARM) that provided knowledge about the biodiversity, the species from the pelagic and benthonic ecosystems, and also about the human pressures in the area.
Marine Strategy Framework Directive is developing in collaboration with mainland	Assessment of the current environmental status of national marine waters and the environmental impact and socio-economic analysis of human activities in these waters. Establishment of a monitoring programme for the ongoing assessment and the regular update of targets, etc. https://www.dgrm.mm.gov.pt/en/web/guest/as-pem-diretiva-quadro-estrategia-marinha

Strength	Description and evidence
	Marine Strategy Framework Directive is developing in collaboration with mainland and other Macaronesia islands, examples of advances and collaboration with projects Mistic Seas I (https://mistic-seas.madeira.gov.pt/), II (https://mistic-seas.madeira.gov.pt/pt-pt/content/mistic-seas-ii), III (https://www.misticseas3.com/pt-pt)
Marine Spatial Planning	The Maritime Spatial Plan covers the entire national maritime space, from the baselines to the outer limit of the continental shelf, integrating inland maritime waters, the territorial sea, the exclusive economic zone and the continental shelf, including beyond 200 nautical miles. The Maritime Spatial Plan is an instrument for planning the national maritime space and constitutes an essential tool for the policy of the sea. The Plan identifies the spatial and temporal distribution of existing and potential uses and activities, also identifying areas relevant to nature conservation, biodiversity, the values corresponding to underwater cultural heritage and the networks and structures essential to national defense, internal security and civil protection. The Plan promotes compatibility between competing uses or activities, with a view to contributing to a better economic use of the marine environment and minimizing the impact of human activities on the marine environment. This plan is also the instrument that allows the attribution of a Permit of Private Use of the National Maritime Space. https://www.psoem.pt/ (Resolução do Conselho de Ministros n.º203-A/2019), https://www.dgrm.mm.gov.pt/en/web/guest/geoportal-mar-portugues; Example of projects : MISTIC SEA (I, II, III), iFADO, RAGES
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Knowledge of the gears and fishing activities operating	Information and studies are available of gears operating in Madeira (e.g., Santos *et al.*, 2019, Morato *et al.*, 2012, ORFISH, Tejerina *et al.*, 2019, Delgado *et al.*, 2018, Martínez-Escauriaza *et al.*, 2020a, 2020b,Pajuelo *et al.*, 2018, Sousa *et al.*, 2019, Vasconcelos *et al.*, 2018). List of references available in profile report (Annex 2).

Strength	Description and evidence
Main fishing activities are considered highly selective.	For example, the drifting deep-water longline is very specialized with a small amount of bycatch and discards (Morato *et al.*, 2012; Delgado *et al.*, 2018; MM, 2020).
Possibility of developing new fisheries	There is interest in developing a fishery targeting crustaceans, namely the Madeiran deep-water shrimp *Plesionika edwardsii* and the deep-water red crab *Chaceon affinis.* Studies show that this fishery can be very selective for the main target species (Pajuelo *et al.*, 2018)
No industrial fishery	There are no records of industrial fishery in this OR.
IUU fishing (estimates of illegal and unreported local overfishing).	
No IUU fishing products within ARM (pers. comm.)	To date, there are no records of this activity in OR waters or that in any way IUU fishing products have entered the commercial circuit in OR, which is why there is no information reported to the services in charge of stock assessment. If this happens, this information will be made available for management purposes (pers. comm.).
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
A divide of responsibilities on marine fisheries is established	Fisheries are under the responsibility of the regional government and also under the CFP. For transboundary species the RFMOs ICCAT and CECAF operate in coordination with the EU and the Member State government.
The fishing sector is organised at local and regional level	In Madeira the fishing sector is organised in Producer Organisations (POs). Fisheries organisations allow coordination and may facilitate cooperation with scientists in data collection. The fishing sector is represented in the South Western Waters Advisory Council (CC-Sud) by COOPESCAMADEIRA and thus its insights concerning data collection needs can be channelled to the EC.
Familiarity	People know each other (few people work in the area, can contribute to research projects and work in Governmental organizations; work in the same building, work in the area for long periods).
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	

Strength	Description and evidence
Examples of cooperative governance between administration, POs and other local stakeholders within the OR	There are studies and several projects dealing with Portuguese ORs governance issues that involves all the relevant stakeholders e.g., GPS AZORES, ORFISH, BEST, MarSP. MSFD cooperation between OR in Mystic Seas I, II and III.
Cooperation and communication and knowledge exchange between institutions (familiarity)	Most of the institutions are located in Funchal (capital of the OR).
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
Academia also contributes to the knowledge base in the region	Universities are beyond the DCF circuit but are making a substantial contribution to fisheries knowledge. There are a number of scientific studies that form the basis for local regional management measures and are candidates for newly proposed data collection requirements under the DCF.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
Coordination of data collection mainland-OR	Coordination between General Directorate of fisheries and the Regional Directorate regarding DC issues. ICCAT data coordinated with mainland (IPMA).
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
The main stocks of Madeira are represented to the regional bodies by IPMA scientist	ICCAT for tuna species.
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	

Strength	Description and evidence
The EMFF and the European Union's Cohesion Policy funds DCF is sustainable through the years	The DCF (EMFF) and the European Union's Cohesion Policy funds are undoubtedly the key instrument to ensure the continuity of financial resources.
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
There are managing, certifying, paying and audit authorities to improve control of EMFF funding	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
Other structural funds also offer funding for scientific purposes	The MAC programme, which belongs to INTERREG (funded by the European Regional Development Fund) has three 3 axes which could be relevant for data collection and fisheries management: research, environment conservation and institutional capacity enhancement. In addition, Pilot Actions funded by the EU like the project ORFISH make a substantial contribution to fisheries scientific knowledge in the ORs. Lots of financial resources are used for nature conservation and biodiversity studies provided by the regional authorities, and there is also a long and effective tradition in the use of financing from European programmes such as LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac are excellent demonstrations of cooperative projects involving Madeira, the Azores (Portugal) and the Canary Islands (Spain) (BEST project Regional ecosystem profile–Macaronesia Region. 2016).
Sustainability of funding (long-term to OR)	
The programme RIM through DCF is sustainable through the years EMFF and the European Union's Cohesion Policy funds	The DCF (EMFF) and the European Union's Cohesion Policy funds are undoubtedly the key instrument to ensure the continuity of financial resources.
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	

Strength	Description and evidence
Fishing sector is a contributor to data collection	In Portuguese ORs, the auctions are mandatory in all landing sites (distributed in all islands) and thus this brings an advantage of catch and census-like information.
It's not expected that the the new EU-MAP list of DCF species impact current data collection processes significantly	The competent authorities don't see the need to include additional species or data collection needs in the national workplan for this particular OR (pers. comm.).
Data collection network in landing sites	DCF is implemented by specialized personnel from DRM. Length sampling is made in landing sites along the islands of ARM. In Portuguese ORs, the auctions are mandatory in all landing sites and thus this brings an advantage of census-like first sales information (STECF, 2020).
Collection of biological data	There is collection of biological data for several species.
Collection of some socio-economic data	In Madeira OR, since the fishing fleet is small, economic and social data collection is done by census and data is archived is specific databases.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
Data compliance	ICCAT data collected and submitted. Data on small pelagic, *patellas* and *Sparisoma cretense* submitted to CECAF.
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
Standardisation of information (Database of auction-markets vs VMS/AMS info)	Pilot study in IPMA based on an innovative framework of combining species sales notes by commercial size category, the length and age composition of commercial sizes from onshore sampling and the fishing ground and fishing effort from vessel monitoring system records it is possible to obtain high resolution mapping of daily landings. This type of data is also available at the OR level.
Availability of new technologies to aid data collection	

Strength	Description and evidence
Difficulties in monitoring the small-scale fleet with scientific observers onboard	The use of new technologies could be a way forward to collect data in this type of fisheries/métiers. E.g., the use of AIS, real time monitoring of the fishing fleet.
Fishmetrics.pt	Remote length sampling at auction market to respond to isolated fishing ports.
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
Information from the academic and scientific institution is used in management	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Low levels of bycatch of endangered species (marine mammals, seabirds and turtles)	In general, accidental catches of marine birds and mammals was not identified as a major concern in the Macaronesia area. However, this may be a consequence of the lack of on-board observation programmes.
Selection of appropriate controls and measures at correct levels of coverage	
Protection of some coastal areas	Six regulated MPA´s. Three are the islands of Porto Santo, Desertas and Selvagens. Marine protected areas are managed by IFCN. Two artificial reefs were created in two protected areas. These are intended to increase the area of coastal habitat for several fish species and thus create a spillover effect for contiguous fishing areas. Some areas are also under NATURA 2000 sites. Unlike Portugal mainland, there is considerable work in Madeira identifying inshore and offshore areas of conservation interest.
Recreational marine fishing is described, well segmented, and regulated.	Recreational fishing is performed by both locals and tourists. All recreational activities are regulated. Fishing with or without boat is allowed. Recreational fishing is only permitted with the following fishing gear: handlines, shore angling, spearfishing, and with boat one can use lines and hooks.

Strength	Description and evidence
	Daily landings limits per person are set for some species; minimum landing size to protect immature individuals; allowed baits, protection of species highly seasonal in the area, specific species are prohibited. (https://joram.madeira.gov.pt/joram/1serie/Ano%20de%202016/ISerie-199-2016-11-14sup.pdf)
Fishing fleet has remained stable or even reduced due to management measures	The Madeiran fleet represent 5% of the Portuguese fishing fleet. The number of small-scale vessels of less than 12 m decreased by 7% between 2005 and 2016 without a concomitant significant increase in fishing power (7 kW on average in 2005 compared to 9 kW on average in 2016). The number of vessels greater than 12 m remained stable (48 unit in 2005 and 47 in 2016, with an average engine power slightly increasing from 228 kW in 2005 to 272 kW in 2016 (Policy Department B, 2017)). For example, from five purse seiners they reduced to three for management reasons.
Regulation on areas authorised for the practice of underwater spearfishing	There are several restrictions on the catch, area, species, and time.
Regulation of shellfish gathering/collection	There are several restrictions on the catch, area, species and time.
Regulation of Marine Reserves	Madeira has six regulated MPAs. In all marine protected areas of the RAM all types of fishing, even live bait fishing, are prohibited. All activities within the MPA's are regulated by specific Regional Portarias and Decretos.
Regulation for managing other activities related to fisheries: fishing tourism and marine tourism	Recreational fisheries are regulated at a regional level and apply to tourists also (lack of MCS weakness).
ORs enjoy exclusivity to fish under 100 nautical miles	Access to waters until 100 nautical miles can be restricted to fleets based on ORs, with some exceptions. This is not *per se* a management measure aimed at scientific purposes. But can bring advantages for data collection since scientific analysis would not require data from third parties.
Some LO exemptions are based on knowledge of species behaviour	The exemptions for OR´s are included in the Southwestern waters regulation COMMISSION DELEGATED REGULATION (EU) 2018/2033. De minimis exemptions for relevant species in OR´s are:

Strength	Description and evidence
	• mackerel caught with gillnets in ICES subareas 8, 9 and 10 and CECAF areas 34.1.1, 34.1.2, 34.2.0. • horse mackerel caught with gillnets in ICES subareas 8, 9 and 10 and Fishery Committee for the Eastern Central Atlantic (CECAF) areas 34.1.1, 34.1.2, 34.2.0.
No bottom trawling or trammel nets are allowed to fish in Madeira-Canaries and Azores below 200 m	Regulamento (CE) nº 1568/2005 do Conselho, de 20 de setembro de 2005.
Improved data collection and assessment may allow to implement TACs	TAC as a management tool can facilitate the allocation of resources amongst fleets and can help in the framework of the landing obligation. This may allow diverse means to compensate for quota surpasses. Thus, TACs are desirable tool for management. Improved data collection systems and thus enhanced assessment may allow to implement TACs gradually in the Macaronesia region.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
Regulation of fisheries agreements in the Macaronesia Region	Fisheries Agreement between Spain and Portugal for the small-scale fishing fleet in Madeira and the Canary Islands, done "ad referendum" in Porto on 9 May 2012. Spain - BOE
MCS in place according to EU	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
Knowledge for establishment of MCRS (MLS) have been conducted	There is not concrete evidence for MLS for Madeira.
Scientific bodies are prompt to translate science into regulation	There are many studies on the biology, ecosystem, economic impact and management measures that could be readily incorporated to the regulations
There are a number of scientific studies that form the basis for local regional management measures	Several published studies that have informed management.

Strength	Description and evidence
Data from MCS activities are available to inform management	Data are made available to the management of the fisheries sector in various types (reports, databases, technical information, etc.).
Management measures for limpets	As a consequence of the monitoring and evaluation of both exploited limpet species, several management measures were implemented as conservation measures and have prompted a positive effect.
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

There are gaps in knowledge for some important stocks in the region. This results in lack of a proper assessment of such stocks and effective management which may end in overfishing. Also, fisheries management does not always take into account the specific socio-economic characteristics of ORs. Since no regular scientific surveys and on-board observer programmes have been conducted it's not possible to assess the extent of discards and the by-catch of endangered species. Regional institutions report a lack of sufficient skilled staff for the implementation of the on-board observer programmes and for other DCF tasks which result in overload of work for the available staff. The fact that there are no coordination tools/platforms in place to facilitate communication amongst institutions, scientists and managers makes the process of sharing data more burdensome. So far, the work of NGO's is poorly related with fisheries issues and there is a limited involvement of producers in management. Despite the extensive oceanic area of the archipelago of Madeira, its oligotrophic waters predominantly restrict fishing activity to the Exclusive Economic Zone (EEZ). The predominantly deep and low productive waters in addition to the narrow continental shelf limits available habitats for coastal and demersal species and therefore fishing methods. Recreational and small-scale fisheries constitute a challenge for data collection and monitoring.

Table 2: Summary of Weaknesses Identified for Madeira

#	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities		
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation		
	Some resources lack stock assessment	For example, there is no knowledge on the status of the stock of swordfish *Xiphias gladius*. Dozens of demersal fish species are not assessed and regulated, although of high economic value, they represent a small individual weight in the commercial fishing of Madeira.
	No biological information is collected for some commercial important species	Specially for the fishing activity that directs its fishing to a wide diversity of species and for recreational fisheries, there is no collection of biological data. Examples of species: common dentex *Pagrus pagrus,* red snapper *Dentex gibbosus,* Seriola sp., *Sparisoma cretense*.
	Gaps in abundance of marine species, including species that are exploited by fisheries. No regular scientific surveys and on-board observers	No fishery independent data collection such as scientific surveys and no observers programme in place.

#	Weakness	Description and evidence
		Dozens of demersal fish species are not assessed and regulated, although of high economic value, they represent a small individual weight in the commercial fishing of Madeira (pers. comm.).
	Overfishing of topshells	
	The majority of stock boundaries unknown. Stock connectivity unknown in the region	Large migratory species occur in the area. Black scabbard fish connectivity with other Macaronesia archipelagos is unknown.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).		
	Potential catch is limited	Fisheries in Madeira are strongly conditioned by the geological and environmental characteristics of the islands, in particular their narrow insular platforms, steep incline of the slopes, and low productivity of its oligotrophic waters. These features impose severe limits on the available habitat for demersal species, the fishing methods that are practicable, and the abundance of resident fishes (Delgado, 2007). For this reason, the fisheries sector in Madeira is greatly dependent on the exploitation of a very small number of fish species, in particular deep-water species, large pelagic migratory fishes and small pelagic fishes.
	Gaps in oceanography, topography and mapping of habitats	BIOMETORE was an opportunity to collect data in this area but is the only case in recent years
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).		
	Gaps in knowledge of resource status and awareness may lead to overfishing	Even though several management measures (e.g., closed areas, TACs, and minimum landing sizes) have been implemented, indications of depletion or over-exploitation of some demersal fish populations highlight that there are still gaps in the knowledge base.
	No consistent and readily available baitfish catch data for the Madeiran pole and line fleet	Baitfish is normally captured by the tuna vessels with small purse seines or lift nets and consists of small pelagic fishes such as blue jack mackerels (*Trachurus picturatus*). However, there are no consistent and readily available baitfish catch data for the Madeiran pole and line fleet (Shon *et al.*, 2015).

#	Weakness	Description and evidence
	Lack of knowledge about some species/métiers	For example, swordfish (*Xiphias gladius*) are fished by licensed fishing gears but there is a lack of information about the stock, fishing effort, etc. There is also no information about squids and octopus.
	IUU fishing (estimates of illegal and unreported local overfishing).	
	Inability to quantify IUU uptakes, mainly in recreational fisheries	It is widely recognized that illegal, unreported and unregulated fishing is a common practice in spearfishing (Ramdeen *et al.*, 2013).
	2. Institutional structures	
	Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
	None identified	
	National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
	Coordination for fisheries management and data collection could be burdensome between EU and OR level	In the Macaronesia ORs the diverse layers of decision-making in fisheries management and data collection requires intensive coordination between the State, regional administrations, and scientific entities at state and international level. There are no common platforms between institutions.
	National competencies regarding DCFs are subject to changes	DCF implementation is the responsibility of the Regional Directorate of Sea (DRM) but was previously of the responsibility of Regional Directorate of Fisheries (DRP). Both belong to SRMar and under the umbrella of the Directorate General for Natural Resources, Safety and Maritime Services. Maybe within SRMar is only a matter of how they organize themselves.
	Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
	Data collection by universities is not structured	Data collection by universities is usually not structured in the function of the nature of the fisheries and do not necessarily result in management measures. Outputs are presented in the form of scientific articles, thesis (master, PhD, etc.) or project reports. However, those responsible for data collection in the OR do access the data.
	Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	

#	Weakness	Description and evidence
No simple way to obtain data		There are no coordination tools/platforms in place to facilitate communication amongst scientists and managers. There is no data sharing among institutions. It is only made available when formally requested.
Jurisdiction overlap		There is jurisdiction overlap across different RFMOs due to ICCAT oversees migratory resources in the Atlantic.
Lack of representation at the OR level		Only national scientists participate in ICCAT and CECAF, and the specificities of the OR are not included. There is no regional representation on the CECAF Working Groups.
Integration of participatory decision making into management structure where applicable		
Scarce coordination of managers and sector to organize the fishing activity		Some examples of cooperation are occasional and should be improved.
Clear MCS organisation and assessment of IUU fishing		
Lack of MCS in coastal fishing activities and protected areas		
No IUU estimates		It is widely recognised that IUU is a common practice in spearfishing.
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies		
Deficient participation in CECAF		No clear membership and representation to CECAF.
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection		
Experts needed		The currently existing infrastructures are found adequate although the staff (researchers and technicians) from several institution is still considered understaffed.
3. Funding and funding structures for data collection		
Availability, accessibility and utilisation of EMFF funding for data collection.		
Centralization and bureaucracy in the management of the EMFF Shortcomings of the accessibility and utilisation of EMFF		There is a need to create a fund for fisheries like the one that already exists for the agricultural sector. Although the EMFF already exists for the operational period 2014-2020, it is necessary to bear in mind that it ends in 2020 and the post-2020 review of this instrument will lead to the interruption of the allocation of support to the sector as has already happened previously.

#	Weakness	Description and evidence
		Shortcomings (delays, underutilization) of the EMFF, as in the case of the lack of financial support for support for fishermen in region between 2014 and 2016. More funding for data collection. The majority of funding is used (not always well) for ports and infrastructure. The difficulties faced in ORs regarding the EMFF implementation are, in particular, linked to the management of the EMFF, the low administrative capacity in ORs (as most of potential beneficiaries are small businesses) and the lack of adaptation of EMFF measures to the local context.
Management model of EMFF funds (e.g., managed regionally, centrally).		
Centralization and excess bureaucracy in the management of the EMFF for data collection.		There are quite a few institutions involved in the management of EMFF funding in Portugal mainland and the ORs (high administrative burden). The managing, certifying, paying and audit authorities are national-based and the regional local application, quality control, administrative validation of investments and measures using EMFF funding is performed by regional intermediate bodies. There is a need to simplify the support measures and instruments from the EMFF.
Opaque information at national and regional level		
Collaboration between organisations in OR and MS		
None identified		
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).		
None identified		
Sustainability of funding (long-term to OR)		
None identified		
4. Current state of data collection obligations		
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***		

#	Weakness	Description and evidence
No on-board observers programme		The main gap comes from the scarce information from fishery independent data. Currently the on-board observer program is not operational and for various administrative reasons has not been implemented. Although there is not a major concern associated with the accidental catch of marine mammals and birds, this could be because of the lack of on-board observer programmes.
No scientific survey		No scientific survey (absence of a research vessel).
Gaps in oceanography and habitats data		Gaps in data requirements are in oceanography, topography and mapping of habitats and abundance of marine species (fishery independent data), including species that are exploited by fisheries.
Recreational fisheries constitute a challenge for data collection		Recreational activities are increasing in the three regions and means to collect data seem insufficient to address these needs. For example, recreational data is collected in the framework of a pilot programme.
Data required for sustainability of stocks and fishing activity is only partially collected		Small scale fleet and recreational fisheries common in the area are difficult to assess.
Difficulties in monitoring the small-scale fleet		Most of the ORs vessels are small in size and this may lead to important limitations to the possibility of having onboard observers or REM to collect scientific data.
Effort by métier		Fishing effort by metier is not estimated. Auction market on-site questionnaires could be implemented.
Add data collection requirements		The collection of biological data in Madeira OR follows the DCF sampling methodology but additional data/species are proposed for some species, namely for the *Phorcus sauciatus*.
Compliance with data requirements and status of submission for RFMO / RFB data collection		
None identified		
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).		
None identified		

#	Weakness	Description and evidence
MCS data collection and IUU risk assessment / estimations to complete estimations of removals		
	Inability to quantify IUU uptakes	
	Increasing recreational fisheries	Recreational fisheries are difficult to control due to the enormous number of fishermen and the diverse modalities that take place. It imposes a challenge for data collection and MCS.
	Monitoring of marine protected areas	Not sufficient, although some monitoring and regulations restricting fishing activity was established under the project MONIZEC-ARP of the regional Government.
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)		
	VMS not always available	The small scale nature of the regional fleet hampers the utilization of VMS data
Availability of new technologies to aid data collection		
	None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management		
	Databases are shared on request.	To have access to National/Regional databases it is necessary to make a specific request. The process is not clear and may be denied.
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.		
	No comprehensive data collection for all species	What characterises the fisheries in the Outermost Regions, is the predominance of local fisheries of artisanal, subsistence or recreational nature. Many of the species that sustain those fisheries, e.g., small neritic tunas are not subject to comprehensive data collection under regular programs.
5. Fisheries management and conservation measures		
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).		
	Biased regulation	Madeira has limited demersal resources, therefore fishing activity and regulations are biased towards very few, high trophic level species, such as scabbardfishes and tunas. On the other hand, traditional food consumption patterns influence economic factors that limit the local utilization of small pelagic fish. This pattern of exploitation is not sustainable in

#	Weakness	Description and evidence
		the long term. Madeira should balance the exploitation of resources, better utilization of low trophic level species (e.g., Hermida and Delgado, 2016).
	Low levels of monitoring and enforcement	Limpets are exploited near the maximum sustainable yield and monitoring and enforcement should be accomplished to avoid future overexploitation.
	Micro management is needed	Fisheries management, especially at the European level, does not always take into account the specific socio-economic characteristics of ORs like Madeira. One of these specific cases is the current zero TAC imposed on the capture of deep-sea sharks in the region, not taking into account the dependence of some regions such as Câmara de Lobos on this resource and the fact that these selaceans are an inevitable bycatch of the black scabbardfish fishery which, although highly selective, catches these species.
Selection of appropriate controls and measures at correct levels of coverage		
	Some species need to be regulated	Conservation measures such as catch limits, minimum landing size and seasonal ban where proposed based on scientific studies and have to be introduced.
	Protection of endemic and vulnerable species	Need to establish minimum catch sizes and a ban on catches for the endemic and vulnerable species *Bodianus scrofa* and *Mycteroperca fusca*.
	Management measures and support from EMFF not available or with shortcomings (subsidies not in time)	There is a need to simplify the support measures and instruments from the EMFF to reduce fishing capacity. Despite the existence of support instruments to reduce the total fishing capacity of vessels in the OR, support for diversification of fishermen's professional activities, the lack of investment in professional training is a barrier to be taken into account. The need to create more incentives from EMFF for the adoption of fishing gears that is less damaging to stocks, such as reducing by-catches of unwanted species.

#	Weakness	Description and evidence
	Lack of scientific knowledge for Marine Reserve designs	Many financial resources are used for nature conservation and biodiversity studies provided by the regional authorities, and European programmes such as LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac. However, there is the need to redesign outdated conservation strategies by redefining the size, shape, and location of MPAs. This can be of extreme importance considering that the Azores, Madeira, and Canary Archipelagos contribute with the largest marine surface to the EU, which is vital for conservation and sustainable management policies (BEST project regional ecosystem profile– Macaronesia Region. 2016.).
	TACs are not used for all species	In Macaronesia TAC is only in use for BFT, BET and from 2020 for three billfish species. All these are ICCAT species. (STECF 2020; ICCAT). For *Trachurus* spp there is a precautionary TAC.
	Specific measures in the purse seine fleet for bycatch	Results from a project specific fisheries observation programme (2016-2017) suggest a need for the introduction of specific measures in the purse seine fleet to promote more effective utilisation of the resources. Following communication with DRM (pers. comm.), this fishery already presents some indicators that show the need to protect the respective stocks, one of the proposed measures is to introduce a seasonal ban to protect reproduction.
	Needed technical measures such as closures and establishment of minimum sizes are not applied	Management measures are useful and effective, in some cases technical measures such as closures and establishment of minimum sizes are not applied for some important fisheries in the region.
	IUU	Some illegal fishing (no licenses) in recreational fisheries either due to lack of knowledge that one should have a license, difficult to obtain a license, licenses are too expensive, etc.
	Inaccuracies in the fishing legislation	Inaccuracies in the new fishing legislation of recreational fishing such as the daily bag limits established for the stock control and designed to reduce fishing mortality of highly exploited species, because no studies in Madeira were performed to correctly allocate sustainable fishing quotas to each species. Moreover, the minimum landing sizes of many species of interest are smaller than the length at maturity thus compromising the reproduction of these species.

#	Weakness	Description and evidence
Big game fishing impact unknown		Evaluate the impact of big game fishing in the resources and socio economy of the OR.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).		
Monitoring		Monitoring is not enough to assure accomplishing with the management regulations e.g., there is no monitoring of topshell harvesting or of the new shrimp (*Plesionika* genus) fishery.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management		
No regional representation in ICCAT and CECAF scientific WG		Representation in ICCAT and CECAF scientific WGs could improve cooperation on data collection and approaches to management. Although there is no regional representation in ICCAT, IPMA scientists participate in the ICCAT working groups and in the assessment of the large migratory pelagic species.
ICCAT stock evaluation		ICCAT stock evaluation seems sufficient for the main five tuna stocks. It can be improved with abundance indexes but, alike other scientific bodies, such as ICES, these indexes are less available due to the strong dependency of tuna data on fisheries dependent data.
ICES WGDEEP does not assess the black scabbard fisheries in Madeira		ICES WGDEEP does not assess the black scabbard fisheries in Madeira. Nonetheless, it is admitted that the incorporation of CECAF data could provide a global perception of the whole dynamics of the stock. Regional relative stock indices (length-based indicators) for the CECAF Madeira waters are estimated in this Working Group.
Restriction of fishing opportunities within an OR to vessels from that OR only		
None identified		
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?		
Specific measures in the purse seine fleet for bycatch		Results from a project specific fisheries observation programme (2016-2017) not applied
Specific measures for topshells		The harvesting of topshells is not regulated (catch limits, MLS, seasonal ban where proposed based on scientific studies and have to be introduced).
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.		
None identified		

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As Opportunities are external, an Outermost Region cannot easily 'create' Opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any Opportunities that appear. For example, an Opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

Improvements in data collection include the further development of cooperation with third party countries and development of information technologies. Cooperation already exists between regional institutions but could be reinforced and common access to data resources could be implemented. Cooperation between all actors could be enhanced concerning the use of the funds allocated for data collection in the framework of the EMFF and other funds could be explored. There is also a potential for increased OR presence at ICCAT and CECAF meetings that would help to better represent OR priorities. Participation of the Macaronesia actors in international fisheries bodies allows realising needs for data collection on transboundary and highly migratory stocks. This provides opportunities for a more regional approach to data collection and Advisory Councils should be considered an Opportunity. Better data collection and management may allow further stock assessments to be conducted. TACs may be expanded to other resources and may lead to improved control and allocation of resources.

Table 3: Summary of Opportunities Identified for Madeira

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Climate change effects on stocks	There may be beneficial effects on current stocks or new stocks able to exploited.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	

Opportunities	Description and evidence
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
These are also good examples of coordination among OR´s in the Macaronesia (ORFISH – Macaronesia).	
New communication and information technologies	The standardisation of available VMS/AMS information and auction market databases could result in a significant improvement in management of large migratory species occurring in mainland and other OR.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
More articulation with other sea related activities (biotechnology)	Collaboration with the Research Centre in Biodiversity and Genetic Resources (CIBIO) in the Department of Biology of the University of the Azores produce high end research in blue biotechnology.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
Development of cooperation in the region in data collection	Research institutes in the diverse Macaronesia's ORs have been conducting research initiatives in the framework of projects funded by the EU for years. They also participate in working groups in DCF-Regional expert groups, STECF, diverse ICES working groups, ICCAT and CECAF. Thus, networking and cooperation is already in place even though steady funding for cooperation in data collection and management is not in place for these initiatives. It is noted that the DG MARE has recently launched a call for proposals for the elaboration of regional DCF work plans. This call is addressed to the different Regional Coordination Groups. There is scope for addressing a regional DCF workplan in Macaronesia. https://ec.europa.eu/fisheries/press/call-proposals-mare202008-strengthening-regional-cooperation-area-fisheries-data-collection_en Madeira has a tradition of participating in research projects involving the Azores and Canaries under Programs such as Interreg and Interreg MAC.
Integration of participatory decision making into management structure where applicable	
None identified	

Opportunities	Description and evidence
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
Regional representatives in scientific working groups relevant for the area	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
The EU legislation for the fisheries sector needs a revision in the field of simplification of measures and rules for the sector. It is divided in a vast number of regulations, which makes it difficult to fully application and interpretation	
The need to create more incentives for the adoption of fishing gears. The need to create more incentives for the adoption of fishing gear less harmful to the stocks as the case The need for more incentives to adopt fishing gear that is less damaging to stocks, such as reducing by-catches of unwanted species	
There is a need to simplify the support measures and instruments from the EMFF to reduce fishing capacity. Despite the existence of support instruments to reduce the total fishing capacity of vessels in the OR, aimed at reducing the effort of fishing activities, such as the case of support for diversification of fishermen's professional activities, the lack of investment in professional training is a barrier to be taken into account.	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	

Opportunities	Description and evidence
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
Structural funds other than EMFF provide opportunities for funding research initiatives	The MAC programme provides funding for initiatives at the level of Macaronesia, where also Western Africa countries and Cape Verde can cooperate with the ORs in research. Very few projects have been implemented for fisheries. Most of the projects concerning the marine environment are related to aquaculture.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
Use of drones to control marine protected areas	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
Standardisation of information (DB of auction-markets vs VMS/AMS info)	Pilot study in IPMA based on an innovative framework of combining species sales notes by commercial size category, the length and age composition of commercial sizes from onshore sampling and the fishing ground and fishing effort from vessel monitoring system records it is possible to obtain high resolution mapping of daily landings. This type of data is also available at the OR level.
Availability of new technologies to aid data collection	

Opportunities	Description and evidence
New technologies could be employed to facilitate observation on board of fishing activities.	REM technologies could be employed as a substitution of scientific observers' programmes which are difficult to implement in large fleets where very small vessels predominate, making these programmes technically complicated. Observer programmes are very useful to know and characterize the fleet activities, gears used for capturing each species, fishing areas, discards, etc.
Use of apps to collect data taking advantage of younger fisherman	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Create basic regulations for fisheries and their interpretation and transposition adapted to the regions concerned. This would allow for an approach to the fisheries sector which is more regionalised and therefore more specific. Within the framework of a decentralised vision of the fisheries sector, new regional ordinances and decrees would have the approval of the EU and they would directly influence any another EU Member State, which traditionally fished in the waters of the region	

Opportunities	Description and evidence
Selection of appropriate controls and measures at correct levels of coverage	
Improved data collection and assessment may allow to implement TACs	TAC as a management tool can facilitate the allocation of resources amongst fleets and can help in the framework of the landing obligation. This may allow diverse means to compensate for quota surpasses. Thus, TACs are desirable tool for management. In Macaronesia, the implementation of TACs is only in place for ICCAT's BFT, BET and billfish (from 2020). *Trachurus* spp will have a precautionary TAC to be established in 2020. Improved data collection systems and thus enhanced assessment may allow to implement TACs gradually in the Macaronesia region.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
Regional networking may allow a more holistic approach to data collection	Participation of the Macaronesia actors in international fisheries bodies allow realising needs for data collection on transboundary and highly migratory stocks. This provides opportunities for a more regional approach to regional data collection.
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

Despite the extensive oceanic area of the archipelago of Madeira, its oligotrophic waters predominantly restrict fishing activity to the EEZ area. The predominantly deep and low productive waters in addition to the narrow continental shelf limits available habitats for coastal and demersal species and therefore fishing methods. Other Threats for the fishing activity include factors that need a global or third parties action (e.g., climate change, IUU fishing from third countries). Global warming will probably have detrimental effects on the current exploited stocks. If these include the major source of income (e.g., tunas) this will have negative economic impacts.

Table 4: Summary of Threats Identified for Madeira

Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Reduction of catch opportunities	
Climate change effects on stocks	There may be detrimental effects on current stocks or new stocks may not be able to exploited.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
Climate change	There may be detrimental effects on current stocks or new stocks may not be able to exploited.
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	

Threat	Description and evidence
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	

Threat	Description and evidence
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
Increasing IUU fishing	Illegal practices impose a risk to the sustainability of professional fisheries and a risk to fishing resources. This requires a large MCS and compliance effort and monitoring at all levels of the value chain.
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Uneven application of the law across actors	Lack of application of laws to foreign fleets operating offshore due to a lack of control and monitoring.
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for Madeira. This goes further than a traditional SWOT analysis and looks to match individual strengths, weaknesses, opportunity and threats together to help identify recommendations that could be implemented to improve data collection in Madeira. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal Opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the Opportunity to be realised. An external Opportunity may occur when an external Threat (e.g., climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 5 Second level SWOT Analysis

	Strengths	**Weaknesses**
Opportunities	**"Natural Opportunities"** • None identified	**"Attractive Options"** • Utilise regional collaboration to improve knowledge on stock boundaries and shared stocks • Alternative funding to the EMFF could be identified to fill existing gaps in fisheries knowledge • The use of new technologies could be a way forward to collect data in this type of fisheries/métiers • Regional networking and representation may help to improve management of OR fisheries
Threats	**"Threats that can be defended"** • None identified	**"High Risk Scenarios"** • There may be detrimental effects on current stocks and new stocks may not be able to exploited potentially further reducing catch • Uneven application of law could result to issues amongst fishers

	Threats		Weakness
Opportunity	**"External Opportunities"** • None identified	Strength	**"Internal Opportunities"** • Current knowledge may provide information to support stock assessments (limited by presence at meetings) • There is the possibility of exploiting new fisheries which may help reduce pressure on stocks that are thought be subject to overfishing • Wider range of data collection and assessment • Most institutions are based in Funchal and so familiarity may help facilitate potential institutional changes or transitions in responsibility • Universities can provide valuable data to fisheries knowledge and help support management • Auction market on-site questionnaires could be implemented

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For Madeira, no 'Natural Opportunities' were identified.

Table 6: Summary of Strength and Opportunity Combinations Identified for Madeira

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many Threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For Madeira, no 'Threats that can be defended' were identified.

Table 7: Summary of Strength and Threat Combinations Identified for Madeira

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an Opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

In Madeira, there are several 'Attractive Options' that were identified where certain Opportunities could be exploited to combat internal Weaknesses. This includes using external funding to fill existing gaps in fisheries knowledge as well as developing regional collaboration to improve knowledge on stock boundaries and shared stocks. Where new technologies exist or are being developed, these could be used to improve data collection and facilitate observation on board the small-scale fleet.

Table 8: Summary of Weakness and Opportunity Combinations Identified for Madeira

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Potential catch is limited	Climate change effects on stocks	A change in stock distribution due to climate change may make some species more available.
•	The majority of stock boundaries unknown. Stock connectivity unknown in the region	Development of cooperation in the region in data collection	Utilise regional collaboration to improve knowledge on stock boundaries and shared stocks.
•	Gaps in abundance of marine species, including species that are exploited by fisheries. No regular scientific surveys and on-board observers	Structural funds other than EMFF provide opportunities for funding research initiatives	Funding could be identified to fill existing gaps in fisheries knowledge.
•	Gaps in oceanography, topography and mapping of habitats	Structural funds other than EMFF provide opportunities for funding research initiatives	Funding could be identified to fill existing gaps in oceanography, topography and habitat mapping.

#	Weakness	Opportunity	Description and evidence
•	Recreational fisheries constitute a challenge for data collection	Structural funds other than EMFF provide opportunities for funding research initiatives	Funding could be identified to fill existing gaps in recreational fisheries.
2. Institutional structures			
•	Coordination for fisheries management and data collection could be burdensome between EU and OR level	New communication and information technologies	Utilise communication platforms and technology to improve collaboration and communication between different levels.
•	Coordination for fisheries management and data collection could be burdensome between EU and OR level	To improve governance on the basis of networks between administration, POs and other local stakeholders	Opportunities to improve coordination through lessons learnt from previous studies and projects.
•	National competencies regarding DCFs are subject to changes	New communication and information technologies	New technologies could be used to support changes in responsibility to ensure that data collection is complete and timely.
•	No simple way to obtain data	New communication and information technologies	Coordination tools / platforms could facilitate communication and data sharing.
•	Lack of representation at the OR level	Development of cooperation in the region in data collection	Madeira participates in regional data collection and as such could attend RFMO / regional meetings to represent OR specificities.
•	Deficient participation in CECAF	Regional representatives in scientific working groups relevant for the area	Madeira should participate at the regional level to represent OR specificities.
3. Funding and funding structures for data collection			
•	Shortcomings of the accessibility and utilisation of EMFF	Structural funds other than EMFF provide opportunities for funding research initiatives	Other funds may be able to be exploited to support research and data collection

#	Weakness	Opportunity	Description and evidence
•	Centralization and excess bureaucracy in the management of the EMFF for data collection.	The EU legislation for the fisheries sector needs a revision in the field of simplification of measures and rules for the sector. It is divided in a vast number of regulations, which makes it difficult to apply and interpret.	EU legislation should be simplified to supports its uptake.
•	Opaque information at national and regional level in regards to funding	New communication and information technologies	Employ better communication tools to increase the transparency of funding opportunities.
4. Current state of data collection obligations			
•	Difficulties in monitoring the small-scale fleet with scientific observers onboard	New technologies could be employed to facilitate observation on board of fishing activities.	The use of new technologies could be a way forward to collect data in this type of fisheries/métiers. E.g., the use of AIS, real time monitoring of the fishing fleet
•	Data required for sustainability of stocks and fishing activity is only partially collected	Fishmetrics.pt	Remote length sampling at auction market to respond to isolated fishing ports
•	Data required for sustainability of stocks and fishing activity is only partially collected	Use of smartphone apps to collect data taking advantage of younger fisherman	Employ new technology to assist in data collection.
•	No on-board observer programme	New technologies could be employed to facilitate observation on board of fishing activities.	The use of new technologies could be a way forward to collect data in this type of fisheries/métiers. E.g., the use of AIS, real time monitoring of the fishing fleet
•	Monitoring of marine protected areas	Use of drones to control marine protected areas	Use of drone technology to assist in monitoring.
•	Inability to quantify IUU uptakes	Use of drones to control marine protected areas	Use of drones to help identify and quantify IUU in MPAs.
5. Fisheries management and conservation measures			

#	Weakness	Opportunity	Description and evidence
•	Management measures and support from EMFF not available or with shortcomings (subsidies not in time)	The need to create more incentives for the adoption of fishing gear less harmful to stocks.	There is a need to create more incentives from EMFF for the adoption of fishing gears that are less damaging to stocks, such as reducing bycatch of unwanted species.
•	TACs are not used for all species	Improved data collection and assessment may allow to implement TACs	TACs can be a desirable tool for management and support allocation of resources amongst fleets.
•	No regional representation in ICCAT and CECAF scientific WG	Regional networking may allow a more holistic approach to data collection	Regional networking and representation may help to improve management of OR fisheries.

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

In Madeira, 'High Risk Scenarios' identified include detrimental effect on current stocks due to climate change that may result in further reduction in potential catch. There is also a risk of increasing IUU contributing to stock overexploitation due to inabilities to quantify IUU.

Table 9: Summary of Weakness and Threat Combinations Identified for Madeira

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Potential catch is limited by geographic and environmental conditions	Climate change effects on stocks	There may be detrimental effects on current stocks and new stocks may not be able to exploited potentially further reducing catch.
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	Inability to quantify IUU uptakes	Increasing IUU fishing	Increasing IUU and no method to monitor level could lead to overexploitation of stocks.
5. Fisheries management and conservation measures			
•	Biased regulations	Uneven application of the law across actors	This could cause issues amongst actors in the fisheries sector.

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the Opportunity to be realised.

There are several existing Strengths in Madeira that were identified that could be used to help overcome internal Weaknesses. These 'Internal Opportunities' include using existing assessments for ICCAT to improve knowledge on fisheries and contribute to assessments. As most institutions are based in Funchal, familiarity may help facilitate potential institutional changes or transitions in responsibility and universities could help provide valuable data to fisheries knowledge. Other structural funds also exist that may be exploited to fill data gaps.

Table 10: Summary of Strength and Weakness Combinations Identified for Madeira

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Knowledge of population structure/parameters of some target species	Some resources lack stock assessment	Current knowledge may provide information to support stock assessments (limited by presence at meetings).
•	Large pelagic migratory stocks assessed by ICCAT	Some resources lack stock assessment	Wider range of data collection and assessment
•	Large pelagic migratory stocks assessed by ICCAT	Gaps in abundance of marine species, including species that are exploited by fisheries. No regular scientific surveys and on-board observers	Wider range of data collection and assessment
•	Knowledge of the gears and fishing activities operating	Gaps in knowledge of resource status and awareness may lead to overfishing	There is information available in Madeira to help determine which stock are being overfished.
•	Possibility of developing new fisheries	Gaps in knowledge of resource status and awareness may lead to overfishing	There is the possibility of exploiting new fisheries which may help reduce pressure on stocks that are thought be subject to overfishing.
•	Marine Spatial Planning	Gaps in oceanography, topography and mapping of habitats	MSP may help to provide information to fill gaps.

#	Strength	Weakness	Description and evidence
•	No IUU from third countries or IUU fishing products reported within RAM	Inability to quantify IUU uptakes, mainly in recreational fisheries	No IUU fishing reported from third countries means that efforts can be focussed on internal waters.
2. Institutional structures			
•	Examples of cooperative governance between administration, POs and other local stakeholders within the OR and between Macaronesia OR´s	Coordination for fisheries management and data collection could be burdensome between EU and OR level	Use existing examples of good cooperation to reduce burden.
•	Cooperation and communication and knowledge exchange between institutions (familiarity)	National competencies regarding DCFs are subject to change	Most institutions are based in Funchal and so familiarity may help facilitate potential institutional changes or transitions in responsibility.
•	Academia also contributes to the knowledge base in the region	Gaps in knowledge of resource status and awareness may lead to overfishing	Universities can provide valuable data to fisheries knowledge and help support management.
3. Funding and funding structures for data collection			
•	Other structural funds also offer funding for scientific purposes	Shortcomings of the accessibility and utilisation of EMFF	Alternative sources of funding are available to fill data gaps.
•	The programme RIM through DCF is sustainable through the years	Shortcomings of the accessibility and utilisation of EMFF	Although weaknesses are connected to EMFF, it is still thought to be a key instrument to ensure the continuity of financial resources.
4. Current state of data collection obligations			
•	Fishing sector is a contributor to data collection	Data required for sustainability of stocks and fishing activity is only partially collected	Auctions are mandatory at all landing sites and should be used to collect data for all fish landed.
•	Data collection at network of landing sites present in archipelago islands	Recreational fisheries constitute a challenge for data collection	Some recreational data are already collected at auction sites and should be further utilised and collected.

#	Strength	Weakness	Description and evidence
•	Data collection at network of landing sites present in archipelago islands	Effort by métier is not estimated	Auction market on-site questionnaires could be implemented
5. Fisheries management and conservation measures			
•	Regulation of Marine Reserves	Protection of endemic and vulnerable species is needed	Legislation is available to support the protection of endemic and vulnerable species.
•	Improved data collection and assessment may allow to implement TACs	TACs are not used for all species	TACs can be a valuable management tool when good catch data are available.
•	Recreational marine fishing is, described, well segmented, and regulated.	IUU fishing in the recreational fishery.	There is knowledge and a framework available to improve the management and monitoring of the recreational fishery.

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a threat to an Outermost Region could be climate change but an Opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For Madeira, no 'External Opportunities' were identified.

Table 11: Summary of Opportunities and Threats Combinations Identified for Madeira

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

Canary Islands

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Canary Islands SWOT Report

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Acronyms

Acronym	Definition
BET	Bigeye Tuna
BFT	Bluefin Tuna
BOE	Spanish Official Gazette (*Boletín Oficial del Estado*)
CECAF	Fishery Committee for the Eastern Central Atlantic
DCF	Data Collection Framework
EC	European Commission
EFF	The European Fisheries Fund
EMFF	European Maritime and Fisheries Fund
ERDF	The European Regional Development Fund
EUR	Euro
FAO	Food and Agriculture Organization
FMPs	Fisheries Management Plans
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IEO	Spanish Institute of Oceanography (*Instituto Español de Oceanografía*)
IMB	Intermediate Management Body
IUU	Illegal, Unreported and Unregulated fishing
LO	Landing Obligation
MAP	Multi-Annual Plan
MCRS	Minimum Conservation Reference Size
MCS	Monitoring, Control and Surveillance
MLS	Minimum Landing Size
MPA	Marine Protected Area
NGO	Non-Governmental Organisation
REM	Remote Electronic Monitoring
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SGP	General Secretariat of fisheries of Spain
SSF	Small Scale Fisheries
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch

Acronym	Definition
ULPG	University of Las Palmas de Gran Canaria
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (strengths and weaknesses) are those related to the system under evaluation; the external scope (opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e. EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities, and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities, and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for the Canary Islands, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

The Autonomous Community of the Canary Islands have more than 2 million inhabitants. The archipelago consists of eight islands with a total area of 7,943 km^2, and an Exclusive Economic Zone of 445,910 km^2.

In the Canary Islands, the 11 most commonly caught species are included in the EU-MAP, representing around 92% of the local landings. Three métiers (tuna, small pelagic fish and demersal species, respectively) are identified under the data collection framework and monitored within small scale fisheries (SSFs) in the Canary Islands' waters. The fisheries activity is characterised by the predominance of small-scale fishing activities. The fishing fleet comprises between 600-700 fishing vessels. It employs a large array of traditional fishing technologies and mostly operate under the "minor gear" licence category, which allow fishermen to use several gears in the same trip (e.g., traps and hooks). Thus, the high polyvalence mostly when it comes to catch tunas and demersal species is one of the characteristics of the regional fleet.

There are 38 landing sites scattered throughout the Canary Islands. According to official data, in 2019 landings in the Canary Islands by the regional fleet amounted to 11,300 tonnes, 84%, where pelagic species and 14% demersal species. There are catches by Spanish and third countries industrial vessels with port base in the Canary Islands which operates in African waters. These fish are landed in the Canary Islands to be processed and reexported (i.e., not consumed in the archipelago). Per capita fish supply has been estimated around 20.5 kg in 2019, see Country Profile (Annex 2). Total employment in the Canary Islands in the first trimester of 2021 was estimated as 804,138 workers. Fisheries and aquaculture employ 1,542 people in the first trimester of 2021, with the average number of workers being 1,620.

The institutional set up of fisheries in the Canary Islands consists of three levels of decision-making. The EU establishes management measures which are then applied in the external waters of the archipelago (waters where fisheries is the competence of Spanish state) by the government of Spain. In turn, fisheries management within Canary Islands waters' is the competence of the regional government.

Concerning fisheries data collection, it is structured according to the National Work Plan. Data collection obligations for the Canary Islands include length samplings (at market and at sea), as well as biological sampling of some target species (e.g.,, small pelagic fish). The EU-MAP establishes the minimum obligation to collect data for those species with catches higher than 200 tonnes per year (Commission Implementing Decision 2019/909). For the Canary Islands, these are parrotfish, sardine, mackerel, horse mackerel, sardinella, bluefin tuna, albacore, skipjack, bigeye tuna, yellowfin tuna and swordfish. Data collection activities are funded by the EMFF and administrated by the IEO.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for the Canary Islands

	Positive	Negative
Internal	**STRENGTHS** • Fleets and gears are characterised • Relevant data collection program (both at market and at sea) • Highly qualified scientific staff in IEO and academia • IEO is an Intermediate Management Body under EMFF and thus in capacity to manage own funding for research within the DCF and beyond • Other sources of funding are available such as INTERREG • Clear roles and competencies in fisheries at local, regional, and international level • Extended exclusive fishing zone (the first 100 nautical miles) for fishing activities of the Canary Islands' fleet • Professional fishing is thoroughly regulated with many technical measures e.g.,, trawling is forbidden • The fishing sector contributes with scientists in data collection process • Research and academia contribute with sound research on fisheries biology and socioeconomics • TACs are already in place for some ICCAT species • IEO has a research vessel that may allow successful acoustic surveys in the near future	**WEAKNESSES** • Large number of landing sites • Large fleet mostly artisanal and polyvalent • Mixed fisheries, large variety of gears and species targeted: difficult to obtain species-specific standardized fishing effort • First sales data difficult to collect accurately: misidentification of species at the first sale points • Biological samplings only in place in the west (Tenerife Island) • Weak awareness on sustainable practices leading to overfishing • IUU fishing is an acute problem • Recreational fisheries are increasing and are difficult to control and monitor • Scarce coordination of administration, scientists, and sector to organize the fishing activity • Management measures are poorly based on science • Some management measures are inconsistent with overarching sustainability goals • Lack of stock assessment for relevant small pelagic and demersal stocks • Coordination amongst regional actors involved in management and research is weak

	Positive	Negative
External	**OPPORTUNITIES** • Potential for an OR presence at ICCAT and CECAF meetings to increase representation. OR priorities would be much better included in this way • Structural funds other than EMFF offer good opportunities at regional and Macaronesia level • New technologies could be employed to facilitate observation on board of fishing activities • The new ORs AC may strengthen the voice of the Canary Islands and other OR fishing sectors before the EU • Improved data collection may allow increasing use of TAC as a management tool that facilitates control of catch uptakes • Implementation of methods from other areas where data-poor fisheries have improved their stocks assessment	**THREATS** • Oligotrophic waters • Climate change

3 SWOT Definition

The following four sections identify individual strengths, weaknesses, opportunities and threats identified for the Canary Islands.

3.1 Strengths

In the Canary Islands strengths are evident concerning the scientific background and expertise of the scientists and other technicians working in marine research, both at IEO and in the two universities ULPG and Universidad de La Laguna. The management framework both at regional and national levels is also robust in terms of staff and expertise. The scientific parties have characterised fisheries, even the recreational, and resources and the knowledge base for fisheries management is sound and comprehensive. There are clear division of responsibilities in terms of competences in interior waters and external waters. The fishing sector is well organised in fishing guilds and federations of guilds that are represented at national and EU level, for example in the Advisory Councils.

The data collection framework conducted by the IEO, and to lesser extent by the regional government, has been in place for many years and there is ongoing cooperation between IEO and the regional government. Onboard samplings are in place with collaboration from the sector. Within the data collection frameworks, IEO scientist comply with the requirements of the National Program of Basic Fisheries Data, including those having an international component such as CECAF and ICCAT where the regional scientists participate, and beyond EU-MAP in collection of additional data and participating in international EU funded projects. In the same way the role of the academia is relevant in data collection beyond the EU-MAP. IEO and the regional government cooperate in the collection of data in the multitude of landing sites, so cross-sectional data are also collected.

Funding is an important strength for data collection and fisheries research in general in the region. The EU-MAP activities are funded by the EMFF as well as in other ORs but the funds are directly administrated by the IEO which plays the role of an Intermediate Body in the framework of the national EMFF operational program. This role brings a great advantage for IEO to manage the data collection funding when it comes to comply with the EU-MAP requirements and other scientific purposes. Other source of funding is the Interreg's MAC program which is devoted to the Macaronesia region even including non-EU countries in the region such as Cape Verde. The regional government is also an Intermediate Body and receive EMFF and other funds to collect fishery data, (e.g. collection of first sale data) outside DCF.

Management in the region is very comprehensive and includes regional and national management measures. Biological knowledge of the resources has been incorporated into management measures such as the high survivability exemption in the framework of the Landing Obligation (LO), other measures aim to ban the use of nets that could have a negative impact on ground habitats and species such as trawling. Bilateral agreements are in place with Madeira to exploit stocks in each other's waters. An exclusive economic area of the first 100 nautical miles is in place for the activities of the regional fleet which allows better control since fleets from other countries and even from other regions in Spain need special permits to operate in those waters. Regulations are also in place for Marine Protected Areas and other means of biodiversity conservation to reduce the impact of fisheries on the environment.

Table 2: Summary of Strengths Identified for the Canary Islands

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Knowledge of population structure/parameters of some target species	Research on population structure and population parameters of target species within the DCF have been conducted in the Canary Islands, such as Patella spp (e.g., González-Lorenzo *et al.,* 2015); *Trachurus picturatus* (e.g., Jurado-Ruzafa *et al.,*) or *Scomber colias* (e.g., Medina-Alcaraz *et al.,*). There is also one new study on octopus (Quinteiro *et al.,* 2020).
Length sampling	Monthly length sampling of the whole catch, including discards, is conducted at sea in the purse seiner fleet (targeting small pelagics) and demersal fleet (targeting demersal species). Some stock-specific sampling of target species of demersal, small and large pelagic is also conducted by IEO at market in the main landing sites of the Canary Islands.
Biological sampling	Biological sampling (sex and maturity) of target small and large pelagic species is undertaken; from 2016, the collection of hard structures (otoliths) for age and growth of the Atlantic chub mackerel was included in DCF Work Plans. Growth structures has been collected for relevant tuna species in some periods (e.g., *Thunnus thynnus*) under specific projects funded by ICCAT.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
Knowledge of marine ecosystem.	Oceanographic characteristics of the Canary Islands and their marine ecosystem are available (E.g., Aristegui *et al.,* 2004; Vélez-Belchí 2018). Marine pollution is also studied (e.g., Uche-Soria and Rodríguez-Monroy 2019)
Marine Strategy Framework Directive is developing in the Canary Islands	Law 41/2010, of 29 December, on the Protection of the Marine Environment, transposes the Marine Strategy Framework Directive (2008/56/CE), with the objective of extending environmental protection to Spanish waters. The aim of this law is to achieve good environmental status in the marine environment, by means of planning tools known as marine strategies. Five strategies will be developed, one for each marine demarcation established in the law.

Strength	Description and evidence
	It studies the influence of fishing activities in the MPA of the Canary Islands. Description of the main communities, etc. See https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/estrategias-marinas/demarcacion-canaria/ . Additional published information e.g., Abramic *et al.*, 2020
Marine Spatial Planning is developing in the Canary Islands	There are projects working on the development of management plans of the marine space for the Canary Islands where fishing and aquaculture activities are considered. The Canary Strategy for Blue Economy is available at: https://www.gobiernodecanarias.org/cmsweb/export/sites/economia/galeria/Galeria_politica_economica_2/2021-07-ECEA_doc-completo-GobCan.pdf. Spatial distribution of fishing effort, as well as climate change, pollution and biodiversity are also of general interest in the Marine Spatial Planning. https://marsp.eu/ https://ecoaqua.ulpgc.es/en/tags/marine-spatial-planning
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
Improvement in the process of *métierization* of the artisanal fishery	A new process is taking place at IEO in assigning capture and effort to each *métier* due to the high polyvalence and opportunistic use of different gears during the trip (mostly affecting to the tuna and demersal métiers).
Knowledge of the gears and fishing activities operating	Studies have been conducted by Jimenez *et al.*, . (2013), Santamaría *et al.*, (2014) in the framework of GEPETO and also in the framework of ORFISH (EMFF funded project), amongst others.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	

Strength	Description and evidence
A clear division of responsibilities on marine fisheries is established	Fisheries in coastal (inland) waters are under the responsibility of the regional government of the Canary Islands. The coordination with the regional sector is also in hands of the regional government. Fishing in national waters, outside the inland waters is in charge of the State government, which implements and enforces the EU policies and transpose EU regulation into national regulations. In turn, management or transboundary and highly migratory stocks are in charge of ICCAT in coordination with the EU and State government. CECAF also plays a key role as an advisory body when it comes to scientific issues for stocks of regional interest (Macaronesia), IEO is in charge of most of the requirements and activities under EU-DCF. The team of IEO-Canary Islands works under the CECAF fisheries area of IEO.
The fishing sector is organised at local and regional level	In the Canary Islands the fishing sector is organised in Producer Organisations (POs), and also the so called *cofradías de Pescadores* (fishing guilds). Fisheries organisations allow coordination and may facilitate cooperation with scientists in data collection. Until 2020, the fishing sector was represented in the Southwestern Waters Advisory Council (CC-Sur) and currently is represented in the Advisory Council of the Outermost Regions (CC-RUP), and thus its insights concerning data collection needs can be channelled to the EC. There is an active process of data exchange between entities in the Canary Islands, and the data is employed in diverse working groups.
Insular governments collect data	The insular governments ("cabildos" in Spanish) of Gran Canaria and Tenerife islands also conduct data collection for local needs (outside of the DCF).
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
To improve governance on the basis of networks between administration, POs and other local stakeholders	There are studies on how to improve governance of artisanal fisheries in the Canary Islands (Corral and de Lara, 2017; Pascual-Fernandez *et al.*, 2017).
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	

Strength	Description and evidence
Academia also contributes to the knowledge base in the region and has a close relationship with IEO.	Even though universities are beyond the DCF circuit, these institutions and, in particular, their post graduate departments are making a substantial contribution to fisheries knowledge in the form of projects, papers and theses. Data on biological topics, fisheries and fleets, socioeconomic aspects and governance are contributed by the Universidad de Las Palmas and Universidad de La Laguna for the Canary Islands side. The latter specialises in socioeconomic aspects and governance of fisheries.
Fishing sector is collaborating with IEO in the observer program on board the artisanal fleets targeting small pelagic and demersal species	The program operates since 2015 in Tenerife Island (west province of the archipelago) and from early 2021 it has been extended to Gran Canaria Island (as representative of east province of the archipelago)
The Fishery Office of the regional government is preparing the creation of a Scientific Committee for the advice on the fishery management, with participation of research institutions like IEO and local universities, among other relevant stakeholders	Specific working groups will be created to analyse and discuss proposals, e.g., there is a working group already analysing several proposals from the fishing sector
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS	
There is a framework of collaboration between IEO and SGP (Fishing General Secretariat of the National Ministry)	*Ad hoc* meetings are in place to coordinate strategies related to relevant issues of assessment and management in the framework of RFMOs (e.g., in 2021 a meeting was in place before the CECAF working group of small pelagic stocks)
Regional cooperation with RFMOs and RFBs	IEO's scientists participate regularly in the relevant assessment working groups, and in the scientific committees of both ICCAT and CECAF, including the DCF Regional Coordination Group of Long Distance Fisheries. IEO staff also participate in the Joint Scientific Committees of the different SFPAs between the EU and some NW African coastal states.
Integration of participatory decision making into management structure where applicable	
The sector is conscious of the need for participatory decision-making	*Cofradías* (fishing guilds) in the Canary Islands recognise the need to be engaged in decision-making in order to address some of the most pressing issues such as overfishing and IUU fishing. The process to be tackled would involve managers, scientists, and the sector (Corral and Romero, 2017).
Clear MCS organisation and assessment of IUU fishing	
Sampling on board by scientific observers	Each month, a minimum of 3 trips are monitored by scientific observers in vessels representative of the activities in the main zones. Observers collect data on length frequency for all species caught (target and not target, as well as retained and discarded).

Strength	Description and evidence
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
The main stocks of the Canary Islands are presented to the regional bodies by IEO scientists	ICCAT for tuna species and CECAF for small pelagic and demersal species.
Participation of IEO specialist in the ICES Working groups of relevant species	Cephalopod and small pelagics Working Groups and Workshops of ICES
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Scientific staff and infrastructure	DCF team at IEO-Canary Islands with adequate facilities for fisheries research. A research vessel is able to implement acoustics surveys of small pelagics in the Canary Islands waters (Perales-Raya *et al.*, 2018).
Universities and other institutions and the Canary Government	Institutions have, in general, good knowledge and staff capacity to support data collection
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
MAPs are developed in Spain according to DCF directives since early 2000s, and included marine resources of the Canary Islands	Only tuna resources in the first stages, until 2013 that started a metier for small pelagic in the Canary Islands.
EMFF as funding DCF activities	The métiers included under DCF from 2013 (small pelagics) and from 2015 (demersal species) are a good baseline of consistent and long-time EU funding for data collection of artisanal fisheries. Notice that this is funding administrated by the IEO and has not relation with the funding allocated to the regional government (see below).
EMFF available to the Canary Islands.	As of January 2019, the Canary Islands was allocated around EUR 83 million from the EMFF. Out of this figure, 72 % of the resources are devoted to the financial compensation for the conditions of insularity and remoteness of this region, which is granted to fishing and aquaculture operators.
Management model of EMFF funds (e.g., managed regionally, centrally).	
IEO is an Intermediate Management Body (IMB) in the framework of the Spanish EMFF's Operating Programme (EU-MAP)	The role of IEO as an IMB simplifies and speeds up the administrative process of accessing to funds for complying with its specific responsibilities under the DCF (FEMP Operational Programme 2014-2020 for Spain adopted in 2015, available at: https://ec.europa.eu/oceans-and-fisheries/funding/emff-operational-programmes-2014-2020_en).
There are some EMFF-funded projects that are being developed by the Regional Government	Currently (2021) the regional government is developing some EMFF-funded under Union Priority 3, mostly for fisheries control (e.g., related to recreational fishing, green boxes for tracking fishing activity, the development of

Strength	Description and evidence
	software for traceability and first sale improvement, etc.)
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
Other structural funds also offer funding for scientific purposes	The MAC programme, which belongs to INTERREG (funded by the European Regional Development Fund) has three 3 axes which could be relevant for data collection and fisheries management: research, environment conservation and institutional capacity enhancement. . In the Canary Islands, European projects (e.g., ISLAPILOTO, GEPETO) the scientific monitoring of fishery activities in the Canary MPAs (co-funded by local-national governments), as well as some national projects funded by Spanish Government (e.g., CONAFRICA), or co-financed by the ERDF and local and national governments (e.g., OMARCOST) and contributed to this knowledge. Lots of financial resources are used for nature conservation and biodiversity studies provided by the regional authorities, and there is also a long and effective tradition in the use of financing from European programmes such as LIFE, INTERREG and MAC. INTERREG IIIB and PCT-Mac are excellent demonstrations of cooperative projects involving Madeira, the Azores (Portugal) and the Canary Islands (Spain) (BEST project Regional ecosystem profile–Macaronesia Region, and Horizon 2020 project forward: https://ec.europa.eu/programmes/horizon2020/en/news/forward-%E2%80%93-unlocking-research-innovation-potential-eu%E2%80%99s-outermost-regions).
Sustainability of funding (long-term to OR)	
The EMFF is sustainable through the years	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Collection of hard structures for age studies	Collection of hard structures (otolith/spines) for age studies of several target species is conducted (e.g., otolith of *Scomber colias* under DCF, otolith of Thunnus thynnus and spines of *Thunnus alalunga* under ICCAT programmes).

Strength	Description and evidence
Concurrent length sampling at sea by scientific- observers onboard programme	Scientific observer programmes have been in place since 2017 for small pelagics and 2015 for demersal species (Perales-Raya *et al.*, 2018). They collect length data of retained and discarded catches for these fleets on a monthly basis (concurrent with sampling at sea under DCF obligations). Some tagging campaigns are also carried out for tuna (under specific ICCAT programmes/projects)
Good observer programme for small scale fleets	In recent years, the Canary Islands has achieved considerable progress in the collection of information from small scale fleets, by establishing a programme of observers on board in Tenerife Island. This was extended to Gran Canaria Island in 2021. The at-sea sampling scheme examines the retained and discarded catch.
Stock specific length sampling in the main landing sites	The sampling network of IEO (*Red de Información y Muestreo* – RIM) is in charge of the length samplings at market (high number of primary landing sites in the Canary Islands), providing stock specific length sampling of the main commercial species for DCF obligations (small and large pelagics). For demersal species, the parrotfish (*Sparisoma cretense*) is the most caught species. Its catches do not always reach 200 tonnes per year but it is selected for length sampling under DCF as required stock
Data collection for locally important species not required by DCF	Additional length sampling at market is also collected by the RIM for other relevant commercial species that are not required stocks under the DCF (catches lower than 200 tonnes), e.g., *Pagrus* spp., *Dentex* spp., *Beryx* spp., *Muraenidae*, *Serranidae*, *Seriola* spp.
Biological sampling of main target species	Small pelagics are sampled monthly in the lab to collect length-weight and reproductive data. Several samplings are also performed in target tuna species
Scientific surveys are carried out in the Canary Islands	Since 2016, the IEO has carried out several pilot surveys to stablish the methodology applicable in the Canary Islands to the stock assessment of small pelagic species
Compliance with data requirements and status of submission for RFMO / RFB data collection	
Data requirements and their submission are ok	ICCAT, CECAF, ICES
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	

Strength	Description and evidence
Advice requested by national/regional bodies	Outside DCF, satisfactory compliance with specific advice requested from National/Regional/Local institutions (IEO-Canary Islands, Regional Universities)
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
MCS improvements in course by the Canary Islands Government	Some control measures are being updated and improved under EMFF projects developed in the Regional Government (e.g., measures of effort control in the recreative fishing, prevention of incidental by-catch of marine mammals and sharks, catch recording in the commercial and tourism fishing, census of licensed vessels). At National level there is also a new proposal for the development of recreative fishing in exterior waters (https://www.mapa.gob.es/es/pesca/participacion-publica/pproyecto%20pesca%20recreativa%202021.aspx)
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
Data collection network in landing sites	In the Canary Islands, IEO has good coverage thanks to its data collection network in most landing sites (STECF, 2020). Landing data (first sale notes) are collected by the Regional Government from the main first-sale sites of the Canary Islands
Fishing sector is a key contributor to data collection	The Canary Islands fishing fleet cooperates with the programme of scientific observers onboard (Perales-Raya *et al.*, 2018)
Availability of new technologies to aid data collection	
The Regional Government is developing some new softwares and electronic control elements to aid data collection	Softwares for registering the licensed recreational vessels (census), the traceability of marine products, the activity of touristic fishing (*Pescaturismo*), captures from commercial fishing and fishgemen's guilds. A new software is also under development to control the electronic beacon tags of passive gears. Improvement of the current software to register the artisanal fishing vessels. The developing of green boxes and electronic beacon tags as vessel monitoring system for small boats.
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
Academia data collection outside DCF	The local universities (mostly the University of Las Palmas de Gran Canaria) collect biological-fishery data under specific projects and thesis carried out in some periods. They also perform analysis of landing and biological data collected during the execution of their projects.
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	

Strength	Description and evidence
Tuna species have stock assessment under ICCAT	Ability to collect length and biological data to provide and participate in the ICCAT assessments
Progress from universities and research realm. Knowledge to support a future stock assessment	Having independent research ongoing would always been considered advantageous
A multimodel approach has been carried out for small pelagic and presented at 2021 CECAF WG of FAO	Trying different modelling approaches which are being taking forward to RFMO to advance stock assessments
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
ORs enjoy exclusivity to fish under the first 100 nautical miles	Access to waters until the first 100 nautical miles can be restricted to fleets based on ORs, with some exceptions. This is not *per se* a management measure aimed at scientific purposes. But can bring advantages for data collection since scientific analysis would not require data from third parties
Highly regulated fisheries in internal waters. Revision of management is subjected to scientific knowledge	Minimum conservation sizes for fish caught in internal maritime waters were established in Decreto 155/1986. This law includes minimum sizes for a number of commercially important species (parrotfish, several *sparidae* species, red mullet, tropical tuna, mackerel, and horse mackerel). The Decree 182/2004 of 21 December (BOC 4 of 7 January 2005) describes the fishing gear allowed in internal waters and establishes technical measures such as traps for moray eels, regulating dimensions and fishing effort which is set at 25 traps/boat to be deployed from 5 m deep. and maximum number of traps per boat. In Gran Canaria, however, 75 drums/boat were allowed for a period of first 5 years of the regulation, and then reduced to 60 during the following 5 years. The Gran Canaria Government is empowered to forbid the use of the traps if assessments outsourced to experts indicate negative effects on the resource. It seems that other studies have also been commissioned to estimate the effect of gillnets in other fisheries. In contrast, the regulation forbids use of traps in the inner waters of Fuerteventura.
Protection of some coastal areas	Article 12 of the Law on Fisheries of the Canary Islands (Law 17/2003), (Order of 26 March 1998). An example is provided by the Bay of Santa Agueda off the coast of Arguineguín where there are artificial reefs.

Strength	Description and evidence
Recreational marine fishing is described, well segmented, and regulated	Fishing with a boat, from shore, and submarine fishing are categorised. Fishing with a troll from a boat is called "high-sea fishing" (Licence 1). Recreational spearfishing (Licence 2). Any of these types of sport/recreational fishing requires the corresponding licence. Regulated by the Canarian Fishing Law (17/2003, Title II) and amended by Law 15/2019. Decree 182/2004 (Regulations of the Fisheries Act regulates recreational fishing licences.
Regulation on areas authorised for the practice of underwater spearfishing in the internal waters of the Canary Islands	Order of 30 October 1986, which is complemented with the Order of 29 October 2007 and, in turn, modified by the Order of 3 July 2008.
Regulation of shellfish gathering/collection on foot of some species of seafood from the Canary Islands (some issues in Fuerteventura)	ORDER of 2 May 2011.
Regulation of Marine Reserves of Fishing Interest in Spain	La Graciosa e Islotes al Norte de Lanzarote (1995) Punta de La Restinga–Mar de Las Calmas (1996) La Palma (2001) (La pesca artesanal y la conservación de la biodiversidad: avances en la gestión integrada de la pesca y el medio ambiente en el mar de Canary Islands. Pablo Martín-Sosa, 2017).
Extension to regulation for managing other activities related to fisheries: fishing tourism, aquaculture tourism and marine tourism	To regulate, within the scope of the competences of the Autonomous Community of the Canary Islands, the activities of fishing tourism, aquaculture tourism and marine tourism, as complementary activities to the fishing sector. These activities are secondary or subordinate to the corresponding main activity of the fishing sector. Law 15/2019, of 2 May, amending Law 17/2003, of 10 April, on Fisheries in the Canary Islands.
Some LO exemptions are based on knowledge of species behaviour	In the artisanal purse seiners of the Canary Islands, small individuals of pelagic species could be liberated before the gear is on board, according with the exemption of the landing obligation applicable, due to the survival capacities of the species in purse seiner fisheries of European southern waters (Regulation UE 1394/2014, Article 2).
Regulation of fisheries agreements in the Macaronesia Region	Fisheries Agreement between the Kingdom of Spain and the Portuguese Republic for the small-scale fishing fleet in Madeira and the Canary Islands, done "ad referendum" in Porto on 9 May 2012. Spain – BOE.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	

Strength	Description and evidence
MCS is in place according obligations of EU	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
In 2020, the Fishery Office of the regional government created a working group for the management of the fishery resources, with participation of research institutions like IEO and local universities.	The main goal of this working group will be to analyse and discuss proposals from the fishing sector in the Canary Islands.
Restriction of fishing opportunities within an OR to vessels from that OR only	
TACs for tuna	There are TACs stablishing fishing opportunities of some tuna species that affect the canary fleet. In particular *Tunnus thynnus* has allocated quotas exclusively for artisanal vessels from the Canary Islands.
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
Knowledge for establishment of MCRS (MLS) have been conducted	Studies have been conducted on minimum catch sizes for fish, crustaceans and molluscs of fisheries interest based on science (González Pérez, J.A. *et al.*, 2009).
Scientific bodies are prompt to translate science into regulation	There are many studies on the biology, ecosystem, economic impact and management measures that could be readily incorporated to the regulations
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.2 Weaknesses

Fisheries in the region present a number of weaknesses which in many cases are the results of factors such as the difficult geography and the complex nature of the fishing activity that have evolved to the mirror the peculiarities of the region. The archipelago is of volcanic origin thus the continental shelf is narrow and the large biodiversity concentrates near shore, while the high depths predominate in the rest of interior and exterior waters. That is not surprising that small scale activities predominate in the region. The large number of species targeted by the regional fleet require a large number of fishing technologies, hence the fleet is polyvalent. This fact increases the complexity of data collection and management. There is evidence that overfishing has been identified as one of the main problems in the region.

The particular characteristics of the islands (e.g., narrow continental shelf) impose a challenge for scientists on stock identification since this physical feature separates populations due to the great depths, thus stock boundaries remain unknown as of today. There is a lack of historical biological data for some resources such as small pelagics and in other cases, biological data is not collected at all. Thus, this lack of data impedes stock assessment in the region. Onboard sampling is conducted only in the west (Tenerife Island) due to staff and funding limitations, although progress is being made for extending the program to the east (Gran Canaria Island). Sampling on landing sites is also difficult due to the numerous landing sites that exist in the archipelago. Most of them are also First Sale Sites where landings are registered, since the auction system of continental Spain is not present in the Canary Islands, One of the main problems detected is accurate species identification at the First Sale Sites.

One of the main weaknesses is the inability of the regional government to control the expansion of the recreational fishing activity and the lack of data from those fisheries. A recent development on recreational fisheries is being prepared at National level[1]. Control of IUU fishing is also a problem due to the obvious lack of data that can be collected from these activities and of the overfishing this may generate, provoking a negative impact on the resources as well as an unfair competition for professional fishermen. Some management measures, in particular in interior waters, seem not to be consistent with the physical features and particular characteristics of the fishing activities in the archipelago e.g., regulation on traps. Management of Fisheries Marine reserves is not currently supported by any monitoring program.

[1] (https://www.mapa.gob.es/es/pesca/participacion-publica/pproyecto%20pesca%20recreativa%202021.aspx).

Table 3: Summary of Weaknesses Identified for the Canary Islands.

Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Unknown stock boundaries and state of exploited resources: from the fishing point of view, each island has individual fish stocks, particularly because these are separated by great depths and their respective island platforms are independent (Lanzarote and Fuerteventura are an exception).	The Canary Islands have a high geographical and environmental diversity according to their distance from the African continent, which results in significant differences in the structure of the island's marine ecosystems, particularly in their biodiversity (Brito *et al.*, 1996). The same species may present different biological characteristics depending on the environmental characteristics of each island (the temperature difference between the eastern and western islands is more than 5 ºC) (La Violette, 1974; Ramos, 1992). This has to be translated into differences in metabolic rates (Schmidt-Nielsen, 1990), growth rates, reproductive periods, fertility rates, longevity and, therefore, in the relative abundant among species (Castro *et al.*, 2000; Fazeres-Malheiro, 2007). Although there could be a certain genetic flow between the fish populations that inhabit the different islands (Castro *et al.*, 2000; Rodríguez *et al.*, 1999), from the fishing point of view, each island has individual fish stocks, more so when these are separated by great depths and their respective island platforms are independent (Lanzarote and Fuerteventura are an exception).
Overfishing has been identified	According to García-Cabrera (1970) the fishing grounds of all the islands with depths less than 100 m were overfished. González (2008) confirmed that this phenomenon had spread to all fishing grounds and the entire range of depths at which the artisanal fleet operate.
Polyvalent fishing	This can make stock assessment difficult as effort cannot be standardised easily.
Gaps in knowledge of resource status and awareness may lead to overfishing	In the Canary Islands, the *cofradías* lack information on stocks status. This situation may lead to overfishing. Besides, this awareness and education on the impact of fishing on the environment is needed. There is a lack of communication amongst stakeholders and lack of a sense of community. *Cofradías* demand more collaboration and coordination to exchange information and address other needs such as oversight of areas to prevent IUU fishing. The latter in coordination with authorities (Corral and Romero, 2017).

Weakness	Description and evidence
There are key resources that lack stock assessment	Annual data (catch, effort, length, biology from 2013) of small pelagics of the Canary Islands are provided by IEO-Canary Islands to FAO/CECAF working group of assessment of small pelagics but up to date, the current time series of data are still not sufficient to assess the state of these stocks and any shortfalls have been identified in the available data. The multi-model approach performed in the IEO-Canary Islands in 2021 resulted inconclusive and quantitative scientific advice in terms of catch and effort limits are not feasible.
Complex *métierization* of the artisanal fishery	Difficulties in assigning the capture and effort of to each *métier* due to the high polyvalence and opportunistic use of different gears during the trip (mostly affecting to the tuna and demersal *métiers*).
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
Aquaculture	Escapes from aquaculture farms i.e., seabream and sea drum negative effects on native fauna (Toledo-Guedes *et al.*, 2014.)
Oligotrophic waters and fragile balance of ecosystems	Oligotrophic waters and fragile balance of ecosystems (high biodiversity and variety of marine resources, but relatively low abundance of each species). In particular, the demersal fleet catch and retain a high number of commercial species.
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
First sale data difficult to collect accurately	This can lead to the misidentification of species.
Recreational fisheries are increasing and are difficult to control and monitor	
IUU fishing (estimates of illegal and unreported local overfishing).	
IUU fishing present and unquantified	Mostly Illegal (e.g., recreative fishing selling the captures, recreative fishing with no license or capturing more than permitted), and Unreported (e.g., professional fishermen not reporting some catches as they are sold before landing and not registered in the first sale points).
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	

Weakness	Description and evidence
Coordination for fisheries management and data collection could be burdensome	In the Macaronesia ORs the diverse layers of decision-making in fisheries management and data collection requires intensive coordination between the State, regional administrations, and scientific entities at state and international level.
Scarce coordination of administration, scientists, and sector to organize the fishing activity	The fishery management and regulation process in the Canary Islands has not generally considered the available scientific-technical information (ORFISH, 2015).
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
Data collected beyond official channel are not part of regular sampling programmes	Other entities (e.g., universities) collect data for marine and fisheries research. These are not part of regular sampling programs and usually respond to data needs of research projects. Insular governments in the Canary Islands (e.g., Gran Canaria, Tenerife) conduct some activities for the collection of data for purposes of management of littoral resources and local fisheries. The link between academia, local governments and others for funding, storage and accessibility of their data is, at this stage, unclear and poorly documented.
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
There is evidence that IUU fishing is taking place in the region	Illegal fishing is thought to be high in the region but deterring these activities seems necessary, which may require to reinforce the control systems and the legal framework to persuade furtive fishers to conduct prohibited activities.
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
IEO in charge of DCF collect data but there are sometimes difficulties in finding the time to analyse them	Due to lack of staff with knowledge/time to do it.
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
EMFF funding for data collection not fully employed	As of 2019, the EMFF (UP3) funding not related to the DCF had not been employed by the regional government in the current EMFF's operational program (2014-2020).

Weakness	Description and evidence
	These funds have not been employed since there have not been opportunities to establish cooperation with IEO concerning the use of these funds in data collection. According to regional authorities, it could be useful to establish cooperation with IEO to use these funds. One of the opportunities is to employ these funds to enhance the capabilities of fishing guilds in the landing sites for first sales data collection.
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
Limited funding for collaboration between General Fisheries Secretariat and IEO	In relation to the control and monitoring of Marine Reserves, collaboration ended in 2012 and it has not been resumed due to lack of funding (Martín-Sosa, 2017).
Lack of comprehensive collaboration between IEO and the regional government	This may undermine efforts in data collection and scientific process, particularly when it comes to collect data at landing sites and management of species in interior waters.
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Difficulties in monitoring the small-scale fleet with scientific observers onboard	Most of the ORs vessels are small in size and this leads to important limitations to the embarkment of onboard observers to collect scientific data in all the islands (which have significant differences among them). The observer programme is currently operating in the main islands i.e. Tenerife and Gran Canaria as representatives of the west and east part of the archipelago respectively. Limited information of discards.
Recreational fisheries constitute a challenge for data collection	Recreational activities are increasing in the Canary Islands and means to collect data seem insufficient to address these needs.
Recreational fisheries constitute a challenge for data collection	Landings by species are not recorded for the recreational fishery.

Weakness	Description and evidence
Data required for sustainability of stocks and fishing activity is partially collected	The fishing-trip duration for small pelagics and demersal species is 1 day. Catch data by fishing day are collected in first sale notes. Every year IEO performs the *metierization* of trips, so there are estimations of total capture and effort by métier. However, the fishing effort by species is complicated as they are mixed fisheries and fishing effort is usually not directed at a species, but to a group of them (in both métiers, demersal and small pelagics). The artisanal fleet is multigear, polyvalent and multispecific, often using several gears in the same fishing trip (day), because they are allowed to alternate gears in the same day. There are different gears catching the same species and same gears targeting and catching different species. The standardized effort by species and the accurate data collection of recreational activities are major issues to be solved (Recreational fisheries is about 40% of total catches, reaching 70 % in some islands) (MAPyA, 2006, Jiménez-Alvarado, 2016; Pascual-Fernández *et al.*, 2012).
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
Large number of landing sites	Due to the topological features of the Canary Islands archipelago, there are lots of small landing points which imposes problems to data collection due to the difficulties to have personnel to collect data in all landing sites (STECF 2020).
Species and geographical limitations	In the Canary Islands, length sampling is conducted at sea and at port. Biological sampling is limited to small pelagics due to staff limitations. This is conducted only in the western side of the archipelago (Tenerife only) (STECF, 2020). Monthly collection of samples from other islands is very complicated, but Tenerife is the most important Island in terms of landings of small pelagic target species (81% of the total landed in the Canary Islands in 2019).
Inability to quantify IUU uptakes	IUU fishing is present in the three archipelagos and thus constitute a source of fishing mortality not accounted under the DCF.

Weakness	Description and evidence
Increasing IUU fishing	Illegal practices impose a risk to the sustainability of commercial fisheries and a risk to fishing resources. This requires a large MCS and compliance effort and monitoring across the fishery at all levels of the value chain which may not be under the full control of the OR, the MS or the EU.
Increasing recreational fisheries	Recreational fisheries are difficult to control due to the enormous number of fishermen and the diverse modalities that take place. It imposes a challenge for data collection and MCS.
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
Difficulties in collecting first sales data	First sales in the Canary Islands differs from those conducted in continental Spain, where the auction is the predominant system. First sales are administrated by cofradías but they lack resources to have effective first sales registration in all landing sites. Besides this, buyers do not need to attend the landing sites to buy the fish (like in the auctions in continental Spain) since, in many cases, fish is already compromised due to private agreements. This may lead to problems in the declaration of first sales prices (Boza-Vindel, 2015). Another problem is the misidentification of species. The personnel that collect data at places of first sale are not always able to correctly identify the species and requires training.
Availability of new technologies to aid data collection	
Monitoring system as VMS is not in place for the small boats, the majority of SSF fleet in the Canary Islands	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Large and complex body of legislation	This causes problems in its applicability for the Canary Islands fisheries (internal waters, external waters, and international waters).

Weakness	Description and evidence
Contradictions in regulation and arbitrariness that reduces legitimacy before the administered	Decree 182/2004 on the regulation of authorised fishing gear includes different considerations for traps so minimum depth of draught is 18 m in general, although in Tenerife in particular it is 12 m. There are no known ecological, biological, or geomorphological reasons for this distinction except fishing sector pressure (Barrera-Luján, 2011).
Contradictions in regulation: recreational fisheries are considered to overcome professional fisheries in some islands and are paradoxically poorly monitored	The considerable increase in fishing effort on the resources of the coastal areas has been aggravated by the intense development of recreational fishing. In spite of recognizing the importance, no mechanisms are established to evaluate the impact of recreational fishing through an obligatory declaration of catches (Barrera Luján, 2011)
Selection of appropriate controls and measures at correct levels of coverage	
TACs are only in use for large pelagics	In Macaronesia TAC is only in use for BFT, BET and from 2020 for three billfish species. All these are ICCAT species. (STECF 2020; ICCAT).
Management measures not fit for purpose	The Government of the Canary Islands favoured a notable increase in fishing effort (e.g., 75 pots per boat for the Gran Canarias's moray eel fishery) which is not consistent with the general spirit of the fisheries act (Couce, 2010).
Management measure not fit to funding programmes (EFF and EMFF) in relation to remodelling the fleet	There has been a notable increase in fishing power, something which is paradoxical in the face of a situation of overfishing as recognised by the administrations concerned and caused by commercial and recreational fisheries (Barrera-Luján, 2011, ORPFISH.EU).
Some resources are exploited without obligation to catch declaration	The capture of small pelagics for live-bait in the tuna fishery is allowed without establishing any obligation on catch data, nor a control system that would reduce the impact of this fishery on the recruitment of many bento-demersal and pelagic-coastal species. Recruitment is one of the most critical phases of the populations, and the impact of the intense fishing for tuna, which can last more than 4 months a year, can put sustainability at risk (García-Martín, 2011; Barrera-Luján, 2011).
Proposals to close large marine areas may trigger spill over effects of fishing in other areas	The NGO Oceana (Aguilar *et al.*, 2009) is proposing to close seamounts and turn El Hierro into a marine protected area. This may lead to spill over effects over other areas, speeding up a race for fish that may be detrimental for the sustainability of fishing resources and the ecosystem.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
Management of Fisheries Marine reserves is not supported by any monitoring	As of 2011, the monitoring of Marine Reserves for Fisheries was stopped due to the lack of funding (Martín-Sosa, 2017).

Weakness	Description and evidence
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
Lack of scientific knowledge for Marine Reserve designs	Scientific studies have been conducted to guide the final design of the Canary Marine Reserves, including the proposals of La Gomera and Tenerife. The problem is that they are partial studies and then cannot always serve as a reference point to track the impact of the Marine Reserve on fishery resources (Martin-Sosa, pers. comm.). Planning is also limited and budgets prepared annually seem too rigid to the long-term planning required for the design a marine reserve (Martin-Sosa, 2017).
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.3 Opportunities

The region seems a fertile field for improvements in fisheries management and data collection. Sound research infrastructures and teams are in place in the region both at IEO and academia. Cooperation already exists although it could be reinforced and common access to data resources could be implemented. There is a perception from the questionaries filled by the diverse experts that some data, particularly those associated to research projects, are not easily accessible and interchanged. In the same way, cooperation between the IEO and the regional government is already in place but could be enhanced in particular concerning the better uptake of funds allocated for data collection (outside DCF) in the framework of the EMFF. These funds have not been implemented because there is not a protocol in place to cooperate. Considering that cooperation between these two entities is already in place for other aspects of fisheries research it is highly possible that such cooperation may be effective in the short run. There is also a potential for increased OR presence at ICCAT and CECAF meetings that would help to better represent OR priorities. Participation of the Macaronesia actors in international fisheries bodies allows realising needs for data collection on transboundary and highly migratory stocks. This provides opportunities for a more regional approach to regional data collection and the Advisory Council for the Outermost Regions (CCRUP) should be considered an opportunity.

Better data collection may allow further stock assessments to be conducted. A more comprehensive of TACs already in place for a few tuna species may be expanded to other resources and may lead to improved control and allocation of resources.

Table 4: Summary of Opportunities Identified for the Canary Islands

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Local stock knowledge could be better understood through collaboration between institutions and other CECAF Members.	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	

Opportunities	Description and evidence
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
Potential for an OR presence at ICCAT and CECAF meetings to increase representation. OR priorities would be much better included in this way.	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
Structural funds other than EMFF provide opportunities for funding research initiatives	The MAC programme provides funding for initiatives at the level of Macaronesia, where also Western Africa countries and Cape Verde can cooperate with the ORs in research. Very few projects have been implemented exclusively for fisheries. Most of the projects concerning the marine environment are related to aquaculture or ecosystem aspects where fisheries are only dealt with as an element.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	

Opportunities	Description and evidence
Data collected in the frame of EU funded projects could be exchanged between the diverse actors	A large amount of data is collected by diverse actors including the IEO, universities and the regional and insular government. This data is only accessible for those conducting the research. Studies could be conducted on how to make this information accessible and useful for general purposes. This may greatly contribute to knowledge of the fisheries in the region. The availability of these data may allow reducing costs of collections and to establish priorities in data collection thus saving resources.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
New technologies could be employed to facilitate observation on board of fishing activities	REM technologies could be employed as a substitution of scientific observers' programmes which are difficult to implement in large fleets where very small vessels predominate, making these programmes technically complicated. Observer programmes are very useful to know and characterize the fleet activities, gears used for capturing each species, fishing areas, discards, etc.
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	

Opportunities	Description and evidence
Improved data collection and assessment may allow to implement TACs	TAC as a management tool can facilitate the allocation of resources amongst fleets and can help in the framework of the landing obligation. This may allow diverse means to compensate for quota surpasses. Thus, TACs are desirable tool for management. In Macaronesia, the implementation of TACs is only in place for ICCAT's BFT, BET and billfish (from 2020). Improved data collection systems and thus enhanced assessment may allow to implement TACs gradually in the Macaronesia region. For small pelagics a multi model approach for small pelagic stocks of the Canary Islands carried out by IEO will be presented in FAO/CECAF WG of small pelagics 2021. Results are inconclusive and quantitative scientific advice in terms of catch/effort limits are not feasible so far.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
Development of cooperation in the region in data collection	Research institutes in the diverse Macaronesia's ORs have been conducting research initiatives in the framework of projects funded by the EU for years. They also participate in working groups in DCF-Regional expert groups, STECF, diverse ICES working groups, ICCAT and CECAF. Thus, networking and cooperation is already in place even tough steady funding for cooperation in data collection and management is not in place for these initiatives. It is noted that the DG MARE launched a call for proposals for the elaboration of regional DCF work plans. This call is addressed to the different Regional Coordination Groups. There is scope for addressing a regional DCF workplan in Macaronesia. https://ec.europa.eu/fisheries/press/call-proposals-mare202008-strengthening-regional-cooperation-area-fisheries-data-collection_en
Regional networking may allow a more holistic approach to data collection. Advisory Councils are an opportunity.	Participation of the Macaronesia actors in international fisheries bodies allows realising needs for data collection on transboundary and highly migratory stocks. This provides opportunities for a more regional approach to regional data collection.
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.4 Threats

Threats for the fishing activity encompass factors for which not control is possible at least for regional and national authorities such as climate change (and natural disasters e.g., the 2021 volcanic eruption in La Palma), oligotrophic waters and IUU fishing from third countries. Uneven management restrictions across actors are also identified since some measures in the Canary Islands waters are in place for regional fleets but not for others coming from outside e.g., the Madeira fleet.

Table 5: Summary of Threats Identified for the Canary Islands

Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
Oligotrophic waters	
Climate change and oceanographic conditions	Climate change/unfavourable oceanographic conditions could contribute to a further reduction in the stock abundance. For example, the recent and ongoing volcanic eruption in La Palma Island which has affected the fishing industry.
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing)	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	

Threat	Description and evidence
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	
None identified	

Threat	Description and evidence
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Uneven application of the law across actors	Division of competences between administrations creates inequalities between different actors targeting the same resource. While fishermen operating in waters closest to the islands have limited use of longlines (in terms of number of hooks), fishermen from the Peninsula (e.g., Algeciras) or Madeira (inter-governmental agreements to fish in each other's waters) can use larger longlines for fishing swordfish and related species or black scabbardfish, respectively.
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
Difficulties for Canary stocks to fit within the framework of NW African coast where the main target stocks are located for CECAF. Canary stocks are not shared by other countries of CECAF	The Fishery Committee for the Eastern Central Atlantic is mostly focused on the assessment of the main small pelagic and demersal stocks shared by coastal countries of NW Africa, and less involved in SSF and the assessment of these resources in the region (FAO 34).
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for the Canary Islands. This goes further than a traditional SWOT analysis and looks to match individual strengths, weaknesses, opportunity and threats together to help identify recommendations that could be implemented to improve data collection in the Canary Islands. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate strengths-weaknesses (internal opportunities which are most likely to have already been implemented) and opportunities-threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal opportunity could occur where a weakness has been identified but a strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the opportunity to be realised. An external opportunity may occur when an external threat (e.g., climate change and natural disasters such as the 2021 volcanic eruption in La Palma) can make use of external opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • If OR presence was increased at regional and international meetings, then OR specificities would be better represented	**"Attractive Options"** • Increase knowledge through more collaboration • Increase local knowledge on stock can help identify stocks that are subject to overfishing or at risk of overfishing • Improve collaboration in the region could help strengthen data collection and resource assessments • Joint coordinated efforts could be done to increase uptake of EMFF if any of these funds are eventually difficult to employ • REM technologies could be employed as a substitution of scientific observers' programmes which are difficult to implement in large fleets where very small vessels predominate, making these programmes technically complicated • Improved data collection may allow implementation of more TAC (where appropriate)
Threats	**"Threats that can be defended"** • Oceanographic characteristics and the marine ecosystem are well studied and might provide insight into possible changes in stock abundance and distribution to help mitigate any negative effects of climate change	**"High Risk Scenarios"** N/A

	Threats		Weakness
Opportunity	"External Opportunities" • None identified	Strength	"Internal Opportunities" • Current knowledge may provide information to support stock assessments • Alternative approaches have been developed to advance stock assessments • Wider range of data collection and assessment • Independent research could help support resource assessments • A new process is taking place at IEO in assigning the capture and effort to each métier due to the high polyvalence and opportunistic use of different gears during the trip • Existing knowledge of the marine ecosystem can be used to determine and mitigate possible impacts from aquaculture • The creation of a new Scientific Committee should help facilitate coordination and communication • Institutions can make a valuable contribution to fisheries knowledge and potentially could help supply vital data • Other funding sources should be exploited to help fill gaps in data collection • There is a framework in place to manage the recreational fishery

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's strengths with an opportunity can help to identify any natural priorities that currently exist. These 'natural opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's strengths and opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For the Canary Islands, one 'Natural Opportunity' was identified. This includes increasing OR presences at regional and international meetings, so that OR specificities would be better represented.

Table 7: Summary of Strength and Opportunity Combinations Identified for the Canary Islands

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	Regional cooperation with RFMOs and RFBs	Potential for an OR presence at ICCAT and CECAF meetings to increase representation.	If OR presence was increased at regional and international meetings, then OR specificities would be better represented.
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details threats that should be easy to defend and counter based on the Outermost Region's existing strengths. For many existing threats the current skills, funding and administrative requirements may already be in place to be able to meet these threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address threats in limited situations.

In regards to 'Threats that can be defended' for the Canary Islands, oceanographic characteristics and the marine ecosystem are well studied and might provide insight into possible changes in stock abundance and distribution to help mitigate any negative effects of climate change.

Table 8: Summary of Strength and Threat Combinations Identified for the Canary Islands

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Knowledge of marine ecosystem	Climate change and oceanographic conditions	Oceanographic characteristics and the marine ecosystem are well studied and might provide insight into possible changes in stock abundance and distribution to help mitigate any negative effects of climate change.
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a weakness has been identified but an opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current weaknesses and turning those weaknesses into strengths. If weaknesses are not being addressed and opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other weaknesses limiting the chances of exploiting opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

Several 'Attractive Options' were identified for the Canary Islands. This includes increasing knowledge through collaboration at a regional and national level and utilising alternative funds to address any data or knowledge gaps. New technologies could also be employed to help collect data on small-scale fleets where the use of observers is restricted.

Table 9: Summary of Weakness and Opportunity Combinations Identified for Canary Islands

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Gaps in knowledge of resource status and awareness may lead to overfishing	Local stock knowledge could be better understood through collaboration between local institutions and other CECAF Members.	Increase knowledge through more collaboration
•	Overfishing has been identified	Local stock knowledge could be better understood through collaboration between local institutions and other CECAF Members.	Increase local knowledge on stock can help identify stocks that are subject to overfishing or at risk of overfishing.
•	Gaps in knowledge of resource status and awareness may lead to overfishing	Regional networking may allow a more holistic approach to data collection. Advisory Councils are an opportunity	Improve collaboration in the region could help strengthen data collection and resource assessments.
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	Limited funding for collaboration between General Fisheries Secretariat and IEO	Structural funds other than EMFF provide opportunities for funding research initiatives	Other funds may be available to fill current gaps that cannot be addressed by EMFF funding.

#	Weakness	Opportunity	Description and evidence
•	EMFF funding for data collection not fully employed	Structural funds other than EMFF provide opportunities for funding research initiatives	Other funds may be available to fill current gaps that cannot be addressed by EMFF funding.
4. Current state of data collection obligations			
•	Difficulties in monitoring the small-scale fleet with scientific observers onboard	New technologies could be employed to facilitate observation on board of fishing activities	REM technologies could be employed as a substitution of scientific observers' programmes which are difficult to implement in large fleets where very small vessels predominate, making these programmes technically complicated
5. Fisheries management and conservation measures			
•	TACs are only in use for large pelagics	Improved data collection and assessment may allow to implement TACs	Improved data collection may allow implementation of more TAC (where appropriate).

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For the Canary Islands, no 'High Risk Scenarios' were identified.

Table 10: Summary of Weakness and Threat Combinations Identified for the Canary Islands

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the opportunity to be realised.

Several Strengths exist in the Canary Islands, that could be utilised to overcome existing Weaknesses. For example, alternative approaches have already been developed to advance stock assessments and for data limited species. A new process is taking place at IEO in assigning the capture and effort to each métier due to the high polyvalence and opportunistic use of different gears which could help improve the métierization of the artisanal fishery. The creation of a new Scientific Committee should help facilitate coordination and communication while institutions can make a valuable contribution to fisheries knowledge and potentially could provide vital data. Finally, joint coordinated efforts could be done to increase uptake of EMFF if any of these funds are eventually difficult to employ .

Table 11: Summary of Strength and Weakness Combinations Identified for the Canary Islands

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Knowledge of population structure/parameters of some target species	Some key resources lack stock assessment	Current knowledge may provide information to support stock assessments.
•	A multimodel approach has been carried out for small pelagic and presented at CECAF WG.	Some key resources lack stock assessment	Alternative approaches have been developed to advance stock assessments.
•	Progress from universities and research realm. Knowledge to support a future stock assessment	Some key resources lack stock assessment	Independent research could help support resource assessments.
•	Tuna species have stock assessment under ICCAT	Gaps in knowledge of resource status and awareness may lead to overfishing	Wider range of data collection and assessment
•	Length sampling	Gaps in knowledge of resource status and awareness may lead to overfishing	Current knowledge may provide information to support stock assessments.
•	Some stock specific sampling is undertaken	Gaps in knowledge of resource status and awareness may lead to overfishing	Current knowledge may provide information to support stock assessments.
•	Improvement in the process of métierization of the artisanal fishery	Polyvalent fishing	A new process is taking place at IEO in assigning the capture and effort to each métier due to the high polyvalence and opportunistic use of different gears during the trip

#	Strength	Weakness	Description and evidence
•	Improvement in the process of métierization of the artisanal fishery	Complex métierization of the artisanal fishery	A new process is taking place at IEO in assigning the capture and effort to each métier due to the high polyvalence and opportunistic use of different gears during the trip
•	Knowledge of the gears and fishing activities operating	Gaps in knowledge of resource status and awareness may lead to overfishing	There is information available in the Canary Islands to help determine which stock are being overfished.
•	Knowledge of marine ecosystem	Escapees from aquaculture	Existing knowledge of the marine ecosystem can be used to determine and mitigate possible impacts from aquaculture.
2. Institutional structures			
•	Studies to improve governance on the basis of networks between administration, POs and other local stakeholders	Scarce coordination of administration, scientists, and sector to organize the fishing activity	There are studies on how to improve governance of artisanal fisheries in the Canary Islands which may help to improve coordination through lessons learnt.
•	The Fishery Office of the regional government is preparing the creation of a Scientific Committee for the advice on the fishery management, with participation of research institutions like IEO and local universities, among other relevant stakeholders	Scarce coordination of administration, scientists, and sector to organize the fishing activity	The creation of a new Scientific Committee should help facilitate coordination and communication.
•	Academia also contributes to the knowledge base in the region and has a close relationship with IEO.	Data collected beyond official channels are not part of regular sampling programmes.	Institutions can make a valuable contribution to fisheries knowledge and potentially could help supply vital data.
3. Funding and funding structures for data collection			
•	Other structural funds also offer funding for scientific purposes	EMFF funding for data collection not fully employed	Joint coordinated efforts could be done to increase uptake of EMFF if any of these funds are eventually difficult to employ

#	Strength	Weakness	Description and evidence
•	Other structural funds also offer funding for scientific purposes	Limited funding for collaboration between General Fisheries Secretariat and IEO	Although collaboration in the monitoring and control of Marine Reserves ended in 2012, other funds do exist which could be exploited to help fill current gaps.
4. Current state of data collection obligations			
•	Good observer programme for small scale fleets	Difficulties in monitoring the small-scale fleet with scientific observers onboard	The Canary Islands has made considerable progress in the collection of information on small scale fleets though an programme of observers on board in Tenerife. This programme could be extended to the other islands.
5. Fisheries management and conservation measures			
•	Recreational marine fishing, is described, well segmented, and regulated	Increasing recreational fisheries	There is a framework in place to manage the recreational fishery

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an Opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For the Canary Islands, no 'External Opportunities' were identified.

Table 12: Summary of Opportunities and Threats Combinations Identified for Canary Islands

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

Martinique

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Martinique SWOT Report

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Acronyms

Term	Definition
AFD	Agence Française de Développement
COPEM	Collectif Pêche Martinique
CRFM	Caribbean Regional Fisheries Mechanism
CRPMEM	Comité Régional des Pêches Maritimes et des Elevages Marins
DCF	Data Collection Framework
DPMA	Le Directeur de la Direction des pêches maritimes et de l'aquaculture
EMFF	European Maritime and Fisheries Fund
ENSAM	Ecole Nationale de la Sécurité et l'Administration de la Mer
ETP	Endangered, Threatened and Protected Species
EWG	Expert Working Group
FAD	Fish Aggregating Device
ICCAT	The International Commission for the Conservation of Atlantic Tunas
IRD	The Research Institute for Development
IUU	Illegal, Unreported and Unregulated Fishing
MAP	Multi-Annual Plan
MCS	Monitoring, Control and Surveillance
MPA	Marine Protected Area
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SIH	Système d'informations halieutiques
STECF	Scientific, Technical and Economic Committee for Fisheries
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e.,. EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities, and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities, and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for Martinique, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for Martinique

	Positive	Negative
Internal	**STRENGTHS** • Fishery sector in Martinique is exclusively small scale fisheries, operated from one type of vessel designed to be multigear (legacy from the old wooden Yole) and catching a large variety of species • It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch). • Institutional routine data collection is in place for biological data (catch / effort / some length frequencies), implemented and managed by Ifremer Martinique • Exploited stocks are well identified and information published (SIH) • ICCAT stocks are assessed • Funds are adequate to financially support current data collection activities • External fund available • DCF obligations are full filled for biological data except for recreation fisheries • Complete and up-to-date legislation for management and conservation of resources in Martinique	**WEAKNESSES** • General decrease in catches and number of fishers in the island for different reasons (hardness of fishing condition, impact of chloredecone) • No routine data collection on socio economic data and for recreational fisheries • No assessment of demersal stocks (reef fish, deep fish) • No compliance to DCF obligation regarding socio economics data and recreational fisheries
External	**OPPORTUNITIES** • N/A	**THREATS** • N/A

3 SWOT Definition

The following four sections identify individual Strengths, Weaknesses, Opportunities and Threats identified for Martinique.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc.

A major strength in Martinique related to data collection and knowledge of stocks is the full implementation and management by Ifremer of the SIH since 2008. In support to this implementation is a strong institutional setup for data collection and scientific advice, as well as good financial support from EMFF and national French budget.

Regarding data collection specifically, strengths of the system in Martinique are based on a specific monitoring of Martinique fishery sector being exclusively small-scale fisheries, operated from one type of vessel designed to be multigear (legacy from the old wooden "*Yole*") and catching a large variety of species (multigear and multispecies). It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch).

The strength of data collection is to be managed directly by Ifremer: Given the nature of multi gear / multi species nature of fisheries, sample based surveys have been put in place in 2008; there are designed, implemented and monitored by Ifremer in Martinique and Brest (for the SIH part). Catch, effort and biological data are collected for landed species, either at species (Conch, *Lobatus gigas*, Yellowfin tuna, *Thunnus albacares* or group level (Snappers / groupers). Another Strength of the system is to have a steering committee in place composed of fishery sector main stakeholders, to discuss progress, issues and concerns on the data and its quality. Last but not least regarding data collection activities in relation to DCF, staff in Martinique is sufficient to fulfil DCF current obligations. Compliance with other DCF obligations for which gaps have been identified / are known (socio-economic data / recreational fisheries) would require more human resources. As a consequence of this data collection in place since 2008, stocks are well known and monitored in the island, which is a major strength in the island.

Strength of data collection system is also to have good funding sources. Funding through EMFF is available (under measures on data collection referred to in Article 77). These fundings are managed at central level. National budget is also available to cover the remaining theoretical 20% not eligible under EMFF (which are more 40% according to Ifremer).

Regarding Strength in management of resources, a complete legal arsenal is implemented and enforced in Martinique to ensure sustainable management of fisheries resources, both for professional and recreational fisheries. Ifremer plays a central role to provide scientific advices based on information collected through the SIH. MCS activities are regularly conducted according to a two years MCS plan established by French Authorities.

Table 2: Summary of Strengths Identified for Martinique

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Exploitation of the identified stock is monitored	Yearly summary of catches published by Ifremer (Weiss 2019, individual metiers publication by SIH).
ICCAT stocks are assessed	Blanchard *et al*., 2018 indicates that Yellowfin tuna, Blue marlin, White marlin, Atlantic sailfish and Skipjack tuna are assessed with different methods.
Stocks are well identified	Several publications from the year 2000 to now describing the fisheries in Martinique (Blanchet *et al*.,2000; Blanchard *et al*., 2018). 65 stocks are monitored in Martinique, five of which are formally assessed. A study by Ifremer started in 2020 to collect more biological data (using funds from the Agence Francaise de Developpement (AFD) to buy fish directly from fishers) to fill gaps in the biological knowledge of the main fished species in Martinique waters to conduct stock assessments of such species.
Studies to assess level of knowledge for 12 main species stock assessment, and as a consequence, implementation of streamline biological data study	Ifremer has taken the lead on improvement of knowledge on stocks that have not been assessed yet. (Froehlicher *et al*., 2019).
Emerging stocks	In parallel, a trend is emerging with more pelagic targeting and new species opportunities explored.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Coverage of Activity Surveys	Activity surveys, cover the whole fleet of skiffs and ships over 10 m.
On-going study on recreational fisheries	This study will increase the knowledge of impact of recreational fisheries on Martinique stocks
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
A clear institutional setup is in place for data collection in France	See institutional scheme in Martinique profile (Annex 2). As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests.

Strength	Description and evidence
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
IFREMER has a predominant role in Martinique to collect data and produce reports	Ifremer website (https://wwz.ifremer.fr/Expertise/Peches-maritimes/Collecte-de-donnees-halieutiques-dans-le-cadre-de-la-politique-commune-de-la-peche)
SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	Discussion with Ifremer Martinique and Brest Weiss et Al 2018 and 2019 describing methodologies. Fisheries statistics activities are presented and discussed by all fisheries sector stakeholders during yearly SIH steering committees. Issues and problems are raised to Ifremer by stakeholders such DM. SIH allows data to be gathered in a single system.
A transversal SIH Steering committee with all fisheries stakeholders is in place in Martinique to yearly review data related progress and issues	From discussions with Direction de la Mer (DM) in Ifremer team in Martinique.
Logsheet reporting is increasing (EU legal obligation for reporting	Number reported by CRPMEM: 40 to 60% of vessels comply with the community obligation.
Good coverage of data collection	Landing data are recorded on a daily basis.
Increased compliance to logsheet declaration EU obligation	FranceAgrimer is centralizing logsheet declaration reported by fishers (EU obligation) and punched in by Direction de la Mer.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Full funding of data collection activities	DCF data collection funding comes from two main sources: EMFF and national budget.

Strength	Description and evidence
Management model of EMFF funds (e.g., managed regionally, centrally).	
EMFF	DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth. France received for EMFF 2014-2020 €588 M. EMFF 2014-2020 funds for Martinique: €9,043 520,66.
France National Budget covers 20% of data collection funds not eligible to EMFF (actually more 40% according to Ifremer)	IFREMER received in 2017 €154 M. IFREMER Martinique (supervises Guadeloupe activities) has a budget of €189,251 in 2017.
EMFF measures on data collection referred to in Article 77	Measures on data collection referred to in Article 77 for EMFF DCF data collection represents €66,146,872. No specific EMFF funding for Martinique related to measures on data collection referred to in Article 77is identified. Ifremer indicated that activities related to data collection in Martinique represented a total of €277,927.03 in 2019. Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
External funding to support ad hoc studies to fill gaps	Three studies are being implemented / completed related to socio-economics fisheries data, recreational fisheries and improvement of biological knowledge of species: for the latter, if successful, EMFF funds will be requested to move it from ad-hoc studies to routine data collection.
Studies with external funding to fill gaps for socio economics and recreational fisheries	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	

Strength	Description and evidence
Globally Positive assessment of France compliance with EU-MAP	Assessment of France compliance with EU-MAP (STECF, 2019): Overall, the MS complied with the legislation (EU-MAP and WP template) and WP guidelines and most issues that were identified were resolved at EWG 19-18. Overall good progress has been made in the provision of data relating to Data Quality Assurance.
List of activities that France will implement in 2020-2012 to comply with DCF: FISHING ACTIVITY DATA, ECONOMIC AND SOCIAL DATA, SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES	Definition of activities to be conducted by France for 2020-2021 (France, 2019).
Data published for Martinique: fishing activity data, fleet economic and social data.	Fishery in Martinique summary for 2018 (Weiss *et al*., 2019a)
Compliance with data requirements and status of submission for RFMO / RFB data collection	
Good data collection for species under RFMO remit	Biological sampling on large pelagics under the mandate of RFMOs (ICCAT) is considered as generally good.
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Large legal arsenal to regulate fisheries in Martinique: conservation measures for species (closed season, ban on gears), no fishing zone when suspicion of Chlordecone poisoning etc.	Arrêté n°R02-2019-04-25-003 portant réglementation de la pêche maritime professionnelle en Martinique. Arrêté n°R02-2019-04-08-004 portant réglementation de la pêche maritime de loisir en Martinique.

Strength	Description and evidence
	Arrêté R02-2016-12-13-002 réglementant la navigation ainsi que la pêche, les activités nautiques, les activités subaquatiques et la baignade le long du littoral de la commune du Carbet.
Selection of appropriate controls and measures at correct levels of coverage	
Creation of Regional MPA of Prêcheur	Analysis of the impact of the creation of this MPA (Failler *et al*., 2013).
Potential for fleet renewal	Potential to exploit deep sea stocks. Such fleet renewal would enhance the safety of fishers fishing in the deeper waters, including the need for boats to have facilities for fishers to stay at sea overnight. Collectif Pêche Martinique (COPEM), a professional fishers association (On-site interview with COPEM co-president) has initiated studies to create a modern *Yole*, which combines the two new emerging needs: fishing deeper and further from the coast.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
Use of logbooks	Vessels between 10 and 12 m are requested (according to Regulation) to report fishing activities through logsheets. Outreach and training efforts have increased reporting through logbooks.
Regular MCS training	Operational Units receive regular training on MCS through ENSAM (Ecole Nationale de la Sécurité et l'Administration de la Mer, National School for Sea Security and Administration). Specific training for Police and Customs officers related to fisheries are also regularly organized.
MCS activities with priority in fighting against IUU fishing	2 years sub-national MCS plan. The plan defines objectives for controls and enforcement.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

Fisheries in Martinique are declining. This can be seen as a major Weakness of the sector given that most of seafood is imported: 85% of vessel owner are above 46 years old, and 30% above 60 years old (Weiss *et al*., 2019) and fishing conditions are tough given the operation mode (multi gear from a non-specialized boat).

Regarding knowledge of exploited stocks, it was mentioned that they are well identified and monitored. One Weakness of the system is the level of detail of exploited stocks, known and monitored at the level of the family rather than at species level. Fishing sector in Martinique being multigear and multi species, more than 180 species are caught and monitoring at species level can be difficult. In terms of assessment, few known stocks are assessed; assessed stocks are large pelagics under ICCAT. Demersal stocks, which constitute an important portion of catches are not formally assesses. A first study was conducted to make a first assessment of 12 major demersal species. Preliminary results were positive in terms of availability of data to run data limited models although further studies are required to have more precise assessment. Proposals were made to streamline data collection, especially for some biological indicators for other species than the 12 studied.

In terms of compliance to DCF, gaps have been identified with lack of recreational fisheries information, and of socio-economics data. Actions have been already taken to address these gaps.

Table 3: Summary of Weaknesses Identified for Martinique

Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Demersal stocks are not assessed	For all the other species in which there was not a formal stock assessment, the basic biological data needed for such assessments (e.g., breeding rate, natural mortality rate, mortality by predation) were not sufficiently collected for such species to undertake a reliable stock assessment.
Only 5 large pelagics stocks are formally assessed, Demersal stocks are not assessed	Out of 65 stocks which are monitored only five are assessed formally. This means that 94% of stocks are not subject to assessment. The five species that are assessed are those assessed by ICCAT. None have been assessed by French authorities.

Weakness	Description and evidence
	Within discussions during duty travel within Martinique (January, 2021) Ifremer indicated that they had assessed that the information collected for 12 main fished species within Martinique (e.g., snapper, lobster, conch) was sufficient to run data limited models to under stock assessments for this species. Their work has shown that data limited models utilising the current knowledge of such fisheries (e.g., catch and effort data, as well as some biological parameters) provided reliable stock assessment information. For all the other species in which there was not a formal stock assessment, the basic biological data needed for such assessments (e.g., breeding rate, natural mortality rate, mortality by predation) were not sufficiently collected for such species to undertake a reliable stock assessment (Froehlicher, H., Pawlowski, L., Weiss, J., Reynal, L., Thouard, E., 2019. Evaluation des ressources démersales du plateau insulaire martiniquais. Demersal species make up approximately 60% of the total catch. The high percentage of reef fish, crustaceans and 'other species' / 'misc fish' illustrates the likely difficulty in collecting data on such a wide range of landed species or during sales.
Some stocks are monitored at family level, not at species level	Weiss *et al*., 2019.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
Impact of FAD fishing on ecosystem	Use of FAD has an impact on the resource and the communities of fishers. There is a need to better understand this impact (Taquet *et al*., 2000; CRFM, 2013).
Impact of Chlordecone	Closing of coastal areas because of Chlordecone Impact on lobster (Bertrand *et al.*, 2012) Impact on other species (Dromard *et al.*, 2016, Bodiguel *et al.*, 2011).
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Fisher self-sampling can be difficult	There is some biological sampling in the ORs, including self-sampling, but it is a difficult task. Self-sampling can work if done with volunteer fishers.
Of the 1,020 vessels making up the Martinique fleet, only 27 vessels are subject to electronic logbook or declaration of catch using paper logbooks.	This is because only 27 vessels are over 10 m.
Polyvalent fishing	This make stock assessment difficult as effort cannot be standardised easily.

Weakness	Description and evidence
No data is available specifically on ETP species fishes within Martinique	This is likely associated with the local ban on catch of sea turtles, mammals and corals. However, it is not clear if no catches occur or if interactions are just not reported. Ifremer statistics also show catches of species with conservation measures such as conch (*Lobatus gigas*, closed season), on lobster (*Panulirus spp.*, ban on breeding lobster) and white urchin (*Tripnenstes ventricosus* – 1 month open season).
Catches and number of fishers have been divided by two over the last 10 years for several reasons, the hard sea and operation conditions make work harsh and not appealing for young people.	Ifremer statistics shows this decrease (Weiss *et al.*, 2010) and the average age of fishers. Discussion with fishers and local authorities highlighted the hard condition of fishing and the need to fish farer. This creates a weakness as demand for seafood is high.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
Data flow in the ORs is not considered to be as good as the mainland	Compared to the mainland, data flow is not considered to be good in the ORs. One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
High turnover of staff	Could be seen as a weakness due to loss of knowledge and skills. The system does allow for some overlap though to support training.

Weakness	Description and evidence
	Data collectors are only hired on short term contracts. Recruitment within IRD is an issue, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed.
Capacity limits	IRD is running at full capacity and therefore cannot respond to urgent requests that have not been budgeted for. Often requests from UE/DPMA take priority, which can impact routine and project work.
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
EMFF funding cannot be use to hire long-term staff	A lack of human resources is a key issue however, the use of EMFF funding is restricted and can only be used to hire contractors.
Difficulty in application and obtention of EMFF	Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French Cours Des Comptes. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.
There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.
Management model of EMFF funds (e.g., managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	

Weakness	Description and evidence
STECF analysis (2020) of DCF Work Plans and Annual Reports	The analysis concluded that there was a lack of specific mention of the individual ORs in the work plans and annual reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds.
No information on recreation fisheries	No information or data are collected from Martinique on recreational fisheries.
Limited socio-economics data	STECF Annual Economic Report 2019 There is limited socio-economic data collected by Ifremer (i.e., number of crew, price of fish).
Data collection is conducted by a team of 5 data collectors hired by Ifremer on short term contracts	Short term contracts are not ideal for regular data collection.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
Limited biological data for stock assessment	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	

Weakness	Description and evidence
None identified	
Scientific basis for decision making and the science / management nexus – i.e.,. How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As opportunities are external, an Outermost Region cannot easily 'create' opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any opportunities that appear. For example, an opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

No Opportunities were identified for Martinique.

Table 4: Summary of Opportunities Identified for Martinique

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e.,. with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	

Opportunities	Description and evidence
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
N/A	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	

Opportunities	Description and evidence
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage". Another Threat could be high levels of IUU from third countries impacting data collection on catches.

No Threats were identified for Martinique.

Table 5: Summary of Threats Identified for Martinique

Threats	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	

Threats	Description and evidence
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
N/A	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	

Threats	Description and evidence
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for Martinique. This goes further than a traditional SWOT analysis and looks to match individual Strengths, Weaknesses, Opportunity and Threats together to help identify recommendations that could be implemented to improve data collection in Martinique. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal Opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the Opportunity to be realised. An external Opportunity may occur when an external Threat (e.g., climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None identified	**"Attractive options"** • None identified
Threats	**"Threats that can be defended"** • None identified	**"High risk scenarios"** • None identified

	Threats		Weakness
Opportunity	**"External Opportunities"** • None identified	**Strength**	**"Internal Opportunities"** • Ifremer is starting to improve knowledge on stocks that have not yet been assessed • There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised • Wider range of data collection and assessment • Landing data are recorded on a daily basis and could be utilised to support stock assessments • There is a committee already established to review socio-economic data and should be utilised to support further data collection if required • External funding could be utilised to fill gaps in data assessment and collection e.g., demersal stocks

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For Martinique, no 'Natural Opportunities' were identified.

Table 7: Summary of Strength and Opportunity Combinations Identified for Martinique

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many Threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For Martinique, no 'Threats that can be defended' were identified.

Table 8: Summary of Strength and Threat Combinations Identified for Martinique

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an Opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

For Martinique, no 'Attractive Options' were identified.

Table 9: Summary of Weakness and Opportunity Combinations Identified for Martinique

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For Martinique, no 'High Risk Scenarios' were identified.

Table 10: Summary of Weakness and Threat Combinations Identified for Martinique

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the Opportunity to be realised.

For Martinique, several 'Internal Opportunities' were identified. Ifremer is beginning to improve knowledge on stocks that have not yet been assessed and alternative methods are available to assess stocks which are data limited. The centralised SIH could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised. External funding could be utilised to fill gaps in data assessment and collection and there is a committee already established to review socio-economic data.

Table 11: Summary of Strength and Weakness Combinations Identified for Martinique

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Studies to assess level of knowledge for 12 main species stock assessment, and as a consequence, implementation of streamline biological data study.	Demersal stocks are not assessed.	Ifremer is starting to improve knowledge on stocks that have not yet been assessed.
•	Studies to assess level of knowledge for 12 main species stock assessment, and as a consequence, implementation of streamline biological data study.	Only 5 stocks are formally assessed.	Ifremer is starting to improve knowledge on stocks that have not yet been assessed.
•	SIH has a central role in providing methodologies, sampling scheme and workplan for field activities.	Only 5 stocks are formally assessed.	There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised.
•	ICCAT stocks are assessed.	Only 5 stocks are formally assessed.	Wider range of data collection and assessment.
•	Good coverage of data collection.	Only 5 stocks are formally assessed.	Landing data are recorded on a daily basis and could be utilised to support stock assessments.
2. Institutional structures			
•	A clear institutional setup is in place for data collection in France.	No data on ETP species.	There is a good institutional structure in place in Martinique to support monitoring of ETP interactions.

#	Strength	Weakness	Description and evidence
•	A transversal SIH Steering committee with all fisheries stakeholders is in place in Martinique to yearly review data related progress and issues.	Limited socio-economic data.	There is a committee already established to review socio-economic data and should be utilised to support further data collection if required.
3. Funding and funding structures for data collection			
•	External funding to support ad hoc studies to fill gaps.	Difficulty in application and obtention of EMFF.	Alternative funding utilised to fill data gaps
4. Current state of data collection obligations			
•	Studies with external funding to fill gaps for socio economics and recreational fisheries.	No information on recreation fisheries.	Studies are being implemented / completed related to socio-economics fisheries data, recreational fisheries and improvement of biological knowledge of species
•	Studies with external funding to fill gaps for socio economics and recreational fisheries.	Limited socio-economic data.	Studies are being implemented / completed related to socio-economics fisheries data, recreational fisheries and improvement of biological knowledge of species
•	External funding to support *ad hoc* studies to fill gaps.	No data is available specifically on ETP species fishes within Martinique.	Alternative funding could be sourced to support studies and data collection on ETP interactions. (Note: catches of sea turtles, mammals and corals species are banned in Martinique but this is different to interactions which could lead to incidental mortality).
5. Fisheries management and conservation measures			
•	None identified		

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an Opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For Martinique, no 'External Opportunities' were identified.

Table 12: Summary of Opportunities and Threats Combinations Identified for Martinique

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
● None identified			
2. Institutional structures			
● None identified			
3. Funding and funding structures for data collection			
● None identified			
4. Current state of data collection obligations			
● None identified			
5. Fisheries management and conservation measures			
● None identified			

Guadeloupe

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Guadeloupe SWOT Report

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Acronyms

Term	Description
CRPMEM	Comité Régional des Pêches Maritimes et des Elevages Marins de Bretagne
CRPMEM	Comité Régional des Pêches Maritimes et des Elevages Marins de Bretagne
DCF	Data Collection Framework
DPMA	Le Directeur de la Direction des pêches maritimes et de l'aquaculture
EMFF	European Maritime and Fisheries Fund
ENSAM	National School for Sea Security and Administration
ETP	Endangered, Threatened or Protected
ICCAT	The International Commission for the Conservation of Atlantic Tunas
IRD	The Research Institute for Development
IUU	Illegal, Unreported and Unregulated Fishing
MAP	Multi-Annual Plan
MCS	Monitoring, Control and Surveillance
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SIH	Système d'informations halieutiques
STECF	Scientific, Technical and Economic Committee for Fisheries
VMS	Vessel Monitoring System
WECAFC	Western Central Atlantic Fishery Commission

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (*i.e.,* EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for Guadeloupe, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for the Guadeloupe

	Positive	Negative
Internal	**STRENGTHS** • Fishery sector in Guadeloupe is exclusively small scale fisheries, operated from one type of vessel designed to be multigear (legacy from the old wooden Saintoise) and catching a large variety of species • It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch) • Institutional routine data collection is in place for biological data (catch / effort / some length frequencies), locally implemented by an external vendor and managed by Ifremer Martinique • Exploited stocks are well identified and information published (SIH) • ICCAT stocks are assessed • Funds are adequate to financially support current data collection activities • Alternative funding sources • DCF obligations are full filled for biological data except for recreation fisheries • Complete and up-to-date legislation for management and conservation of resources in Guadeloupe	**WEAKNESSES** • General decrease in catches and number of fishers in the archipelago for different reasons (hardness of fishing condition, impact of chloredecone) • No dedicated staff in Ifremer Martinique to monitor Guadeloupe activities • Risk of break in data collection activities related to external vendor contract renewal • No routine data collection on socio economic data and for recreational fisheries • No assessment of demersal stocks (reef fish, deep fish) • No compliance to DCF obligation regarding socio economics data and recreational fisheries • Impact on non-assessed stocks of trend to go fishing farer and deeper due among other to closure of coastal areas (Chlordecone)

	Positive	Negative
External	**OPPORTUNITIES** • None identified	**THREATS** • None identified

3 SWOT Definition

The following four sections identify individual Strengths, Weaknesses, Opportunities and Threats identified for Guadeloupe.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc. For example, a Strength could be an internal organisation with the capacity to collect length frequency data of catches that is required under the DCF framework.

The major Strength in Guadeloupe related to data collection and knowledge of stocks is the full implementation and management by Ifremer of the SIH since 2008. In support to this implementation is a strong institutional setup for data collection and scientific advice, as well as good financial support from EMFF and national French budget.

Regarding data collection specifically, Strengths of the system in Guadeloupe are based on a specific monitoring of Guadeloupe fishery sector being exclusively small-scale fisheries, operated from one type of vessel designed to be multigear (legacy from the old wooden "*Saintoise*") and catching a large variety of species (multigear and multispecies). It offers high resilience to change for fisheries. Multiple gears are operated from this unique type of vessel on a daily trip basis, with a daily shift in gear with no real seasonality except for few species (large pelagics and conch).

The Strength of data collection in Guadeloupe is to be managed directly by Ifremer. Data collection in the field is conducted by an external company. Given the nature of multi gear / multi species nature of fisheries, sample based surveys have been put in place in 2008; there are designed, implemented and monitored by Ifremer in Martinique and Brest (for the SIH part). Catch, effort and biological data are collected for landed species, either at species (Conch, *Lobatus gigas*, Yellowfin tuna, *Thunnus albacares* or group level (Snappers / groupers). Another Strength of the system is to have a steering committee in place composed of fishery sector main stakeholders, to discuss progress, issues and concerns on the data and its quality. Last but not least regarding data collection activities in relation to DCF, Groupe EI Staff in Guadeloupe is sufficient to fulfil DCF current obligations. Compliance with other DCF obligations for which gaps have been identified / are known (socio-economic data / recreational fisheries) would require more human resources. As a consequence of this data collection in place since 2008, stocks are well known and monitored in the island, which is a major Strength in the island.

Strength of data collection system is also to have good funding sources. Funding through EMFF is available (under measures on data collection referred to in Article 77). These fundings are managed at central level. National budget is also available to cover the remaining theoretical 20% not eligible under EMFF (which are more 40% according to Ifremer).

Regarding Strength in management of resources, a complete legal arsenal is implemented and enforced in Guadeloupe to ensure sustainable management of fisheries resources, both for professional and recreational fisheries. Ifremer plays a central role to provide

scientific advice based on information collected through the SIH. MCS activities are regularly conducted according to a two years MCS plan established by French Authorities.

Table 2: Summary of Strengths Identified for Guadeloupe

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Stocks are well identified	Several publications from the year 2000 to now describing the fisheries in Guadeloupe (Blanchet *et al.*, 2000; Blanchard *et al.*, 2018). 59 species are monitored, 5 subject to formal assessment. Catch information and length frequency data are collected throughout the year. Effort information related to the previous year of fishing is collected during the first three months of the current year.
Studies to assess level of knowledge for 12 main species stock assessment, and as a consequence, implementation of streamline biological data study	Ifremer has taken the lead on improvement of knowledge on stocks that have not been assessed yet.
Exploitation of the identified stock is monitored	Yearly summary of catches published by Ifremer (Weiss et Al 2020, individual metiers publication by SIH).
ICCAT stocks are assessed	Blanchard *et al.*, 2018 indicates that Yellowfin tuna, Blue marlin, White marlin, Atlantic sailfish and Skipjack tuna are assessed with different methods.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Fleet structure is well understood	*e.g.*, all fishing vessels in Guadeloupe are below 12 m in length. Of these, 96% of the active vessels in 2018 are below or equal to 10m. All vessels are multigear.
On-going study on recreational fisheries	This study will increase the knowledge of impact of recreational fisheries on Guadeloupe stocks
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
A clear institutional setup is in place for data collection in France	See institutional scheme in Guadeloupe profile (Annex 2). Data collection is well-coordinated and follows Observation des Marées au débarquement (OBSDEB) methodology.

Strength	Description and evidence
	As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests.
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	SIH allows data to be gathered in a single system. Fisheries statistics activities are presented and discussed by all fisheries sector stakeholders during yearly SIH steering committees. Weiss *et al.*, 2018 and 2019 describing methodologies.
IFREMER has a predominant role in Guadeloupe to collect data and produce reports	Ifremer website (https://wwz.ifremer.fr/Expertise/Peches-maritimes/Collecte-de-donnees-halieutiques-dans-le-cadre-de-la-politique-commune-de-la-peche). Ifremer is the de facto "manager" of fisheries data collection issues in ORs for DPMA and are responsible for 90% of data collection.
Logsheet reporting is increasing (EU legal obligation for reporting	Number reported by CRPMEM: 40 to 60 % of vessels comply with the community obligation.
Increased compliance to logsheet declaration EU obligation	FranceAgrimer is centralizing logsheet declaration reported by fishers (EU obligation) and punched in by CRPMEM (Fishers association).
A transversal SIH Steering committee with all fisheries stakeholders is in place in Guadeloupe / Martinique to yearly review data related progress and issues and	From discussions with CRPMEM in Guadeloupe and Ifremer team in Guadeloupe
Outsourcing data collection to EI Groupe	The advantages are that there is a dedicated team in place that can conduct daily activity, and this team can be easily mobilized to conduct other studies (socio-economics).
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
Regional participation	Ifremer and IRD both contribute biological data directly to dedicated regional working groups to which the EU is a participant.
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	

Strength	Description and evidence
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Full funding of data collection activities	DCF data collection funding comes from two main sources: EMFF and national budget.
Management model of EMFF funds (e.g., managed regionally, centrally).	
Management of French EMFF Funds	DPMA is the single EMFF management authority for France and each institution must submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth.
France National Budget covers 20% of data collection funds not eligible to EMFF (actually more 40% according to Ifremer)	IFREMER received in 2017 €154 M. IFREMER Martinique (supervises Guadeloupe activities) has a budget of €189,251 in 2017.
EMFF	France received for EMFF 2014-2020 €588 M EMFF 2014-2020 funds for Guadeloupe: €3,185,283.19.
EMFF Measures on data collection referred to in Article 77	Measures on data collection referred to in Article 77 for EMFF DCF data collection represents €66,146,872. No specific EMFF funding for Guadeloupe related to measures on data collection referred to in Article 77is identified. Ifremer indicated that activities related to data collection in Guadeloupe represented a total of €375,815.45 in 2019. Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess. FranceAgrimer received €35 k for the 2014-2020 period.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
External funding to support ad hoc studies to fill gaps	3 studies are being implemented / completed related to socio-economics fisheries data, recreational fisheries and improvement of biological knowledge of species: for the latter, if successful, EMFF funds will be requested to move it from ad-hoc studies to routine data collection.
Studies with external funding to fill gaps for socio economics and recreational fisheries	

Strength	Description and evidence
Sustainability of funding (long-term to OR)	
N/A	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
High implementation of DCF	Guadeloupe complies 100% with their DCF requirement for species regarding catch volume. Length frequencies are not published but some are collected. There is high compliance to DCF WECAFC requirements for species regarding catch volume (II.2.a.i), though length frequencies are not published (though these are collected). Good compliance to DCF requirements for ICCAT species in Guadeloupe regarding catch volume for II.2.a.i. Length frequencies are not published but some are collected.
List of activities that France will implement in 2020-2012 to comply with DCF: FISHING ACTIVITY DATA, ECONOMIC AND SOCIAL DATA, SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES	Definition of activities to be conducted by France for 2020-2021 (France, 2019).
Globally Positive assessment of France compliance with EU-MAP	Assessment of France compliance with EU-MAP (STECF, 2019): Overall, the MS complied with the legislation (EU-MAP and WP template) and WP guidelines and most issues that were identified were resolved at EWG 19-18. Overall good progress has been made in the provision of data relating to Data Quality Assurance.
Data published for Guadeloupe: fishing activity data, fleet economic and social data.	Fishery in Guadeloupe summary for 2018 (Weiss *et al.*, 2019a).
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	

Strength	Description and evidence
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Large legal arsenal to regulate fisheries in Guadeloupe: conservation measures for species (closed season, ban on gears), no fishing zone when suspicion of Chlordecone poisoning etc.	ARRETE n° 971-2019-08-20-003 Arrêté portant réglementation de l'exercice de la pêche maritime de loisir en Guadeloupe et à Saint-Martin *e.g.*, ban on conch extended to the end of 2021 (2 year ban). ARRETE n° 2002 / 1249 / PREF / SGAR / MAP portant réglementation de l'exercice de la pêche maritime côtière dans les eaux du Département de la Guadeloupe.
Selection of appropriate controls and measures at correct levels of coverage	
Training	Outreach and training efforts have been deployed to encourage fishers to report, in a general effort to better document fishing activities to be eligible for European subsidies, especially in terms of accounting and social contributions to different tax and contribution regime. Operational Units receive regular training on MCS through Ecole Nationale de la Sécurité et l'Administration de la Mer, National School for Sea Security and Administration (ENSAM). Specific training for Police and Customs officers related to fisheries are also regularly organized.
New fisheries in development	CRPMEM (discussed during interview with the Committee in January 2021) is currently conducting a study on the likely opportunities to fish a deepwater squid, the diamond squid (*Thysanoteuthis rhombus*).
Potential for fleet renewal	Potential to exploit deep sea stocks. Such fleet renewal would enhance the safety of fishers fishing in the deeper waters, including the need for boats to have facilities for fishers to stay at sea overnight. In this respect, CRPMEM have initiated studies to create a modern *Saintoise* with 2 models: one to replace the day-trip boat and one to create a new model to stay overnight.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
MCS activities with priority in fighting against IUU fishing	2 years subnational MCS plan. The plan defines objectives for controls and enforcement.

Strength	Description and evidence
MCS training	Operational Units receive regular training on MCS through Ecole Nationale de la Sécurité et l'Administration de la Mer, National School for Sea Security and Administration (ENSAM[1]). Specific training for Police and Customs officers related to fisheries.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

Fisheries in Guadeloupe are declining. This can be seen as a major Weakness of the sector given that most of seafood is imported: 70% of vessel owner are above 46 years old (Weiss *et al.*, 2020) and fishing conditions are tough given the operation mode (multi gear from a non-specialized boat).

Regarding knowledge of exploited stocks, it was mentioned that they are well identified and monitored. One Weakness of the system is the level of detail of exploited stocks, known and monitored at the level of the family rather than at species level. As the fishing sector in Guadeloupe is multigear and multi species, more than 180 species are caught and monitoring at species level can be difficult. In terms of assessment, few known stocks are assessed; assessed stocks are large pelagics under ICCAT. Demersal stocks, which constitute an important portion of catches are not formally assessed. A first study was conducted to make a first assessment of 13 major demersal species. Preliminary results were not as positive as the similar study conducted in Martinique: uncertainties on assessment results were high with missing data, especially related to catch / effort data and biological one.

In terms of compliance to DCF, gaps have been identified with lack of recreational fisheries information, and of socio-economics data. Actions have been already taken to address these gaps.

Table 3: Summary of Weaknesses Identified for Guadeloupe

Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Some stocks are monitored at family level, not at species level	Weiss *et al.*, 2020.
Only 5 stocks, (large pelagics) are assessed out of 59 known stocks; a preliminary assessment was conducted for 13 demersal stocks using data limited models but with uncertain results	The 5 stocks which have been assessed have all been conducted by ICCAT. None have been assessed by French authorities.

Weakness	Description and evidence
	A study was conducted in 2020 (Pawlowski *et al.*, 2021) to assess stock status for 13 main demersal species in Guadeloupe as it was done in 2020 for Martinique. Results in Guadeloupe were more uncertain than in Martinique. 11 species could be assessed and represented on a kobe plot. Authors highlighted uncertainties on these computed status using data limited models, especially because of short catch and effort available time series. Recommendations to improve data for better stock assessment were made, especially to increase the level of granularity of collected data for catch and effort (at species not family level), increase quantity of biological data collected, increase knowledge of recreational fisheries impact, development of new tools on the medium term to ease biological data collection. (reference to the publication: Pawlowski *et al.*, 2021, Evaluation des ressources démersales du plateau insulaire guadeloupéen. Rapport de contrat Ifremer 19/1000520, 75 p.)
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
Fisheries sector development strategy to go fishing further and deeper has the risk of threatening these ecosystems and stocks, which status are not known	Closing of coastal areas because of Chlordecone.
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Catches and number of fishers have been divided by two over the last 10 years for several reasons, the hard sea and operation conditions make work harsh and not appealing for young people.	Ifremer statistics shows this decrease (Weiss *et al.*, 2020) and the average age of fishers. Discussion with fishers and local authorities highlighted the hard condition of fishing and the need to fish further from the home port.
Polyvalent fishing	This make stock assessment difficult as effort cannot be standardised easily.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
Data flow in the ORs is not considered to be as good as the mainland.	Compared to the mainland, data flow is not considered to be good in the ORs. One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed.

Weakness	Description and evidence
Outsourcing of data collection to EI Groupe	The disadvantages of outsourcing are that there is no direct supervision by Ifremer, therefore there is a risk of misunderstanding of some aspects of data collection (methodology for biological sample when collecting catch / effort information). In addition, the renewal of the contract can lead to periods without data collection in place (such as 2016 and 2017), while with staff turnover there is a need to rebuild the trust with fishers.
Difference in species reported	CRPMEM highlighted that some species reported in logsheets (deep shrimp) were not present in Ifremer stocks and these data have not yet been formally compared to Ifremer results. During stakeholder interviews CRPMEM raised concerns about the validity of the Ifremer methodology and coverage of fishers by data collectors during January 2021 meeting.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
No dedicated staff in Ifremer to supervise DCF activities in Guadeloupe	Ifremer in Martinique stated that there are issues in the quality of collected data, highlighting the need for a dedicated staff to interact with the local team in Guadeloupe, to review more closely results and to provide capacity building when needed. DPMA considers that the major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff: having experts in the field. Regarding IRD, there can be limitations if there are urgent requests done which had not been planned/budgeted, as they are running at full capacity, so unexpected tasks are an issue.
Turnover of data collectors and issues with recruitment	From field feedback Trust of fishers needs to be regained with the risk on quality of collected data.

Weakness	Description and evidence
	Recruitment within Ifremer is an issue, as recruiting someone means training and takes time, so it is often easier to not hire new staff. Generally speaking, there is very little competition for data collection calls for tenders in the ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, whilst requiring a certain amount of expert knowledge).
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Difficulty in application and obtention of EMFF.	Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French *Cours Des Comptes*. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.
EMFF funding cannot be use to hire long-term staff	A lack of human resources is a key issue however, the use of EMFF funding is restricted and can only be used to hire contractors.
There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
STECF analysis (2020) of DCF Work Plans and Annual Reports	The analysis concluded that there was a lack of specific mention of the individual ORs in the work plans and annual reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds.

Weakness	Description and evidence
No information on recreation fisheries	
No data on ETP species	In statistics reported by Ifremer, no data are available specifically on ETP species. This is explained by the fact that Guadeloupe regulation bans the catch of sea turtles, mammals and corals. It is unclear though if there are no catches of ETP species or if catches are just not recorded.
Limited socio-economics data	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	

Weakness	Description and evidence
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
Limited biological data for stock assessment; catch and effort time series too short for good data limited model result	A study was conducted in 2020 (Pawlowski *et al.*, 2021) to assess stock status for 13 main demersal species in Guadeloupe as it was done in 2020 for Martinique. Results in Guadeloupe were more uncertain than in Martinique. 11 species could be assessed and represented on a kobe plot. Authors highlighted uncertainties on these computed status using data limited models, especially because of short catch and effort available time series. Recommendations to improve data for better stock assessment were made, especially to increase the level of granularity of collected data for catch and effort (at species not family level), increase quantity of biological data collected, increase knowledge of recreational fisheries impact, development of new tools on the medium term to ease biological data collection. (reference to the publication: Pawlowski *et al.*, 2021, Evaluation des ressources démersales du plateau insulaire guadeloupéen. Rapport de contrat Ifremer 19/1000520, 75 p.)
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Lack of regulation in regards to deep water fisheries	The CRPMEM General Secretary recalled article 349 of EU treaty, recognizing the specificity of fishing activities within the ORs, and the urgent need to have tailored legislation framework developed for the ORs, including the Guadeloupe fisheries sector.
Selection of appropriate controls and measures at correct levels of coverage	
Average age of vessel	In the Guadeloupe fleet, the average age of a vessel is 17 years.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As opportunities are external, an Outermost Region cannot easily 'create' Opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any Opportunities that appear. For example, an opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

For Guadeloupe, no Opportunities were identified.

Table 4: Summary of Opportunities Identified for Guadeloupe

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	

Opportunities	Description and evidence
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	

Opportunities	Description and evidence
Improve legislation of deep-sea fisheries	The Outermost Region Advisory Council could recommend for Guadeloupe that the legislation should be adapted to accommodate regional specificity (*i.e.*, depth is very high close to shore in Martinique and Guadeloupe).
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.4 Threats

Threats are an external factor, *i.e.*, originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

No Threats were identified for Guadeloupe.

Table 5: Summary of Threats Identified for Guadeloupe

Threats	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing)	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	

Threats	Description and evidence
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally)	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	

Threats	Description and evidence
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for Guadeloupe. This goes further than a traditional SWOT analysis and looks to match individual Strengths, Weaknesses, Opportunity and Threats together to help identify recommendations that could be implemented to improve data collection in Guadeloupe. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of Opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the opportunity to be realised. An external Opportunity may occur when an external Threat (*e.g.,* climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None identified	**"Attractive options"** • None identified
Threats	**"Threats that can be defended"** • None identified	**"High risk scenarios"** • None identified

	Threats
Opportunity	**"External Opportunities"** • None identified

	Weakness
Strength	**"Internal Opportunities"** • Availability of data limited models to assess stocks • Ifremer are starting to expand stock assessments to other species • Training to encourage fishers to report catch and other data • Clear institutional set up is in place to support further data collection • There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised • External funding could be utilised to fill gaps in data assessment and collection *e.g.*, demersal stocks • There is a committee already established to review socio-economic data and should be utilised to support further data collection if required • 2-year sub-national Plan in place that defines objectives for control and enforcement

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, *i.e.*, there is a need to adjust focus and reprioritise.

For Guadeloupe, no 'Natural Opportunities' were identified.

Table 7: Summary of Strength and Opportunity Combinations Identified for Guadeloupe.

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats *e.g.*, financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many Threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For Guadeloupe, no 'Threats that can be defended' were identified.

Table 8: Summary of Strength and Threat Combinations Identified for Guadeloupe.

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities *e.g.*, poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

No 'Attractive Options' were identified for Guadeloupe.

Table 9: Summary of Weakness and Opportunity Combinations Identified for Guadeloupe.

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For Guadeloupe, no 'High Risk Scenarios' were identified.

Table 10: Summary of Weakness and Threat Combinations Identified for Guadeloupe

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the opportunity to be realised.

For Guadeloupe, several 'Internal Opportunities' were identified. Ifremer is beginning to improve knowledge on stocks that have not yet been assessed and alternative methods are available to assess stocks which are data limited. The centralised SIH could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised. Regional collaborations could be exploited to support further stock assessments and improve fisheries knowledge and external funding could be utilised to fill gaps in data assessment and collection.

Table 11: Summary of Strength and Weakness Combinations Identified for Guadeloupe

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Studies to assess level of knowledge for 12 main species stock assessment, and as a consequence, implementation of streamline biological data study.	Demersal stocks are not assessed.	Ifremer is starting to improve knowledge on stocks that have not yet been assessed.
•	Availability of data limited models for 12 stocks.	Only 5 stocks are assessed out of 59.	Alternative methods are available to assess stocks which are data limited.
•	Training.	Only 5 stocks are assessed out of 59 but 12 could be assessed using data limited models.	Outreach and training efforts to encourage fishers to report catch and other data that could be used for a data limited style assessment.
•	SIH has a central role in providing methodologies, sampling scheme and workplan for field activities.	Only 5 stocks are assessed out of 59.	There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised.
•	Regional participation.	Only 5 stocks are assessed out of 59.	Regional collaborations could be exploited to support further stock assessments and improve fisheries knowledge.
•	External funding to support ad hoc studies to fill gaps.	Only 5 stocks are assessed out of 59.	External funding could be utilised to fill gaps in data assessment and collection *e.g.*,, demersal stocks.

#	Strength	Weakness	Description and evidence
2. Institutional structures			
•	A transversal SIH Steering committee with all fisheries stakeholders is in place in Guadeloupe to yearly review data related progress and issues.	Limited socio-economic data.	There is a committee already established to review socio-economic data and should be utilised to support further data collection if required.
•	A clear institutional setup is in place for data collection in France.	No data on ETP species.	There is a good institutional structure in place in Guadeloupe to support monitoring of ETP interactions. (Note: there is no local Ifremer in Guadeloupe which may limit this 'internal opportunity').
3. Funding and funding structures for data collection			
•	External funding to support ad hoc studies to fill gaps.	Difficulty in application and obtention of EMFF.	Alternative funds could be used to fill data gaps.
4. Current state of data collection obligations			
•	Studies with external funding to fill gaps for socio economics and recreational fisheries.	No information on recreation fisheries.	Alternative funding could be used to fill knowledge gaps in the recreational fishery.
•	Studies with external funding to fill gaps for socio economics and recreational fisheries.	Limited socio-economic data.	Alternative funding could be used to fill knowledge gaps in the socio-economic data.
•	External funding to support ad hoc studies to fill gaps	No data on ETP species.	Alternative funding could be sourced to support studies and data collection on ETP interactions. (Note: catches of sea turtles, mammals and corals species are banned in Guadeloupe but this is different to interactions which could lead to incidental mortality).
5. Fisheries management and conservation measures			
•	MCS activities with priority in fighting against IUU fishing.	Some stocks are monitored at family level, not at species level.	2-year sub-national Plan in place that defines objectives for control and enforcement.

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an Opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For Guadeloupe, no 'External Opportunities' were identified.

Table 12: Summary of Opportunities and Threats Combinations Identified for Guadeloupe

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

Saint Martin

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Saint Martin SWOT Report

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Acronyms

Acronym	Definition
DCF	Data Collection Framework
DPMA	Le Directeur de la Direction des pêches maritimes et de l'aquaculture
EMFF	European Maritime and Fisheries Fund
GEI	Groupe EI
IRD	The Research Institute for Development
IUU	Illegal, Unreported and Unregulated Fishing
MAP	Multi-Annual Plan
MCS	Monitoring, Control and Surveillance
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SIH	Système d'informations halieutiques
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e., EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities, and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities, and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for St Martin, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for St Martin

	Positive	Negative
Internal	**STRENGTHS** • Fisheries sector is similar to Guadeloupe, with predominance of small scale fisheries. Only 20 vessels are registered in St Martin • Effort information collected by telephone by Groupe EI on behalf of Ifremer • Funds available to support data collection activities • Same legal framework for fisheries management and conservation applies to St Martin as in Guadeloupe	**WEAKNESSES** • No catch data collected • No dedicated staff in Ifremer Martinique to monitor Guadeloupe activities • Risk of break in data collection activities related to external vendor contract renewal • No routine data collection on socio economic data and for recreational fisheries • No assessment of demersal stocks (reef fish, deep fish)
External	**OPPORTUNITIES** None identified	**THREATS** None identified

3 SWOT Definition

The following four sections identify individual Strengths, Weaknesses, Opportunities and Threats identified for St Martin. Each element identified is given a unique number for future reference, fully described and evidence given.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc. For example, a Strength could be an internal organisation with the capacity to collect length frequency data of catches that is required under the DCF framework.

A major Strength related to data collection in St Martin is collection of effort for its active fleet; this is conducted by Groupe EI, the sub-contractor collecting data on behalf of Ifremer in Guadeloupe. The fishing fleet is rather small in St Martin (not more than 20 active vessels a year) and no other data are collected. This limited data collection activity is financially supported by EMFF through funding of Groupe EI (see Guadeloupe report for more details) as included in Guadeloupe data collection support. Collected data are punched in IFREMER SIH although no specific reporting is done by Ifremer compared to other ORs.

Regarding legal framework and management measures, a major Strength is that professional fishing activities, although limited in St Martin are regulated with the same arsenal as in Guadeloupe. Both were under the same administrative entity until 2007. Recreational fisheries are also regulated by common decrees between Guadeloupe and St Martin. The extend of recreational fisheries is not known.

Table 2: Summary of Strengths Identified for St Martin

Strengths	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
A clear institutional setup is in place for data collection in France	See institutional scheme in St Martin profile (Annex 2).

Strengths	Description and evidence
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	Discussion with Ifremer Martinique and Brest. Weiss *at al.*, 2018 and 2019 describing methodologies however effort data are not published by SIH.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
IFREMER has a predominant role in St Martin to collect data and produce reports	Ifremer website (https://wwz.ifremer.fr/Expertise/Peches-maritimes/Collecte-de-donnees-halieutiques-dans-le-cadre-de-la-politique-commune-de-la-peche) Ifremer is responsible for 90% of data collection though in St Martin, the actual data collection is outsourced to the Groupe EI (GEI) team.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Full funding of data collection activities	DCF data collection funding comes from two main sources: EMFF and national budget.
Management model of EMFF funds (e.g., managed regionally, centrally).	
France National Budget covers 20% of data collection funds not eligible to EMFF (actually more 40% according to Ifremer)	IFREMER received in 2017 €154 Million. IFREMER Martinique (supervises Guadeloupe activities, collected data in St Martin) has a budget of €189,251 in 2017.
EMFF	France received for EMFF 2014-2020 €588 Million EMFF 2014-2020 funds for St Martin: €80,412.55 DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth.

Strengths	Description and evidence
EMFF measures on data collection referred to in Article 77	Measures on data collection referred to in Article 77 for EMFF DCF data collection represents €66,146,872 Ifremer indicated that activities related to data collection in Guadeloupe represented a total of €375,815.45 in 2019. A small part is dedicated to interviewing the 20 fishers from St Martin. Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess. FranceAgrimer received €35k for the 2014-2020 period.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	

Strengths	Description and evidence
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Large legal arsenal to regulate fisheries in St Martin: conservation measures for species (closed season, ban on gears), no fishing zone when suspicion of Chlordecone poisoning etc.	ARRETE n° 971-2019-08-20-003 Arrêté portant réglementation de l'exercice de la pêche maritime de loisir en Guadeloupe et à Saint-Martin. ARRETE n° 2002 / 1249 / PREF / SGAR / MAP portant réglementation de l'exercice de la pêche maritime côtière dans les eaux du Département de la Guadeloupe.
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

The major Weakness regarding data collection and fishing activities monitoring in St Martin is the lack of data: only effort data (activity calendar) are collected from the few active fishers in St Martin. No data are published through the SIH and no information is available on recreational fisheries. This is certainly related to the limited size of the fleet (less than 20 active vessels per year) and the fact that St Martin and Guadeloupe used to be under the same administrative entity until 2007 and were divided in two separate entities before SIH came into force: no effort was made to include St Martin in the deployment of sample based survey approach as in Guadeloupe (as it might not have been statistically sound to take sample for 20 vessels). As a consequence to the lack of data on stock, stocks are not identified and not assessed.

Fishing fleets exploiting these stocks are not described either: information from third parties indicated that its composition is similar to Guadeloupe (multigear / multispecies). Effort information is punched into SIH: at least analysis and similar summary as per Guadeloupe and Martinique should be published on the "quartier Maritime" of St Martin describing the fleet.

Another major Weakness in terms of monitoring is the lack of information on recreational fisheries. St Martin is known to be a popular island for tourism. It is crucial to assess impact of recreational fisheries on the ecosystem.

St Martin is not included in the DCF. France has an obligation to monitor its fisheries in all its territories but it can't be concluded that France doesn't comply to DCF for St Martin as this OR is not specifically mentioned in the DCF.

Table 3: Summary of Weaknesses Identified for St Martin

Weaknesses	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
No identification of stock	No literature could be found precisely describing the different stocks / métiers operating in St Martin. Data collection in St Martin are limited, with all collection done by Groupe EI through telephone interview under the exclusive supervision of Ifremer Martinique.
No catch data available	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	

Weaknesses	Description and evidence
No information on vessel composition	No literature could be found precisely describing the different stocks / métiers operating in St Martin.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
Data collection not considered as good compared to Mainland	Data flow in the ORs is not considered as good as in mainland France. This is because reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Lack of manpower	In particular are the lack of local staff in the ORs, including fisheries experts in the field. Although monies can be obtained through EMFF, this does not cover hiring long term staff. Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which had not been planned/budgeted.
Limited competition for data calls	There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	

Weaknesses	Description and evidence
Major issue with the way the DCF funding works	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period. Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French *Cours Des Comptes.*
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
No data available in St Martin. France does not comply to its obligation to monitoring fisheries in general	Importantly, no data are collected on catch within St Martin or information associated with fisheries.
St Martin is not part of DCF	
No information on the recreational or sports fishery.	No information is available on recreational fishery within the St Martin. Given that the island is highly touristic, the impacts of sport fishing on stocks is expected to be important.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
VMS is not mandatory	Because all vessels are below 12 m.
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	

Weaknesses	Description and evidence
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As Opportunities are external, an Outermost Region cannot easily 'create' Opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any Opportunities that appear. For example, an Opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

No Opportunities were identified for St Martin.

Table 4: Summary of Opportunities Identified for St Martin

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	

Opportunities	Description and evidence
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	

Opportunities	Description and evidence
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

No Threat could be identified in St Martin. IUU fishing with the proximity of Anguilla could exist but no confirmation could be obtained from local authorities.

Table 5: Summary of Threats Identified for St Martin

Threats	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	

Threats	Description and evidence
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	

Threats	Description and evidence
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for St Martin. This goes further than a traditional SWOT analysis and looks to match individual Strengths, Weaknesses, Opportunity and Threats together to help identify recommendations that could be implemented to improve data collection in St Martin. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal Opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the Opportunity to be realised. An external Opportunity may occur when an external Threat (e.g., climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Priorities"** • None identified	**"Attractive Options"** • None identified
Threats	**"Threats that can be defended"** • None identified	**"High Risk Scenarios"** • None identified

	Threats
Opportunity	**"External Opportunities"** • None identified

	Weakness
Strength	**"Internal Opportunities"** • Funding is available to support data collection

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For St Martin, no 'Natural Opportunities' were identified.

Table 6: Summary of Strength and Opportunity Combinations Identified St Martin

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For St Martin, no 'Threats that can be defended' were identified.

Table 7: Summary of Strength and Threat Combinations Identified for St Martin

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an Opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

For St Martin, no 'Attractive Options' were identified.

Table 8: Summary of Weakness and Opportunity Combinations Identified for St Martin

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For St Martin, no 'High Risk Scenarios' were identified.

Table 9: Summary of Weakness and Threat Combinations Identified for St Martin

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the Opportunity to be realised.

The only 'Internal Opportunity' that was identified for St Martin was the utilisation of EMFF funds to support further data collection in the OR, including socio-economic and recreational data. Collection of recreational data for St Martin has been highlighted as an important issue.

Table 10: Summary of Strength and Weakness Combinations Identified for St Martin

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	EMFF funds available.	No data available in St Martin. France does not comply to its obligation to monitoring fisheries in general.	Funding is available to support data collection in St Martin.
●	EMFF funds available.	No information on the recreational or sports fishery.	Funding is available to support data collection in St Martin.
5. Fisheries management and conservation measures			
●	None identified		

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an Opportunity could be occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For St Martin, no 'External Opportunities' were identified.

Table 11: Summary of Opportunities and Threats Combinations Identified for St Martin

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

French Guiana

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

French Guiana SWOT Report

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Acronyms

Term	Definition
DCF	Data Collection Framework
DCSMM	Directive Cadre Stratégie pour le Milieu Marin (The Directorate General of Maritime and Aquaculture Fishing)
DPMA	Direction des pêches maritimes et de l'aquaculture
EMFF	European Maritime and Fisheries Fund
IRD	Institut de recherche pour le développement
IUU	Illegal, Unreported and Unregulated Fishing
LEMNA	Laboratory of Economics and Management Nantes-Atlantique
MAP	Multi-Annual Plan
MCS	Monitoring, Control and Surveillance
MSY	Maximum Sustainable Yield
OFB	Office français de la biodiversité
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SIH	Système d'informations halieutiques
SSF	Small Scale Fisheries
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed as positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e. EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities and Threats to take advantage of strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for French Guiana, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for French Guiana

	Positive	Negative
Internal	**STRENGTHS** • Strong national institutional framework and policy for data collection, locally implemented by Ifremer and IRD • Exploited stocks are well identified and information is published (SIH) • ICCAT stocks are assessed • Funds are adequate to financially support current data collection activities • DCF obligations are fulfilled for most biological data • Complete and up-to-date legislation for management and conservation of resources in French Guiana	**WEAKNESSES** • Non-compliance to DCF obligations regarding socio-economic and recreational fisheries as no routine data collection • No assessment of most demersal stocks • Lack of staff resources at Ifremer to cover all activities
External	**OPPORTUNITIES** • Improve access to fisheries data by a wider audience • No conflicts between local fishermen and 3rd party vessels	**THREATS** • IUU fishing from neighbouring countries • Foreign landings and catches are not always recorded

3 SWOT Definition

The following four sections identify individual Strengths, Weaknesses, Opportunities and Threats identified for French Guiana.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc.

The main Strengths in French Guiana relate to a well-established national data collection system, with Ifremer at the centre, funded through EMFF at the national level. Most identified stocks are monitored (catches) and compliance with DCF is relatively good. The main exploited stocks are managed based on Ifremer's scientific advice.

Table 2: Summary of Strengths Identified for French Guiana

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
A few stocks are well identified	Several publications from the year 2000 to now describing the fisheries in French Guiana (Blanchet et Al, 2000; Blanchard et Al, 2018).
Exploitation of most identified stocks is monitored	Summary of catches & fleet and individual metiers fact sheets are published yearly by Ifremer. There are 43 species or species groups that are formally monitored.
New local species added to EU-MAP	Regarding French Guiana, the new EU-MAP list adds 3-4 coastal species (such as Green acoupa *Cynoscion virescens*). There are some exploratory samplings in the project as there is currently very little data available for stock assessment, but staffing remains an issue. But these being included in EU-MAP means that funds will be available.
Some important demersal stocks are assessed by Ifremer	Assessments are produced for DPMA for red snapper and shrimps.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	

Strength	Description and evidence
Data collection in France and its ORs is well structured and there is a national framework and institutional structure in place, with some specificities in ORs depending on the local context	See institutional organisation chart and data collection description in French Guiana profile (Annex 2). The overall reporting rate for the ORs is currently estimated at 50%. Data collection is well-coordinated and follows Observation *des Marées au débarquement* (OBSDEB) methodology.
IFREMER has a predominant role in French Guiana to collect data and produce reports	Ifremer website (https://wwz.ifremer.fr/Expertise/Peches-maritimes/Collecte-de-donnees-halieutiques-dans-le-cadre-de-la-politique-commune-de-la-peche). In French Guiana, landings and biological data are collected by Ifremer on most fisheries, though some sampling is done by a local contractor.
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	Discussion with Ifremer French Guiana and Brest Weiss et Al 2018 and 2019 describing methodologies. As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
N/A	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS.	
Regional collaboration	Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (e.g., working parties, scientific committee) to which France participates through the EU.
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection	
Full funding of data collection activities	DCF data collection funding comes from two main sources: EMFF and national budget.

Strength	Description and evidence
EMFF funding for France	France received for EMFF 2014-2020, €588M Total use of EMFF funds in French Guiana: €23,183,387 (as of December 2019) DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth.
EMFF under measures on data collection referred to in Article 77	Under measures on data collection referred to in Article 77 for EMFF DCF data collection represents €66 146 872.
Management model of EMFF funds (e.g., managed regionally, centrally)	
Management of French EMFF Funds	No specific EMFF funding for French Guiana related under measures on data collection referred to in Article 77 is identified. For French Guiana, between €180K and €270K have been yearly used by Ifremer (from their global EMFF under measures on data collection referred to in Article 77 budget line) for routine data collection over the last 3 years. Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
France National Budget covers 20% of data collection funds not eligible to EMFF (actually more 40% according to Ifremer)	IFREMER received in 2017 €154M.
Studies with external funding to fill gaps for socio economics and recreational fisheries	In 2021, a collaboration between Ifremer and LEMNA, with EMFF funds, will be started to improve socio-economic data collection for vessels <12 m.
Funding external to EMFF available	Convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer and not under DCF (Ifremer proposes actions, DPMA funds them). DCSMM: partnership with OFB/Marine parks to provide tools & services.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	

Strength	Description and evidence
Relatively good DCF compliance in French Guiana	Regarding French Guiana specifically, the STECF19-19 report concluded that " Despite a lower number of species sampled than required by the EU-MAP list, the species sampled represent 80% and 82% of the total in weight and value."
Globally Positive assessment of France compliance with EU-MAP	Assessment of France compliance with EU-MAP (STECF, 2019): Overall WP conformity with the legislation and guidelines. Overall, the MS complied with the legislation (EU-MAP and WP template) and WP guidelines and most issues that were identified were resolved at EWG 19-18. Overall good progress has been made in the provision of data relating to Data Quality Assurance.
List of activities that France will implement in 2020-2012 to comply with DCF: FISHING ACTIVITY DATA, ECONOMIC AND SOCIAL DATA, SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES	Definition of activities to be conducted by France for 2020-2021 (France, 2019)
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
National and international (EU and RFMOs) regulations apply in French Guiana	Relevant EU regulations apply to French Guiana due to its EU OR status.

Strength	Description and evidence
	All ICCAT and WECAFC regulations theoretically apply to French Guiana, but no species covered by ICCAT are fished in this OR, and WECAFC does not adopt binding management and conservation measures.
Ability to implement local regulatory measures	The Préfet de region has the authority to adopt local regulatory measures applying to French vessels and territorial waters (sovereignty).
Selection of appropriate controls and measures at correct levels of coverage	
Main commercial stocks covered by management measures	There are two specific EU management measure that apply to French Guiana: an access agreement with Venezuela, which allows Venezuelan longliners to fish for Red snapper in French Guiana waters; and the definition of a yearly TAC for the Peneid shrimp fishery.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
N/A	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
All local measures proposed are based on scientific evidence	DM or CRPMEM sends a request to Ifremer for scientific advice, then there is a discussion based on the advice provided. For example, there was a request from local industry (processing plants for which the Venezuelan vessels work) to increase the number of licenses for red snapper by 5 vessels, but, based on the stock assessment, Ifremer advised against it and the DM rejected the request.
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

The main Weaknesses in French Guiana, relate to knowledge of the status of stocks, particularly as many species are reported as undifferentiated groups. Two species are managed and assessed on a regular basis, but information isn't adequate to properly determine stock status, thus measures might not be appropriate. The importance of the informal sector (artisanal fishing boats/persons that are not professionals but that do sell a part of their catches outside of any legal framework) and the IUU sector further undermines the management of resources. There is also a distinct lack of socio-economic data and a lack of human resources is a big obstacle to better monitoring and management of the fisheries.

Table 3: Summary of Weaknesses Identified for French Guiana

Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
A minority of demersal stocks are assessed	There are 43 species captured in French Guiana that are formally monitored (at least landing data). Of these only 2 species are formally assessed: penaeid shrimps and Red snapper, both assessed by Ifremer. Their status is currently unknown so there is no way to know whether the fisheries exploiting them are sustainable or not.
Lack of appropriate data for the management of main stocks	The available data are too uncertain to draw conclusions about the state of the red snapper stock and fishery and therefore to recommend precise quantitative management measures. A fishery-independent study of the shrimp stock would be required to properly assess the fishery.
Most of the catches are reported undifferentiated	Exploited stocks in French Guiana are a mix of (i) a large number of coastal species, often undifferentiated, being dominated by one or two species, and (ii) a small number of species targeted by commercial fisheries. The main issue with catch composition in French Guiana is that only a small number of species are actually identified in catches, with a lot of them being landed as species groups by multi-specific fisheries.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	

Weakness	Description and evidence
The informal sector is very important	The informal sector is very important in French Guiana, but it is very difficult to collect data on this sector.
Very few artisanal fishing boats declare their catches	There are very few artisanal (coastal) fishing boats that declare their catches, and the data is of very poor quality, so Ifremer relies on sampling at landing by observers.
IUU fishing (estimates of illegal and unreported local overfishing)	
IUU fishing is a major issue	IUU fishing is a major issue, with catches roughly estimated to be at least equal to, if not higher than, legal catches. In French Guiana the various weakfish species are subject to increased IUU fishing in relation to a high demand from Asian markets for their swim bladders, which have value in traditional medicine.
Not all authorised foreign catches are declared	Venezuelan boats do not land the catches from the last trip of the year in French Guiana but in neighbouring countries, so there isn't any data on that last trip
Designated landing sites are not respected	Though there are mandatory designated landing sites, catches are landed along the whole coastline, which makes sampling difficult.
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
Data flow in the ORs is not considered to be as good as the mainland	One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
Lack of local research institutions	Apart from Ifremer, there are no research institutions in French Guiana involved in Fisheries.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
Lack of MCS data	Control data are not shared with scientists, as there is no local mandate for doing this sort of research.
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	

Weakness	Description and evidence
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Lack of human resources in research institutions	The major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF. There are only two Ifremer scientists, including the research station director and a stock assessment expert. Regarding biological sampling, the shrimp fishery is sampled by Ifremer, but other fisheries are not covered for staffing reasons. Regarding IRD, there are capacity limitations, as this organisation is running at full capacity. Such issues are likely if there are urgent requests which have not been planned/budgeted.
Fishers wary of "the State	Sensitivity of collecting socio-economic data, as fishers can be suspicious and wary that this information could be used for fiscal controls.
Lack of diversity/availability in the subcontractors market	There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
French administrative processes caused issues with actual funds allocation	Early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities.
DCF project-based funding processes not optimal for routine data collection	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
External funding for the majority of data collection activities	Most of the fisheries data collection activities are funded by an external source at the level of the EU (EMFF), and French Guiana or even France has no direct decision power.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	

Weakness	Description and evidence
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Almost no information on recreational fisheries	Recreative fishing is quite developed, but there is no monitoring or data collection, mostly for staffing reasons.
Limited socio-economics data	
Some species important for SSF are not covered by DCF	Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be should be extended.
STECF analysis (2020) of DCF Work Plans and Annual Reports	The analysis concluded that there was a lack of specific mention of the individual ORs in the work plans and annual reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
Some sampling issues due to lack of industry cooperation	There are issues with local processors of shrimps and red snapper, which sometime refuse to allow Ifremer to sample the catches they purchase from fishing boats.
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
Limited biological data available for stock assessment on most demersal stocks	Regarding biological sampling, the shrimp fishery is sampled by Ifremer, with no other fisheries covered for staffing reasons.
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	

Weakness	Description and evidence
Few local fishery regulations	There are very few provisions specific to French Guiana in terms of the regulation of professional maritime fisheries.
Selection of appropriate controls and measures at correct levels of coverage	
Management measures of main stocks are not adequate	According to the most recent red snapper stock assessments performed by Ifremer, the current management measure for that stock, that is a limitation of the number of boats allowed to fish, is not adequate to properly manage that stock. The available data are too uncertain to draw conclusions about the state of the red snapper stock and the fishery and therefore to recommend precise quantitative management measures. Ifremer's advice is that an annual TAC alone is probably not the best management measure and that in-year reassessment (adaptive management) seems to be the preferred option. Other management measures, in particular by means of fishing effort, could be envisaged but would require a very thorough study of the relationship between fishing effort and mortality. Finally, the setting of an alternative management objective to MSY is essential. The available data are too uncertain to draw conclusions about the state of the red snapper stock and the fishery and therefore to recommend precise quantitative management measures.
Vessel age	Vessels are approximately 15 years old.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As Opportunities are external, an Outermost Region cannot easily 'create' Opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any Opportunities that appear. For example, an Opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

In French Guiana, the two main target species (red snapper and shrimps) are not exploited by local fishermen, so their management doesn't cause any conflicts with local communities. Plans by French national authorities to develop a self-service web portal to access fishery data could also improve sharing of scientific information.

Table 4: Summary of Opportunities Identified for French Guiana

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
Improve access to fisheries data by a wider audience	Access to fisheries data for 3rd parties is free, but on request. This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data as in other agriculture sectors.
Improve access to fisheries data by a wider audience	
No conflicts between local fishermen and 3rd party vessels	There are thought to be no conflicts as the 3rd party vessels do not exploit the same resources as the local fishermen and nor is there an interest to develop a fishery on these resources because it would be too costly.
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	

Opportunities	Description and evidence
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	

Opportunities	Description and evidence
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e. bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

The main Threat to fishery resources in French Guiana is IUU fishing from neighbouring countries. The fact that catches of the last trip by Venezuelan liners fishing red snapper are not landed (or sampled) in French Guiana is also a Threat to proper stock assessment.

Table 5: Summary of Threats Identified for French Guiana

Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
IUU fishing is a major issue	IUU fishing is a major issue, particularly by vessels from neighbouring Suriname and Brazil.
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	

Threat	Description and evidence
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	

Threat	Description and evidence
Foreign landings are not always recorded	Catches from 1 trip out of about 10 by Venezuelan boats are not landed in French Guiana (not required by agreement).
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR)	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced)	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e. with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e. How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for French Guiana. This goes further than a traditional SWOT analysis and looks to match individual Strengths, Weaknesses, Opportunity and Threats together to help identify recommendations that could be implemented to improve data collection in French Guiana. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of Opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal Opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the opportunity to be realised. An external Opportunity may occur when an external Threat (e.g., climate change) can make use of external opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None were identified	**"Attractive Options"** • None were identified
Threats	**"Threats that can be defended"** • None were identified	**"High risk scenarios"** • A lack of MCS data and increased IUU fishing from third countries may lead to overfishing and reduced data on removals. • IUU from third parties is a major issue, and French Guiana is not prioritising MCS activities to combat this.

	Threats		Weakness
Opportunity	**"External Opportunities"** • None were identified	**Strength**	**"Internal Opportunities"** • Using regional collaboration to improve knowledge of fisheries. • Alternative funding sources (outside EMFF) could be utilised to plug gaps in data collection. • Implementation of local fishery regulations to protect locally important stocks.

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For French Guiana, no 'Natural Opportunities' were identified.

Table 7: Summary of Strength and Opportunity Combinations Identified for French Guiana.

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many Threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For French Guiana, no 'Threats that can be defended' were identified.

Table 8: Summary of Strength and Threat Combinations Identified for French Guiana.

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an Opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

For French Guiana, no 'Attractive Options' were identified.

Table 9: Summary of Weakness and Opportunity Combinations Identified for French Guiana.

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For French Guiana, the main 'High Risk Scenarios' that were identified were due to the high levels of IUU fishing from third countries that are occurring in combination with a lack of MCS data. If there continues to be a lack of MCS data, overfishing and IUU may increase unknowingly due to a lack of data on removals.

Table 10: Summary of Weakness and Threat Combinations Identified for French Guiana

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	Lack of MCS data	IUU fishing is a major issue	A lack of MCS data combined with IUU fishing could lead to overexploitation of stocks.
•	Lack of human resources in research institutions	IUU fishing is a major issue	Limited capacity to mitigate IUU and conduct research.
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	Lack of MCS data	Foreign landings are not always recorded.	Catches from 1 trip out of about 10 by Venezuelan boats are not landed in French Guiana which will reduce knowledge on removals and may result in increased IUU.
5. Fisheries management and conservation measures			
•	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the Opportunity to be realised.

In French Guiana, several 'Internal Opportunities' were identified where internal Weaknesses may be overcome by existing Strengths. In regards to knowledge of fish stocks and fishing activities, regional collaboration and stock assessments by ICCAT could be exploited to improve knowledge of fisheries and support stock assessment. France also has a clear and well-structured data collection system in place with roles clearly defined and a centralised data collection system (SIH) which provides a good basis to support improved data collection and potential for exploitation of new fisheries. Alternative funding to the EMFF, provides sources of funding to plug existing gaps in data collection and the ability to implement local fishery regulations provides French Guiana the possibility of improving management of locally important stocks.

Table 11: Summary of Strength and Weakness Combinations Identified for French Guiana

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Tuna and tuna-like species stocks are assessed by ICCAT	Lack of appropriate data for the management of main stocks	Wider range of data collection and assessment
•	New local species added to EU-MAP	A minority of demersal stocks are assessed	New species are being added to EU-MAP to improve data collection for assessment. This should be extended to cover more demersal species.
•	Regional collaboration	Lack of appropriate data for the management of main stocks	Good regional collaboration could help improve knowledge of fisheries
•	Regional collaboration	A minority of demersal stocks are assessed	Regional collaboration could be utilised to support data collection and fisheries knowledge of shared stocks.
•	SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	Limited biological data available for stock assessment on most demersal stocks	There is a centralised system in place which could be used to facilitate improved data collection as well as possible exploitation of other fisheries which may be underutilised.
•	New local species added to EU-MAP	Some species important for SSF are not covered by DCF	New species of local importance have previously been added to the EU-MAP. This should be reviewed to determine whether additional species should be added.

#	Strength	Weakness	Description and evidence
2. Institutional structures			
•	Data collection in France and its ORs is well structured and there is a national framework and institutional structure in place	Limited biological data available for stock assessment on most demersal stocks.	There is a strong institutional structure in place in French Guiana that could support improved data collection.
3. Funding and funding structures for data collection			
•	Funding external to EMFF available.	DCF project-based funding processes not optimal for routine data collection.	Alternative funds available that could be exploited to support data collection.
•	Studies with external funding to fill gaps for socio economics and recreational fisheries	Almost no information on recreational fisheries.	External funding is available to help fill gaps in recreational fisheries and also to collect socio-economic data.
•	Studies with external funding to fill gaps for socio economics and recreational fisheries	Limited socio-economic data.	Studies with external funding to fill gaps for socio economics and recreational fisheries
•	Funding external to EMFF available	A minority of demersal stocks are assessed.	External funding is available to potentially support additional data collection and assessment.
•	Funding external to EMFF available	Lack of local research institutions.	External funding could be used to support additional research or used to hire external consultancies to conduct studies.
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	Ability to implement local regulatory measures	Few local fishery regulations.	The Préfet in the region should adopt locally important regulatory measures where gaps currently exist.
•	Ability to implement local regulatory measures	Management measures of main stocks are not adequate.	The Préfet in the region should adopt locally important regulatory measures where gaps currently exist. Note this would not be applicable for the red snapper fishery, which is managed at the level of the EU.

4.6 Opportunities and Threats- "External Opportunities"

An external Opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an Opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

In French Guiana, no 'External Opportunities' were identified.

Table 12: Summary of Opportunities and Threats Combinations Identified for French Guiana

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

Mayotte

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Mayotte SWOT Report

MRAG Europe · MRAG Limited · azti tecnalia · Cefas

DTU Technical University of Denmark · Marine Institute Feras na Mara

IPMA · THÜNEN · WAGENINGEN UNIVERSITY & RESEARCH

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Acronyms

Term	Definition
DCF	Data Collection Framework
DCSMM	Directive Cadre Stratégie pour le Milieu Marin
DMSOI	Direction de la mer à Mayotte
DPMA	Direction des pêches maritimes et de l'aquaculture
EEZ	Exclusive Economic Zone
EMFF	European Maritime and Fisheries Fund
EU OR	European Outermost Regions
IOTC	Indian Ocean Tuna Commission
IRD	Institut de recherche pour le développement
IUU	Illegal, Unreported and Unregulated Fishing
LEMNA	Laboratory of Economics and Management Nantes-Atlantique
MAP	Multi-Annual Plan
MCS	Monitoring, Control and Surveillance
OFB	Office français de la biodiversité
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SIH	Système d'informations halieutiques
SSF	Small Scale Fisheries
STECF	Scientific, Technical and Economic Committee for Fisheries
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (Strengths and Weaknesses) are those related to the system under evaluation; the external scope (Opportunities and Threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e., EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities, and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities, and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for Mayotte, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for Mayotte

	Positive	Negative
Internal	**STRENGTHS** • Strong national institutional framework and policy for data collection, locally implemented by Ifremer and IRD • Funds are adequate to financially support current data collection activities • DCF obligations are fulfilled for most biological data • Complete and up-to-date legislation for management and conservation of resources in Mayotte	**WEAKNESSES** • Stocks delimitations and status is unknown • Non-compliance to DCF obligation regarding socio-economic or recreational fisheries due to no routine data collection. • Most stocks are not assessed • Informal and IUU fishing is widespread • Local institutional framework lacking staff resources • Fisheries policing not a priority
External	**OPPORTUNITIES** • Improve access to collected fisheries data	**THREATS** • IUU fishing from neighbouring Comoros is widespread

3 SWOT Definition

The following four sections identify individual Strengths, Weaknesses, Opportunities, and Threats identified for Mayotte.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc.

In Mayotte, local small-scale fisheries are opportunistic and thus resilient. The main Strengths relate to a well-established national data collection system, with OFB collecting data on behalf of Ifremer, funded through EMFF at the local level. Most identified stocks are monitored (catches) and compliance with DCF is relatively good. There is an adequate body of fisheries regulations addressing specific local issues.

Table 2: Summary of Strengths Identified for Mayotte

Strengths	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Opportunistic, resilient fisheries	Mayotte fisheries are artisanal, opportunistic, and catch a wide range of species.
Stocks are well identified	50 species in the catch are monitored.
Development of new fisheries towards better monitored and managed stocks	In the context of the fleet renewal process, there are plans to develop local fisheries away from the overexploited and fragile lagoon/reef stocks to more pelagic resources, such as tuna and tuna-like species.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing)	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
Data collection in France and its ORs is well structured and there is a national framework and institutional structure in place, with some specificities in ORs depending on the local context	See institutional organisation chart and data collection description in Mayotte profile (Annex 2). The overall reporting rate for the ORs is currently estimated at 50%. Data collection is well-coordinated and follows *Observation des Marées au débarquement* (OBSDEB) methodology.

Strengths	Description and evidence
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	Discussion with OFB Mayotte, Ifremer Réunion and Brest. Weiss *et al.*, 2018 and 2019 describing methodologies. As Ifremer and IRD are the key actors in data collection, they are able to use raw data collected in the SIH to provide answers to advice requests.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
N/A	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
Regional collaboration	Ifremer and IRD also contribute scientific expertise to the various RFMO and RFB science bodies (e.g., working parties, scientific committee) to which France participates through the EU.
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Full funding of data collection activities	DCF data collection funding comes from two main sources: EMFF and national budget.
Management model of EMFF funds (e.g., managed regionally, centrally).	
France National Budget covers 20% of data collection funds not eligible to EMFF (actually more 40% according to Ifremer)	IFREMER received in 2017 €154 M.
EMFF	France received for EMFF 2014-2020 €588 M Total use of EMFF funds in Mayotte: €4,685,541 (as of December 2019) DPMA is the single EMFF management authority for France. Each institution has to submit a request for funding to DPMA. As the request covers funding of data routine collection under DCF, the overall validation process is quite smooth.

Strengths	Description and evidence
EMFF under measures on data collection referred to in Article 77	Under measures on data collection referred to in Article 77 for EMFF DCF data collection represents €66,146,872. Mayotte received specific EMFF funding related to measures on data collection referred to in Article 77, to fund the data collection activities by OFB: €698,475. For Mayotte, between €270K and €180K have been used each year for routine data collection over the last 3 years. Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
External funding to support ad hoc studies to fill gaps	Other sources of funding for data collection come from the national budget, through grant agreements, conventions etc. DG MARE and EASME can also contribute to funding specific projects or research activities. The following point could use additional funding: Collection of new data; New DCF data collection obligation on recreational fisheries; Coverage of informal fisheries; Extension of biological data collection.
Funding external to EMFF available	Convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer and not under DCF (Ifremer proposes actions, DPMA funds them). DCSMM: partnership with OFB/Marine parks to provide tools & services. In Mayotte, data are collected following SIH protocols and entered/stored using SIH tools.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Globally Positive assessment of France compliance with EU-MAP	Assessment of France compliance with EU-MAP (STECF, 2019): Overall, the MS complied with the legislation (EU-MAP and WP template) and WP guidelines and most issues that were identified were resolved at EWG 19-18.

Strengths	Description and evidence
	Overall good progress has been made in the provision of data relating to Data Quality Assurance.
List of activities that France will implement in 2020-2012 to comply with DCF: FISHING ACTIVITY DATA, ECONOMIC AND SOCIAL DATA, SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES	Definition of activities to be conducted by France for 2020-2021 (France, 2019).
Studies with external funding to fill gaps for socio economics and recreational fisheries	In 2021, a collaboration between Ifremer and LEMNA, with EMFF funds, will be started to improve socio-economic data collection for vessels <12m.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Adequate body of fisheries regulations addressing specific local issues in Mayotte	Including having the whole Mayotte lagoon as a Marine Park.
National and international (EU and RFMOs) regulations apply in Mayotte	All IOTC regulations apply to Mayotte due to the EU's status Contracting Party. All EU regulations apply to Mayotte due to its EU OR status.
Selection of appropriate controls and measures at correct levels of coverage	
Local measures in force	The sea cucumber fishery has been closed since 2004, due to stock status concerns. This shows evidence of scientific advice in management measures.

Strengths	Description and evidence
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
Observer programme	IRD does some data collection in Mayotte related to depredation of catches by sharks and marine mammals, as part of their observer programmes on board of large-scale fishing vessels.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

The main Weaknesses in Mayotte, relate to knowledge of the status of stocks, particularly as many species are reported as undifferentiated groups. The importance of the informal and IUU sector further undermines the management of resources, especially since fisheries policing is not a priority. There is no local Ifremer implantation, so data collection is done for them by OFB. There is also a distinct lack of socio-economic data and a lack of skilled human resources is a big obstacle to better monitoring and management of the fisheries.

Table 3: Summary of Weaknesses Identified for Mayotte

Weaknesses	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Stock delimitations and status are mostly unknown.	The composition of catches is largely dominated by a "marine fishes nei" group, followed by "other species nei". Exploited stocks can be effectively defined as a large group of species with only a small number of species actually identified in catches.
Most stocks are not assessed	Only a small number of large pelagic stocks are assessed, because they are under IOTC mandate. General lack of biological sampling, other than size frequency. Of the approximately 50 species in which catch are monitored, only 5 (10 %) are formally assessed; these are species covered and assessed by IOTC. There is no formal stock assessment for non-tuna like species in Mayotte. OFB described that due to the highly opportunistic nature of the artisanal fisheries within Mayotte, it is nearly impossible to collect all the data required to conduct proper stock assessments of the majority of species fished.

Weaknesses	Description and evidence
	Ifremer and IRD mentioned that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be extended so that species important for the ORs can be covered by EMFF. In Mayotte specifically, the new EU-MAP adds one single species to be covered, Bluefin trevally (*Caranx melampygus*), but the local fisheries are so opportunistic that catches of that species are below the threshold for mandatory data collection. Several DCF species are not part of the work plan: Tuna-like fish (*Scombridae*), Swordfish (*Xiphias gladius*), Other billfishes (*Istiophoridae*) and Dolphinfish (*Coryphaena hippurus*).
Most demersal stocks are not assessed	
Exploited stocks in Mayotte are all within the EEZ, and are mostly coastal catches	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides)	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational)	
Informal sector not covered by DCF	As the informal sector is not covered by the DCF, data are difficult to collect and its study is mostly based on requests by local/regional authorities to answer specific questions.
Polyvalent fishing	This make stock assessment difficult as effort cannot be standardised easily.
IUU fishing (estimates of illegal and unreported local overfishing)	
Informal and IUU fishing is widespread	Informal fishing is widespread and often conducted by boats belonging to commercial, licensed fishers. There are approximately 300-400 unlicensed boats in Mayotte, for about 140 licensed boats.
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
Data flow in the ORs is not considered to be as good as the mainland	One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed.
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	

Weaknesses	Description and evidence
No Ifremer implantation in Mayotte	In Mayotte, landings and biological data is collected by OFB following SIH protocols and entered/stored using SIH tools. This introduces an extra level to data collection.
Some inconsistencies between institutions	Since 2014, paper fishing logbook information hasn't been processed by FranceAgrimer, as there have been issues with species code lists used in logbooks compared to what the SIH/DCF mandates. Though this issue has been resolved according to DMSOI and OFB, historical data haven't been corrected and are not entered at this time.
Administrative obstacles	Administrative, staff regulations and salary caps are hindering data collection by OFB staff. One solution could be to externalise the data collection, to make it easier to recruit people, to organise etc (like it is done in French Guiana or Martinique). In Mayotte, fishers are willing to collaborate for data collection activities such as self-sampling (as has been implemented in La Réunion) but the data flow process is not in place.
Definition of recreational fishery	For all of the French ORs, there is very little data on these fisheries, and even their definition is not agreed.
Local data collection	In Mayotte, fishers are willing to collaborate for data collection activities such as self-sampling (as has been implemented in La Réunion) but the data flow process is not in place.
Lack of human resources in research institutions	The major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF. In Mayotte, OFB's staffing regulations also make it difficult to keep expert staff.
Lack of diversity/availability in the subcontractors market	There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
Lack of local research	Apart from Ifremer there are no research institutions.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	

Weaknesses	Description and evidence
Fisheries policing is not a priority	In Mayotte, fisheries policing is not a priority compared to missions related to illegal immigration from neighbouring Comoros, though the fight against illegal fishing is part of the overall illegal immigration issue as a large number of illegal immigrants work in IUU fishing. DMSOI mentioned in interviews that they have only 26 staff for policing navigation, fisheries, and "lighthouses and beacons" tasks, which can be a limiting factor for MCS activities.
Fisheries are not a priority of OFB	OFB's overall missions do not include fisheries monitoring: the fact that OFB does this in Mayotte for Ifremer is an exception, so this is not a priority at the level of the institution.
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Lack of human resources in research institutions	In Mayotte, OFB's staffing regulations also make it difficult to keep expert staff.
No designated ports/landing sites	In Mayotte, there is a large number of landing sites, so covering them all is difficult with only 4 OFB fisheries agents, especially when landings occur between 3AM and 8PM, each day.
Lack of skilled local staff	In Mayotte, there is a lack of skills and knowledge that cannot be addressed with money, due to the local context. In terms of observer/sampler coverage, one key problem is that they need to speak the local language/dialects to be able to interact with fishermen, but they also need to have a certain level of education and training to be able to properly collect data, and this proves very hard to reconcile. So collected data are often of questionable quality and require a lot of verification and correction, increasing the workload of the OFB staff.
Capacity limitations	Staff contracts are 1 year, renewable up to a maximum of 6 years, after which the agent cannot work for OFB anymore, so there is a forced turnover and a loss of expertise.
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Difficulty in application and obtention of EMFF	Difficulties related to the application for, and obtention of funds, under EMFF were highlighted by the French *Cours des Comptes*. DPMA confirmed that administrative issues at the start of the cycle led to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests. This situation gradually improved until the end of the funding cycle, though that didn't allow to fully catch up on planned activities.

Weaknesses	Description and evidence
Long-term staffing	Hiring of long-term staff is also not an option under EMFF.
Management model of EMFF funds (e.g., managed regionally, centrally).	
French administrative processes caused issues with actual funds allocation	Early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities.
Lack of OFB local staff an obstacle to proper EMFF programming	For Mayotte, OFB requests for funding will remain the same for the next EMFF cycle, due to staff constrains that prevented drafting a new proposal.
DCF project-based funding processes not optimal for routine data collection	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period. Hiring of long-term staff is also not an option under EMFF.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding)	
External funding for the majority of data collection activities	Most of the fisheries data collection activities are funded by an external source at the level of the EU (EMFF), and Mayotte or even France has no direct decision power.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Some DCF species not covered in Mayotte	In Mayotte, some DCF species are not part of the French work plan: Tuna-like fish (*Scombridae*), Swordfish (*Xiphias gladius*), Other billfishes (*Istiophoridae*) and Dolphinfish (*Coryphaena hippurus*).
Some species important for SSF are not covered by DCF	Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be extended.
STECF analysis (2020) of DCF Work Plans and annual Reports	The analysis concluded that there was a lack of specific mention of the individual ORs in the work plans and annual reports. It also noted a number of specific issues identified for some French ORs, including regarding the application of catch thresholds.

Weaknesses	Description and evidence
Almost no information on recreational fisheries	There is a strong recreational fisheries sector in Mayotte (though no sport fisheries), that occurs predominantly across weekends. This segment is currently not monitored, but there is a working group on this topic created within OFB to work on targeted surveys to evaluate recreational fishing. There is a lack of human and financial resources to properly monitor this segment.
Limited socio-economics data	According to OFB, observer coverage is 4-5% and is not high enough, but there is a lack of human and financial resources. Biological and socio-economic data are the main gaps.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
Limited biological data available for stock assessment on most demersal stocks	According to OFB, observer coverage is 4-5% and is not high enough, but there is a lack of human and financial resources. Biological and socio-economic data are the main gaps.
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Lack of international regulations on some endangered pelagic species	Such as sharks, which are under the mandate of IOTC.
Selection of appropriate controls and measures at correct levels of coverage	
Average age of vessel	Most vessels are between 18-23 years old.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
Overlap of roles	There is confusion of roles in the minds of fishermen who sometime perceive fisheries MCS activities as police activities, which makes it harder to do data collection etc. since OFB has both roles.

Weaknesses	Description and evidence
Low observer coverage	According to OFB, observer coverage is 4 – 5 % and is not high enough, but there is a lack of human and financial resources. Biological and socio-economic data are the main gaps.
Fighting IUU fishing not a priority	The overall marine policing priority in Mayotte is the fight against illegal immigration from neighbouring Comoros, not IUU fishing.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As Opportunities are external, an Outermost Region cannot easily 'create' Opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any Opportunities that appear. For example, an Opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

In Mayotte, plans by French national authorities to develop a self-service web portal to access fishery data could improve sharing of scientific information.

Table 4: Summary of Opportunities Identified for Mayotte

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Improve access to fisheries data by a wider audience	Access to fisheries data for 3rd parties is free, but on request. This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data as in other agriculture sectors.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	

Opportunities	Description and evidence
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	

Opportunities	Description and evidence
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

IUU fishing from neighbouring Comoros is a widespread issue in Mayotte, and is an obstacle to sound management of fishery resources.

Table 5: Summary of Threats Identified for Mayotte

Threats	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
IUU fishing from Comoros	IUU fishing from Comoros is widespread
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs)	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	

Threats	Description and evidence
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gap	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	

Threats	Description and evidence
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for Mayotte. This goes further than a traditional SWOT analysis and looks to match individual Strengths, Weaknesses, Opportunity and Threats together to help identify recommendations that could be implemented to improve data collection in Mayotte. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of Opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the Opportunity to be realised. An external Opportunity may occur when an external Threat (e.g., climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None identified	**"Attractive options"** • None identified
Threats	**"Threats that can be defended"** • None identified	**"High risk scenarios"** • None identified

	Threats		Weakness
Opportunity	**"External Opportunities"** • None identified	**Strength**	**"Internal Opportunities"** • There are plans in place to reduce pressure on overexploited stocks • Alternative funding to support data collection (outside EMFF) • External funding could be utilised to conduct studies and collect data on the informal sector

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For Mayotte, no 'Natural Opportunities, were identified.

Table 7: Summary of Strength and Opportunity Combinations Identified for Mayotte.

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For Mayotte, no 'Threats that can be defended' could be identified.

Table 8: Summary of Strength and Threat Combinations Identified for Mayotte.

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

For Mayotte, no 'Attractive Options' were identified.

Table 9: Summary of Weakness and Opportunity Combinations Identified for Mayotte

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For Mayotte, one 'High Risk Scenario' was identified which relates to the high levels of IUU fishing from the Comoros. However, as fisheries policing is not a priority in Mayotte, there may be little action taken to mitigate this issue which could lead to increased IUU and the risk of overfishing.

Table 10: Summary of Weakness and Threat Combinations Identified for Mayotte

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Fisheries policing is not a priority.	IUU fishing from Comoros.	IUU fishing from Comoros is widespread but policing is not a priority for Mayotte and there are limited resources of MCS. This could lead to increased IUU and the risk of overfishing. There is also a detrimental effect on stock assessment as not all catches and effort are accounted for.
2. Institutional structures			
•	N/A		
3. Funding and funding structures for data collection			
•	N/A		
4. Current state of data collection obligations			
•	N/A		
5. Fisheries management and conservation measures			
•	N/A		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the opportunity to be realised.

In Mayotte, there are several 'Internal Opportunities' that were identified. This includes plans to reduce pressure on overexploited stocks and the use of externa funding for filling knowledge gaps and capacity issues.

Table 11: Summary of Strength and Weakness Combinations Identified for Mayotte

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	Development of new fisheries towards better monitored and managed stocks.	Exploited stocks in Mayotte are all within the EEZ, and are mostly coastal catches.	There are plans in place to reduce pressure on overexploited stocks.
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	Funding external to EMFF available.	Difficulty in application and obtention of EMFF.	Alternative funding to support data collection (outside EMFF)
•	Funding external to EMFF available.	Hiring of long-term staff is also not an option under EMFF.	Alternative funding could be explored as an option to hire of long-term staff.
•	Funding external to EMFF available.	As the informal sector is not covered by the DCF, data are difficult to collect and its study is mostly based on requests by local/regional authorities to answer specific questions.	External funding could be utilised to conduct studies and collect data on the informal sector.
4. Current state of data collection obligations			
•	Studies with external funding to fill gaps for socio economics and recreational fisheries.	Limited socio-economic data.	Potential funding option to support socio-economic data collection.
•	Studies with external funding to fill gaps for socio economics and recreational fisheries.	Almost no information on recreational fisheries.	Potential funding options to support recreational fisheries data collection.
5. Fisheries management and conservation measures			
•	None identified		

4.6 Opportunities and Threats- "External Opportunities"

An external opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a Threat to an Outermost Region could be climate change but an opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For Mayotte, no 'External Opportunities' were identified.

Table 12: Summary of Opportunities and Threats Combinations Identified for Mayotte

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

Réunion

EASME/EMFF/2018/011

Overview of the state of data collection and scientific advice in the European Outermost Regions

Réunion SWOT Report

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Acronyms

Acronym	Definition
CMM	Conservation and Management Meausures
CRPMEM	Comité Régional des Pêches Maritimes et des Elevages Marins
DCF	Data Collection Framework
DCSMM	Directive Cadre Stratégie pour le Milieu Marin
DMSOI	Direction de la mer à Mayotte
DPMA	Le Directeur de la Direction des pêches maritimes et de l'aquaculture
EMFF	European Maritime and Fisheries Fund
EU OR	European Outermost Region
IOTC	Indian Ocean Tuna Commission
IRD	The Research Institute for Development
IUU	Illegal, Unreported and Unregulated Fishing
LEMNA	Laboratory of Economics and Management Nantes-Atlantique
MAP	Multi-Annual Plan
MCS	Monitoring, Control and Surveillance
OFB	L'Office français de la biodiversité
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
SIH	Système d'informations halieutiques
SIOFA	Southern Indian Ocean Fisheries Agreement
SSF	Small Scale Fisheries
STECF	Scientific, Technical and Economic Committee for Fisheries
TCMP	Technical Committee on Management Procedures
VMS	Vessel Monitoring System

1 Introduction

The main objective of this series of SWOT analyses is to obtain information about the state of data collection and scientific advice in support of fisheries management in the European Outermost Regions.

In a standard SWOT analysis factors are analysed and positive or negative and internal or external (Strengths, Weaknesses, Opportunities, and Threats). The internal scope (strengths and weaknesses) are those related to the system under evaluation; the external scope (opportunities and threats) are those events and pressures that influence the system from the outside. For the purpose of this study, internal factors are defined as those within the Outermost Region or within Europe. External factors are outside of the Outermost Region or Europe. For example, funding coming from within the territory or Europe (i.e., EMFF) would be internal. Funding coming from the World Bank would be classified as external.

Once the four factors: Strengths, Weaknesses, Opportunities and Threats have been analysed individually, some key underlying mechanisms may be determined to utilise Strengths and Opportunities individually or to address and counter Weaknesses and Threats. In addition to this, it is necessary to conduct a second level SWOT analysis to further analyse the relationship between the four factors and help to identify recommendations that could be implemented to improve data collection. This is done by matching individual Strengths, Weaknesses, Opportunities and Threats to take advantage of Strengths based on specific Opportunities and to reduce Threats, combat any identified Weaknesses by identifying Opportunities and highlight where Weaknesses and Threats coincide so mitigation measures can be taken to reduce the potential negative impacts.

2 Summary SWOT matrix

Below provides a summary SWOT analysis for Réunion, highlighting the most important factors only. Further detail for all factors can be identified in the later sections of this report and in the profile report (Annex 2). Where no Strength, Weakness, Opportunity or Threat were identified this is indicated.

Table 1 Summary Table of Strengths, Weaknesses, Opportunities and Threats for Réunion

	Positive	Negative
Internal	**STRENGTHS** • Strong national institutional framework and policy for data collection, locally implemented by Ifremer and IRD • Exploited stocks are well identified and information is published (SIH) • IOTC stocks are assessed • Funds are adequate to financially support current data collection activities • DCF obligations are fulfilled for most biological data • Complete and up-to-date legislation for management and conservation of resources in Réunion	**WEAKNESSES** • No routine data collection on socio-economic data or for recreational fisheries • No assessment of most demersal stocks • Non compliance to DCF obligation regarding socio-economic data and recreational fisheries • Lack of staff resources at Ifremer to cover all activities
External	**OPPORTUNITIES** • Improve access to collected fisheries data	**THREATS** • None identified

3 SWOT Definition

The following four sections identify individual strengths, weaknesses, opportunities and threats identified for Réunion.

3.1 Strengths

Strengths are a system's internal positive attributes that an Outermost Region does well and may separate it from others. Strengths could include attributes such as a defined national focus on a particular key issue, strong academic infrastructure that can underpin research, good long-term funding for relevant government bodies etc.

The main Strengths relate to a well established national data collection system, with Ifremer at the centre, funded through EMFF at the national level. Most stocks are well identified stocks and monitored (catches) and compliance with DCF is relatively good. The main exploited demersal stocks are managed based on Ifremer's scientific advice and tuna and tuna-like species are managed through IOTC's CMMs. There is a good science-management-industry dialogue at the local level.

Table 2: Summary of Strengths Identified for Réunion

Strength	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Fisheries are well monitored	The informal and IUU sectors are almost non-existent, so the activity of the artisanal and industrial fleet is well known. Data on depredation is also collected. IRD indicates that, for the Indian Ocean, all new DCF species are covered by the French national data collection scheme.
Exploitation of most identified stocks is monitored	Summary of catches & fleet and individual metiers fact sheets by published yearly by Ifremer. There are 89 species captured in Réunion that are formally monitored (at the least, landing data).
Some important demersal stocks are assessed by Ifremer	Assessments are produced for DPMA.
Stocks are well identified	Several publications from the year 2000 to now describing the fisheries in Réunion (Blanchet *et al.*, 2000; Blanchard *et al.*, 2018).
Tuna and tuna-like species stocks are assessed by IOTC	These shared stocks are assessed at the level of the Indian Ocean.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	

Strength	Description and evidence
If resources are made available, monitoring of sports and recreational fisheries could be done	Sports fisheries in Réunion are not monitored, but there are projects to do so, particularly for sensitive species (sharks, yellowfin, locally important species…). Similarly, recreational fisheries are not monitored, though there have been ad hoc surveys done in the past.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
Data collection in France and its ORs is well structured and there is a national framework and institutional structure in place, with some specificities in ORs depending on the local context	See institutional organisation chart and data collection description in Réunion profile (Annex 2).
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
Good collaboration between institutional actors	Collaboration between Ifremer and DMSOI is good, with discussions and concertation on projects and the DCF. Ifremer and IRD have clear roles in data collection and interact on a regular basis.
Good stakeholder awareness and capacity building	DMSOI provides routine training for the various stakeholders regarding regulations, techniques etc.
IFREMER has a predominant role in Réunion to collect data and produce reports	Ifremer website (https://wwz.ifremer.fr/Expertise/Peches-maritimes/Collecte-de-donnees-halieutiques-dans-le-cadre-de-la-politique-commune-de-la-peche).
SIH has a central role in providing methodologies, sampling scheme and workplan for field activities	Discussion with Ifremer Réunion and Brest. Weiss et Al 2018 and 2019 describing methodologies.
Increased compliance to logsheet declaration EU obligation	FranceAgrimer is centralizing logsheet declaration reported by fishers (EU obligation).
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
Good legal and MCS framework in place	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	

Strength	Description and evidence
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
Full funding of data collection activities	DCF data collection funding comes from two main sources: EMFF and national budget.
Management model of EMFF funds (e.g., managed regionally, centrally).	
France National Budget covers 20% of data collection funds not eligible to EMFF (actually more 40% according to Ifremer)	IFREMER received in 2017 €154 M.
EMFF	France received for EMFF 2014-2020 €588 M. Total use of EMFF funds in Réunion: €28,887,932 (as of December 2019).
EMFF under measures on data collection referred to in Article 77	Under measures on data collection referred to in Article 77 for EMFF DCF data collection represents €66,146,872. For Réunion, between €270K and €180K have been used for routine data collection over the last 3 years. Overall cost of DCF related activities should also encompass a share of SIH staff activities which is not easy to assess.
Collaboration between organisations in OR and MS	
N/A	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
External funding to support ad hoc studies to fill gaps	Other sources of funding for data collection come from the national budget, through grant agreements, conventions etc. DG MARE and EASME can also contribute to funding specific projects or research activities.
Alternative sources of funding	• Convention between Ifremer and DPMA ("Convention socle halieutique") to cover actions suggested by Ifremer and not under DCF (Ifremer proposes actions, DPMA funds them). There is less and less activities under this line, as more and more is getting covered by the DCF. For years, the remaining 20 % of DCF-funded activities were included under this line, but now this is part of the National counterpart. Currently the activities remaining include SACROIS and the data access portal.

Strength	Description and evidence
	• DCSMM: partnership with OFB/Marine parks to provide tools & services. In Mayotte, data is collected following SIH protocols and entered/stored using SIH tools. In other ORs, there is no data collection activities but Ifremer provides summary data for marine parks and Natura 2000 areas, under a pluriannual data provision convention (latest from 2019). • Grant agreement with IFREMER and IRD • "*Convention socle halieutique*" with IFREMER: used to finance requests for studies to Ifremer to address specific questions (*Réponse à saisine*); financial support to smaller projects (like data collection) which tend to be progressively included into the DCF work plan • Triannual agreement with IRD. DG MARE and EASME can also contribute to funding specific projects or research activities.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Data on seabirds, mammals and sea turtles	Fisheries that interact with these species are covered by IOTC and therefore information is routinely collected and reported, notably through the on-board observer and reporting programmes managed by IRD.
Globally Positive assessment of France compliance with EU-MAP	Assessment of France compliance with EU-MAP (STECF, 2019): Over all, the MS complied with the legislation (EU-MAP and WP template) and WP guidelines and most issues that were identified were resolved at EWG 19-18. Overall good progress has been made in the provision of data relating to Data Quality Assurance.
Good DCF compliance in Réunion	Regarding Réunion specifically, the STECF19-19 report concluded that "*The situation [in Réunion] is quite good compared to other French ORs. Most of the samples are for large pelagic species which are the main component of the landings in Réunion*".
List of activities that France will implement in 2020-2012 to comply with DCF: FISHING ACTIVITY DATA, ECONOMIC AND SOCIAL DATA, SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES	Definition of activities to be conducted by France for 2020-2021 (France, 2019).

Strength	Description and evidence
Socio-economic data	There is a need to make DCF socio-eco data collection a routine process, and this will start in 2021 with a collaboration between Ifremer and LEMNA, with EMFF funds for vessels <12 m.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
Good compliance with IOTC	All species in IOTC are covered in the National Work Plan and the IOTC Compliance Committee in its 2020 EU Compliance Report, didn't note any compliance issues for Réunion.
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures)	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
National and international (EU and RFMOs) regulations apply in Réunion	All EU regulations apply to Réunion due to its EUOR status. All IOTC and SIOFA regulations apply to Réunion due to the EU's status Contracting Party. Regarding large pelagic species, DMSOI indicates that IOTC CMMs are in place and well implemented in EU regulations, and that the level of compliance is good.
Adequate body of fisheries regulations addressing specific local issues in Réunion	Additional local regulations targeting large pelagic species are also in place, but they are more oriented towards ensuring a peaceful cohabitation between different fisheries.
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
MCS training	DMSOI provides routine training for the various stakeholders regarding regulations and techniques.

Strength	Description and evidence
MCS activities with priority in fighting against IUU fishing	2 years subnational MCS plan.
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
All local measures proposed are based on scientific evidence	DMSOI or CRPMEM sends a request to Ifremer for scientific advice, then there is a discussion based on the advice provided.
Good dialogue between science and management	Both at the local level (DMSOI, CRPMEM, Ifremer, IRD, Marine Park, Maritime school) and at the regional level (IOTC formal science-management dialogue). IOTC started a process of science-management dialog, which led to the creation of the TCMP (Technical Committee on Management Procedures). The overall dialogue has improved through training courses, simulation software, regular meetings. Ifremer and IRD participate to this dialogue and confirm that is very positive.
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements	
None identified	

3.2 Weaknesses

Weaknesses stop an Outermost Region from performing at its optimum level. Weaknesses are highlighted as areas or attributes that can be improved to enable the territory to improve in particular areas. For example, a lack of political will to implement changes, or a lack of resources to collect adequate catch data under the DCF framework.

For Réunion, only a minority of demersal stocks are assessed and there is a general under-reporting of bycatch. There is also a distinct lack of socio-economic data as well as information on recreational fisheries. Lack of human resources is an obstacle to better monitoring and management of the fisheries.

Table 3: Summary of Weaknesses Identified for Réunion

Weaknesses	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
Bycatch under-reporting	There is no information available on bycatch.
A minority of demersal stocks are assessed	Of the 89 monitored species, only 16 (or 18%) are formally assessed: a third of them (6) are small demersal or pelagic species and are assessed by Ifremer, while the remaining two thirds (12) are large pelagic species covered and assessed by IOTC. This means 82% of stocks are not assessed.
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Definition of sports / recreational fishery	For all of the French ORs, there is very little data on these fisheries, and even their definition is not agreed.
Polyvalent fishing	The fisheries are multigear, with on average 3 metiers practiced per vessel. This makes stock assessment difficult as effort cannot be standardised easily.
Recreational data	There is a rather important part of the "recreational" fishermen who sell their catches (multimétier, demersal and pelagic species), but it is not monitored so no data is available. Sports fisheries are also not monitored.
IUU fishing (estimates of illegal and unreported local overfishing).	
Some "hidden catches" are not taken into account	Ifremer mentions a gap exists in data collection on depredation of catches (by sharks, marine mammals, etc): these "lost" catches are not taken into account in landing data, and could represent significant amounts.
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	

Weaknesses	Description and evidence
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
Data flow in the ORs is not considered to be as good as the mainland	One major problem is that reference data were originally built for Metropolitan France, so are not necessarily suited for ORs, but this is being addressed.
Lack of flexibility of institutional setup	In Réunion, DMSOI is in charge of coordinating SIH activities for DPMA. It is a very pyramidal system that doesn't leave a lot of wiggle room for local initiative. It can be frustrating because there is no leeway to change methods based on local needs/specificities. It makes it also difficult to promote and use the data at the local level.
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
Lack of human resources in research institutions	The major hampering factor regarding IFREMER is not financial resources but human resources, in particular local staff in the ORs: having experts in the field. Budget can be obtained through EMFF, but hiring long term staff is not an option under EMFF. IRD is running at full capacity, and are unable to deal with unexpected or unplanned requests. Often requests from UE/DPMA take priority, which can impact routine and project work. Recruitment within IRD is an issue too, as recruiting someone means training and takes time, so it is often easier to not hire new staff and for internal staff to complete the work needed.
Lack of diversity/availability in the subcontractors market	There is very little competition for data collection calls for tenders in ORs, and contractors have a hard time recruiting fisheries data collectors (as there is little activity, work is not full time and thus salaries are not great, while requiring a certain amount of expert knowledge).

Weaknesses	Description and evidence
Fishers wary of "the State"	Sensitivity of collecting socio-economic data, as fishers can be suspicious and wary that this information could be used for fiscal controls.
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
DCF project-based funding processes not optimal for routine data collection	There is a major issue with the way the DCF funding works on a project-basis versus the routine nature of data collection. DPMA has proposed that, for the new EMFF, funding be attributed for the whole cycle to secure data collection over the 6 years period.
Management model of EMFF funds (e.g., managed regionally, centrally).	
French administrative processes caused issues with actual funds allocation	Early in the EMFF cycle, major administrative and technical issues caused important delays to the allocation of EMFF funds by the French administration, which caused issues with implementation of activities. Administrative issues at the start of the cycle lead to a very late availability of EMFF funds, due to changes in the management structure in France, as well as issues with the software developed to manage funding requests.
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
External funding for the majority of data collection activities	Most of the fisheries data collection activities are funded by an external source at the level of the EU, and Réunion or even France has no direct decision power.
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
Limited inclusion of ORs in Annual Workplan	The STECF, in 2020, conducted an analysis of the Work Plans and annual Reports submitted by all EU Member States with ORs. Regarding France, it concluded that there was a lack of specific mention of the individual ORs in the work plans and national reports. It also noted a number of specific issues identified for some French ORs, including the application of catch thresholds.
Limited socio-economics data	Ifremer mentioned that no socio-economic data are collected but DMSOI is pushing to start. This is mostly due to a lack of staff.

Weaknesses	Description and evidence
	Ifremer also explained that there is a bad history in terms of socio-economic data collection in Réunion. In the 1990s, Ifremer collected data on cost-effectiveness. Later, there were controls by fiscal authorities for vessels that were under-declaring their catches/revenues. Ifremer was then seen as having "snitched" on the fishermen and trust was lost. DMSOI mentioned that there is a gap in socio-economic data collection because it is only collected by LEMNA for vessels >12m.
Almost no information on recreational fisheries	
Some species important for SSF are not covered by DCF	Ifremer and IRD mention that there are small species important for SSF that are not covered or not covered anymore by DCF EU-MAP and that the list of species should be should be extended.
Compliance with data requirements and status of submission for RFMO / RFB data collection	
N/A	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
N/A	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
N/A	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
N/A	
Availability of new technologies to aid data collection	
N/A	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
N/A	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
Limited biological data available for stock assessment on most demersal stocks	Generally speaking, there is a need for more research on biological parameters to conduct stock assessment except for some large pelagics.
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
Lack of international regulations on some endangered pelagic species	Such as sharks, which are under the mandate of IOTC.

Weaknesses	Description and evidence
Additional species	DMSOI mentions that there are some pelagic species not covered by IOTC that could benefit from CMM, such as dolphinfish (*Coryphaena hippurus*) and seerfishes.
Selection of appropriate controls and measures at correct levels of coverage	
Spatial data	There are no location data available for small fishing boats, so it is not possible for Ifremer to have a spatial vision of the small-scale fisheries.
Average age of vessels	Most artisanal vessels are 20 years old.
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
N/A	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
N/A	
Restriction of fishing opportunities within an OR to vessels from that OR only	
N/A	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
N/A	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
N/A	

3.3 Opportunities

Opportunities detail any external improvement that can be taken advantage of by a territory. Opportunities should be external to the Outermost Region or Europe. Opportunities are a combination of different circumstances at a given time that offer a positive outcome, if they can be effectively and efficiently taken advantage of. As opportunities are external, an Outermost Region cannot easily 'create' opportunities, they can only ensure that they are in the best position to gain the maximum benefit from any opportunities that appear. For example, an Opportunity could include potential for experts from third countries to provide training for enumerators to collect catch data.

In regards to Opportunities in Réunion, plans by French national authorities to develop a self-service web portal to access fishery data could improve sharing of scientific information.

Table 4: Summary of Opportunities Identified for Réunion

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
Improve access to fisheries data by a wider audience	Access to fisheries data for 3rd parties is free, but on request. This is an area where DPMA wants to put more work, in order to allow the same sort of self-service access to fisheries data as in other agriculture sectors.
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	

Opportunities	Description and evidence
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	

Opportunities	Description and evidence
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

3.4 Threats

Threats are an external factor, i.e., originating outside of the system being analysed. No control is exercised by the territory over these factors, but there will be a benefit by having contingency plans to address them if they should occur to reduce any negative impacts. A typical Threat would be "Global warming creating negative economic impacts through reduced fishing opportunities and environmental damage".

No specific Threats have been identified in Réunion.

Table 5: Summary of Threats Identified for Réunion

Opportunities	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities	
Scientific knowledge of stock (e.g., Stock status, biology, population structure, delineation	
None identified	
Environmental knowledge of ecosystem, oceanographic and climate change impacts (incl. water quality, invasive species, FADs, aquaculture escapees, oligotrophic waters, pollution, disturbance and pesticides).	
None identified	
Data availability for different fishing gears and activities (at relevant metier level e.g., recreational).	
None identified	
IUU fishing (estimates of illegal and unreported local overfishing).	
None identified	
2. Institutional structures	
Clear division / organisation of roles responsibilities (incl. area of jurisdiction) – management and science	
None identified	
National coordination between organisations (Mainland to OR, between ORs and inside ORs).	
None identified	
Data collection by academic, scientific and other non-government bodies (e.g., academia, NGOs, research institutions, fisherfolks associations) in the fishing sector.	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection, scientific advice, research and MCS.	
None identified	
Integration of participatory decision making into management structure where applicable	
None identified	
Clear MCS organisation and assessment of IUU fishing	
None identified	
Roles and requirements of regional bodies (e.g., RFMOs, RFBs) with clear membership and representation to these bodies	
None identified	
Organisations and their availability and knowledge of staff (personnel capacity) and supporting infrastructure to support data collection	

Opportunities	Description and evidence
None identified	
3. Funding and funding structures for data collection	
Availability, accessibility and utilisation of EMFF funding for data collection.	
None identified	
Management model of EMFF funds (e.g., managed regionally, centrally).	
None identified	
Collaboration between organisations in OR and MS	
None identified	
Availability, accessibility and utilisation of other funds for data collection (e.g., national funding).	
None identified	
Sustainability of funding (long-term to OR)	
None identified	
4. Current state of data collection obligations	
Compliance with DCF obligations (inter alia): • ***Data on different fishing activities/fleets (metier based or split at simpler levels e.g., recreational/sport/industrial);*** • ***Observer data;*** • ***Level of sampling- port, landing site, fisher self-sampling; and*** • ***Socio-economic data***	
None identified	
Compliance with data requirements and status of submission for RFMO / RFB data collection	
None identified	
Compliance with national or local data requirements and status of submission for (e.g., monitoring of national/local FMPs, evaluation of management measures).	
None identified	
MCS data collection and IUU risk assessment / estimations to complete estimations of removals	
None identified	
Transversal data collection to aid fisheries management (e.g., sales notes, VMS data, etc. collected under the control system)	
None identified	
Availability of new technologies to aid data collection	
None identified	
Use of data collection by academic / scientific bodies independent of government to support stock assessment and management	
None identified	
Are data sufficient for stock assessment? – If not where are the gaps, e.g., catch and effort (abundance data), biological data etc, and is there a clear understanding of the level of knowledge and data gaps.	
None identified	
5. Fisheries management and conservation measures	
Regulatory frameworks and legislation (in terms of applicability and complexity given the size and complexity of the OR).	
None identified	
Selection of appropriate controls and measures at correct levels of coverage	

Opportunities	Description and evidence
None identified	
Appropriate type and level of MCS and application of sanctions (at an appropriate level and effectively enforced).	
None identified	
Regional (i.e., bilateral and through RFB / RFMO) and national (i.e., with mainland) cooperation on data collection and approaches to management	
None identified	
Restriction of fishing opportunities within an OR to vessels from that OR only	
None identified	
Scientific basis for decision making and the science / management nexus – i.e., How does science get turned into management advice?	
None identified	
Management measures to counteract external impacts (third country) e.g., IUU, damaging practices, damaging fisheries agreements.	
None identified	

4 SWOT Level 2 Analysis

In this second level of the SWOT analysis the Strengths and Weaknesses are linked to the Opportunities and Threats for Réunion. This goes further than a traditional SWOT analysis and looks to match individual strengths, weaknesses, opportunity and threats together to help identify recommendations that could be implemented to improve data collection in Réunion. The combinations of the individual SWOTs can be identified as strategies and can be categorised as the following:

- Strengths-Opportunities
- Weaknesses- Opportunities
- Strengths- Threats
- Weaknesses-Threats

In addition to these four categories, we will also to link up appropriate Strengths-Weaknesses (internal opportunities which are most likely to have already been implemented) and Opportunities-Threats (external opportunities). While this is not common practice, with most SWOTs stopping at level 1, from experience it is clear that there is merit in determining whether these types of Opportunities exist and outlining the benefit in exploiting or even in some cases just recognising their existence. An internal opportunity could occur where a Weakness has been identified but a Strength already exists to combat it but has not been exploited and an internal barrier may need to be removed to allow the Opportunity to be realised. An external opportunity may occur when an external Threat (e.g., climate change) can make use of external Opportunities (experts from other regions) but has not been assessed or implemented as both the inputs are external to the organisations concerned.

Table 6 Second level SWOT Analysis

	Strengths	Weaknesses
Opportunities	**"Natural Opportunities"** • None identified	**"Attractive options"** • None identified
Threats	**"Threats that can be defended"** • None identified	**"High risk scenarios"** • None identified

	Threats		Weakness
Opportunity	**"External Opportunities"** • None identified	**Strength**	**"Internal Opportunities"** • There are projects to help monitor sports and recreational fisheries which should be further utilised and a definition of sports and recreational fisheries should be confirmed • There is a good institutional structure in place and a centralised system for data collection which could be utilised to improve monitoring and reporting of bycatch • External funding could be utilised to fill gaps in data assessment and collection • There is a general lack of research on biological parameters but funding could be sourced to fill these gaps • Funding could be used to undertake studies on the recreational/sports fishery to provide a definition and improve knowledge • A collaboration between Ifremer and LEMNA will start in 2021 to collect socio-economic data for vessels <12 m

4.1 Strengths-Opportunities "Natural Opportunities"

Matching an Outermost Region's Strengths with an Opportunity can help to identify any natural priorities that currently exist. These 'Natural Opportunities' are those that the Outermost Region should be able to take advantage of easily due to utilisation of their existing Strengths. These should present the greatest return on investment (based on money or time) as they are likely to be quickest and easiest to implement. These should justify immediate planning or assessment of feasibility.

These combinations are most likely to succeed and generate good practice examples due to the matching of a territory's Strengths and Opportunities. When these areas have not already being highlighted, then it is recommended that they are planned for with a national planning structure and prioritised, i.e., there is a need to adjust focus and reprioritise.

For Réunion, no 'Natural Opportunities' were identified.

Table 7: Summary of Strength and Opportunity Combinations Identified for Réunion.

#	Strength	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	None identified		
2. Institutional structures			
•	None identified		
3. Funding and funding structures for data collection			
•	None identified		
4. Current state of data collection obligations			
•	None identified		
5. Fisheries management and conservation measures			
•	None identified		

4.2 Strengths and Threats- "Threats that can be defended"

This section details Threats that should be easy to defend and counter based on the Outermost Region's existing Strengths. For many existing Threats the current skills, funding and administrative requirements may already be in place to be able to meet these Threats e.g., financial planning to ensure lean periods can be managed without having to resort to laying off of staff, cutting back on research programmers etc. Many Threats are often not recognised as they have been countered effectively by standard procedures that are reviewed on a regular basis. Good practice can be developed to show how to effectively address Threats in limited situations.

For Réunion, no 'Threats that can be defended' were identified.

Table 8: Summary of Strength and Threat Combinations Identified for Réunion.

#	Strength	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.3 Weaknesses and Opportunities- "Attractive Options"

Where a Weakness has been identified but an Opportunity exists, these can be potentially attractive options in being able to plug a gap in funding, skills or experience. These Opportunities are likely to produce good returns if the basic level of capability and implementation are viable. This could be in the form of funding and bringing in experience to enhance the skills of staff to add long-term skill capacity to a research organisation along with necessary technical equipment.

Good practice examples in these cases may come from addressing current Weaknesses and turning those Weaknesses into Strengths. If Weaknesses are not being addressed and Opportunities exist it should be identified what is stopping or limiting progress on implementation, are assumptions correct and are plans realistic and substantial or are other Weaknesses limiting the chances of exploiting Opportunities e.g., poor government effectiveness limiting the ability of government research agencies to apply for and win external funding.

For Réunion, no 'Attractive Options' were identified.

Table 9: Summary of Weakness and Opportunity Combinations Identified for Réunion.

#	Weakness	Opportunity	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.4 Weaknesses and Threats- "High Risk Scenarios"

Where Weaknesses and Threats are matched up this would identify potentially high-risk scenarios. In these cases, the assessment of risk is crucial.

Where risks and potential impacts are shown to be low then we should highlight these issues as a low priority and ensure that countries are not distracted by them, but where the risks and / or the impacts are high then it is recommended that an assessment of funding and capability gaps is conducted and a mitigation plan developed to ensure these risks are addressed. This could be through additional funding, training, bringing in additional temporary technical assistance, or working with neighbouring countries to transfer skills, personnel or equipment or joint purchasing and usage of high value resources.

For Réunion, no 'High Risk Scenarios' were identified.

Table 10: Summary of Weakness and Threat Combinations Identified for Réunion

#	Weakness	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

4.5 Strengths - Weaknesses- "Internal Opportunities"

Where Strengths and Weaknesses are matched up, this could help overcome an internal Weakness with an existing positive attribute of the Outermost Region. This Strength may not have been exploited previously as an internal barrier may need to be removed to allow the opportunity to be realised.

In Réunion, several 'Internal Opportunities' were identified. This includes projects to help monitor sports and recreational fisheries and a good institutional structure in place and a centralised system for data collection which could be utilised to improve monitoring and reporting of bycatch. Additional sources of funding are available and should be explored to fill gaps in data assessment and collection.

Table 11: Summary of Strength and Weakness Combinations Identified for Réunion

#	Strength	Weakness	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
•	If resources are made available, monitoring of sports and recreational fisheries could be done.	Definition of sports / recreational fishery.	There are projects to help monitor sports and recreational fisheries which should be further utilised and a definition of sports and recreational fisheries should be confirmed.
•	If resources are made available, monitoring of sports and recreational fisheries could be done.	Limited recreational data.	There are projects to help monitor sports and recreational fisheries which should be further utilised and a definition of sports and recreational fisheries should be confirmed.
2. Institutional structures			
•	SIH has a central role in providing methodologies, sampling scheme and workplan for field activities.	Bycatch under-reporting.	There is a good institutional structure in place and a centralised system for data collection which could be utilised to improve monitoring and reporting of bycatch.
3. Funding and funding structures for data collection			
•	Alternative sources of funding.	DCF project-based funding processes not optimal for routine data collection.	External funding could be utilised to fill gaps in data assessment and collection
•	Alternative sources of funding.	Definition of sports / recreational fishery.	Funding could be used to undertake studies on the recreational/sports fishery to provide a definition and improve knowledge.
•	Alternative sources of funding OR existing EMFF funding.	Limited biological data available for stock assessment on most demersal stocks.	There is a general lack of research on biological parameters but funding could be sourced to fill these gaps.
4. Current state of data collection obligations			

#	Strength	Weakness	Description and evidence
•	Starting to collect socio-economic data.	Limited socio-economic data.	A collaboration between Ifremer and LEMNA will start in 2021 to collect socio-economic data for vessels <12 m.
5. Fisheries management and conservation measures			
•	None identified		

4.6 Opportunities and Threats- "External Opportunities"

An external opportunity may occur when an external Threat can make use of external Opportunities but has not been assessed or implemented as both the inputs are external to the system concerned. For example, a threat to an Outermost Region could be climate change but an Opportunity could occur if a third country has access to external funding to research the effects of climate change on certain stocks that could be shared with the Outermost Region to improve knowledge.

For Réunion, no 'External Opportunities' were identified.

Table 12: Summary of Opportunities and Threats Combinations Identified for Réunion

#	Opportunity	Threat	Description and evidence
1. Fish stocks and other marine organisms and associated fishing activities			
●	None identified		
2. Institutional structures			
●	None identified		
3. Funding and funding structures for data collection			
●	None identified		
4. Current state of data collection obligations			
●	None identified		
5. Fisheries management and conservation measures			
●	None identified		

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