ORFISH - Development of innovative, low-impact offshore fishing practices for small-scale vessels in outermost regions - MARE/2015/06

WP2 Raising awareness of the opportunities to develop innovative fishing techniques

Task 2.1 Status and evolution of small-scale fisheries in Outermost Regions (ORs)

Deliverable #7

Final report of the Task 2.1

The ORFISH project

The ORFISH project aims at providing a platform for exchange of knowledge on low-impact offshore fishing techniques among fishers for the outermost regions with a view to developing and optimizing these techniques and with the principal objective of alleviating fishing pressure on coastal fish resources. The specific objectives of the project are the following:

- Raising awareness of the opportunities to develop innovative fishing techniques allowing to divert fishing effort away from coastal resources
- Developing and testing low impact fishing techniques adapted to the bio-geographical conditions of each outermost region
- Creating alternative fishing opportunities that will help to consolidate jobs in the fishing industry and ensure a steady supply of fisheries products to local markets
- Exchanging of best practice on low-impact offshore fishing techniques between ORs, which will also do good to overseas countries and territories and third countries
- Improving communication among outermost regions' fishing sectors as part of the good functioning of the Advisory Council on Outermost Regions

ORFISH website:
http://orfish.eu

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PART I: Activity 1. Analyse the status and evolution of small-scale fisheries on the different OR

I. Introduction

Shared knowledge on fleets, gears-species and areas of operation, is essential to engage in a platform of exchange on low-impact offshore fishing techniques between fishers and stakeholders from different outermost regions. Information on small scale fisheries in Europe and especially in OR is often heterogeneous and dispersed. That is why it is fundamental to develop a systematic description – status and evolution - of small-scale fisheries in ORs to identify similarities and contrasts between the different ORs, especially in the perspective of fisheries management and more generally best practices.

II. Objectives

The general objective of the task 2.1.1 was to share knowledge about the status and evolution of small-scale fisheries in ORs according to a common methodology. Within this task, an interactive tool for mapping the evolution of the characteristics of the CFR fleet was scheduled. The general objective of the task 2.1.2 was the analysis of competition with other activities and interactions with the environment. The task is considered in the second part of this report.

Deliverables:

- Final report of the task 2.1 - Synthesis report “Status and evolution of small-scale fisheries in ORs” based on ORs reports. These reports will be disseminated through the website of the project.
- Interactive tool for mapping the evolution of the characteristics of the CFR fleet and the fishing activity by OR (when available). It is already available on the website of the project.

As mentioned in the proposal, this task used a common method for the analysis of the status and evolution of SSF in the different ORs. This methodology served as a basis for the description of the common features and the specificities of these fisheries based on existing knowledge. The first step of the analysis was to consider the Community Fleet Register data set from each OR and to provide an historical analysis of the evolution of the characteristics of the fleet. The second step collated all the available data coming from DCF and regional data in order to build for each OR, the following parameters and indicators : fishing areas of operation gears, métiers, and target species, fishing activity and seasonality, structure of the segment (vessels number, length, capacity in tonnage, power and age), means of production (crew size, capital invested, vessel ownership if available), landings per species and discards if relevant, economic value, social importance, and environmental issues. Considering that the level of information per case study may be heterogeneous, a minimum common framework including

the same indicators for all the segments was defined. Trends on the evolution of these indicators were provided for at least 10 years, if data were available.

III. Material and methods

In order to analyze the status and evolution of SSF in the different ORs, a meeting was organized to define a common framework to gather data from the different partners. No new data collection was scheduled in the project. Considering that the level of information per case study may be heterogeneous, the objective was to identify a common set of variables that could be informed by the partners in a homogeneous way. The interest is that these variables could be processed according a common methodology.

3.1 The common framework

As indicated in the following table, **34 variables** were asked per OR. These variables can be described in four categories:

- Fleet structure [administrative fleet (variables 1 to 6),
- Active fleet characteristics (variables 7 to 21),
- Fleet activity (variables 22 to 30, 35)
- Landings and value of these landings per length class (variables 31 to 34).

NUMBER_VARIABLE	VARIABLE
1	Number of vessels per length categories (CFR)
2	Total tonnage (GT) per length categories (CFR)
3	Total engine power (kW) per length categories (CFR)
4	Number of vessels per age class per length categories (CFR)
5	Vessel age (average) per length categories (CFR)
6	Vessel age (average)(CFR)
7	Number of vessels per length categories in the active fleet
8	Total tonnage (GT) per length categories in the active fleet
9	Total engine power (kW) per length categories in the active fleet
10	Vessel average age per length categories in the active fleet
11	Vessel average age in the active fleet
12	Average crew on board per length categories in the active fleet
13	Number of women in the crew (optional) in the active fleet
14	Number of owners per owner's age class and per length categories in the active fleet
15	Owner average age per length categories in the active fleet
16	Number of owners possessing 1 vessels in the active fleet per length categories
17	Number of owners possessing 2 vessels in the active fleet per length categories
18	Number of owners possessing 3 vessels in the active fleet per length categories
19	Number of owners possessing 4 vessels in the active fleet per length categories
20	Number of owners possessing 5 vessels and more in the active fleet per length categories
21	Value of invested capital (optional) in the active fleet

22	Number of months of activity in the active fleet per length categories
23	Number of days at sea per length categories
24	Number of vessels per annual range of operation (distance to the coast) (<3, 3-12, >12 nm) per length categories
25	Number of vessels per fishing gear (DCF métier level 4) per length categories
26	Number of months per fishing gear (DCF métier level 4) per length categories
27	Days at sea per fishing gear (DCF métier level 4) per length categories
28	Number of vessels per métier (Gear-target species) (DCF métier level 5) per length categories
29	Days at sea per métier (Gear-target species) (DCF métier level 5) per year per length categories
30	Days at sea per métier (Gear-target species) (DCF métier level 5) per quarter per length categories
31	Total landings (tons) per métier (Gear-target species) (DCF métier level 5) and quarter per length categories
32	Total landings (value €) per métier (Gear-target species) (DCF métier level 5) and quarter per length categories
33	Landings (tons) per species (FAO codification) per length categories
34	Landings (value €) per species (FAO codification) per length categories
35	Number of vessels per length categories per fishing technique in the active fleet

Table 1. List of the variables asked per outermost region.

It was not possible to collect more detailed variables on economic indicators of the fleet.

A standardized approach was also developed to gather information in a homogenous way using FAO codification (species – scientific to groups) and DCF métier. Considering that the fleet under 10 meters in the ORs represented in 2017 86% of the overall OR's fleet, the ORFISH partners agreed to provide a more precise segmentation of the fleet in terms of vessel length classes than in the DCF context. Table 2 presents vessel length classes used for DCF[1] and in the ORFISH context.

DCF vessel_length	ORFISH vessel_length
VL0010	< 6 m
VL0010	[6-8[m
VL0010	[8-10[m
VL1012	[10-12[m
VL1218	[12-15[m
VL1218	[15-18[m
VL1824	[18-24[m
VL2440	[24-40[m
VL40XX	>= 40 m

Table 2. Vessel length classes in DCF and ORFISH context.

3.2 Main database used per OR

The first step was to consider the Community Fleet Register2 data set from each OR and provide an historical analysis of the evolution of the characteristics of the CFR fleet, from 1998

[1] https://stecf.jrc.ec.europa.eu/dd/fleet
[2] http://ec.europa.eu/fisheries/fleet/)

to 2016. The second step was collate, from 2008 to 2016, all the available data coming from DCF and regional data in order to build for each OR, the following parameters and indicators : structure of the active fleet (vessels number, length, capacity in tonnage, power and age), gears, métiers, and target species, fishing activity and seasonality, fishing areas of operation (coastal, edge of the islands shelves, offshore), means of production (crew size, capital invested, vessel ownership if available), landings per species

- French ORs - Guadeloupe - Martinique - – Guyane - La Réunion – Mayotte :
  For this study, the information provided the fisheries information system of Ifremer (http://sih.ifremer.fr/)[3] was used. Standardized data base included the EU fleet register for each French OR and the fishing calendars for all the vessels of the fleet. Fishing calendars aims by census at characterizing crew size, inactivity or activity of the vessels each month of the year and, in the latter case, the métiers practiced (use of a gear to target one or several species) and the two main fishing areas and the associated gradient (from coast to offshore). Estimation of landings is carried by sampling schemes in all the regions for the SSF component (under than 12 meters vessels). For the fleet up to 12 meters, data are coming from the French Fisheries Administration. Other additional information relevant for the study are used including economic data. Most of these data are collected through the EU Data Collection Framework.

- Azores: The amount of information available for the Azores is substantial with many available scientific reports, peer-reviewed publications, databases and statistics. One of the main sources of information is the Azores Regional Service for Statistics (SREA, http://estatistica.azores.gov.pt) with available data regarding fisheries landings, value and jobs. Additionally, other sources of information include reports from the fish auctions houses belonging to Lotaçor S.A., and scientific publications such as Pham et al. (2013)4 among others. DCF is also a data source to be considered.

- Madeira: in addition to the information about the fleet, taken from the European File Fleet Register, various types of additional information about the development of the fishing activity, gear used, fishing effort, and socio-economic variables are collected and are available under the data collection framework from sources such as the DRP databases, logbooks, sales notes and inquiries.

- Canary: Information to describe fleets, vessels, fishing gears and techniques, will be provided by the Report and Sampling Web of the Spanish Institute of Oceanography at Canary Islands for the gathering of artisanal fisheries information. Official data from Spain Fisheries Office sent by mail in reply to authors' request. Time series from 2008 to 2016. Fleet activity: Filtered by IEO information from First Sale Spots Network (Canary Islands and Spain Fisheries Offices). Available info does NOT specify geographical origin neither is classified by métier/fishing gear. Catches information come from the official fisheries administration registry at First Sale Spots. The great majority of the artisanal fleet lacks Vessel Monitoring System so detailed spatial distribution of fishing effort is not available. The Spanish Institute of Oceanography also lacks information on economic data.

3 The Fisheries Information System of Mayotte is operated by the Marine protected area of Mayotte (PNMM) with the project management support of Ifremer.

4 Pham, C., A. Canha, H. Diogo, J.G. Pereira, R. Prieto, T. Morato (2013) Total marine fisheries catch for the Azores (1950-2010). ICES Journal of Marine Science 70(3): 564-577. http://dx.doi.org/10.1093/icesjms/fst024

3.3 Data availability per OR

Not all the information required by the project was available in the different ORs. The following table presents data availability per OR.

Variable number	AZORES	CANARIAS	FRENCH GUYANA	MAYOTTE	MARTINIQUE	MADEIRA	GUADELOUPE	REUNION
1	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*		*	*
12			*	*	*		*	*
14	*		*	*	*		*	*
15	*		*	*	*		*	*
16	*	*	*	*	*		*	*
17	*	*	*	*	*		*	*
18	*	*	*	*	*		*	*
19	*	*	*	*	*		*	*
20	*	*	*	*	*		*	*
22		*	*	*	*		*	*
23		*	*	*	*		*	*
24			*	*	*		*	*
25			*	*	*	*	*	*
26			*	*	*		*	*
27			*	*	*	*	*	*
28			*	*	*		*	*
29			*	*	*		*	*
30			*	*	*		*	*
31			*	*	*		*	*
32			*	*	*		*	*
33	(*)	(*)	*	*	*	*	*	*
34	(*)	(*)	*	*	*	*	*	*
35	*		*	*	*		*	*

(*) partial answer using DCF vessel length class; ((*)) partial answer without vessel length class is a key point. N.B. Fleet register [1998-2006[/ Other data [2008-2016] / Effort & Landings Réunion [2010-2016], Mayotte (2015-2016]

Table 3. Available data per variable and outermost region.

3.4 Data storage and processing

All the data sets gathered from each partner were organized in a common file. References tables for species (scientific to groups), gear and métier, vessel length and age categories were organized in separate file but with a link to the common file. A data processing program was written in Java-talend[5] language to provide the relevant indicators and the BIRT software[6] was used to produce standardized indicators in a common format including standard leaflets. A java-script[7] program was also developed to provide the interactive tool for mapping the evolution of the characteristics of the CFR fleet.

IV. Results

4.1 Interactive tool for mapping the evolution of the characteristics of the CFR fleet in the ORs.

4.1.1 Organization of the fleet map tool

An interactive tool was implemented in the ORFISH Web site, mapping the current status and the evolution of the outermost region CFR fleet at various scales from the whole ORs level to the port of registration (figure 1). This tool is available at the following address: https://orfish.eu/fleet?lang=eng

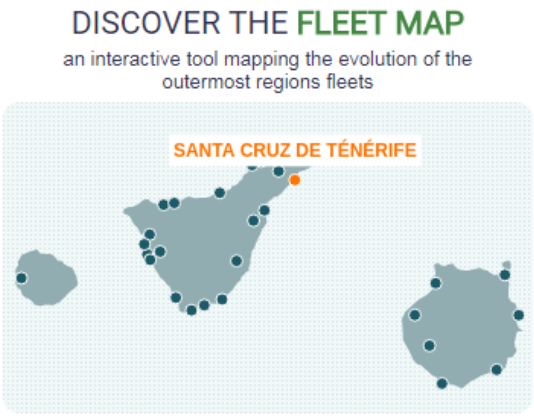


Figure 1: Discover the CFR fleet map in https://orfish.eu/

An online help is also available for the use of the web site (figure 2).

[5] https://fr.talend.com
[6] http://www.eclipse.org/birt/
[7] https://fr.wikipedia.org/wiki/JavaScript

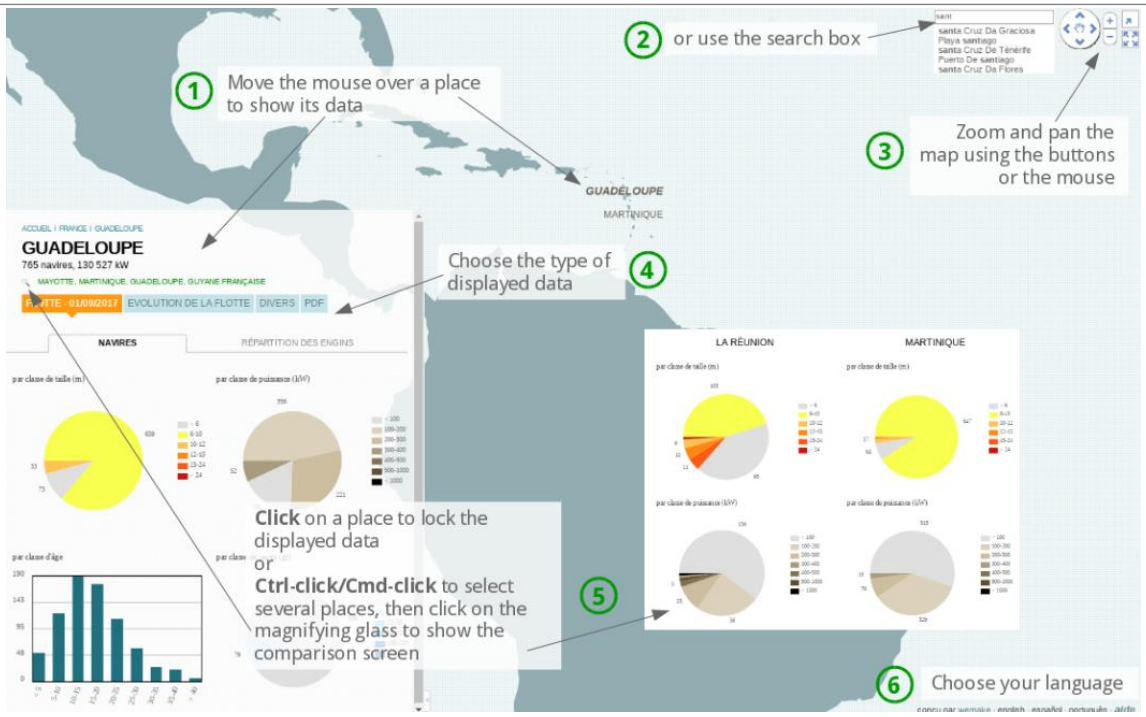


Figure 2: How to use the site

As can be seen in the following figures, the website presents the current status of the CFR fleet at various spatial levels: all outermost regions, regions, islands, port of registration (figures 3,4,5).

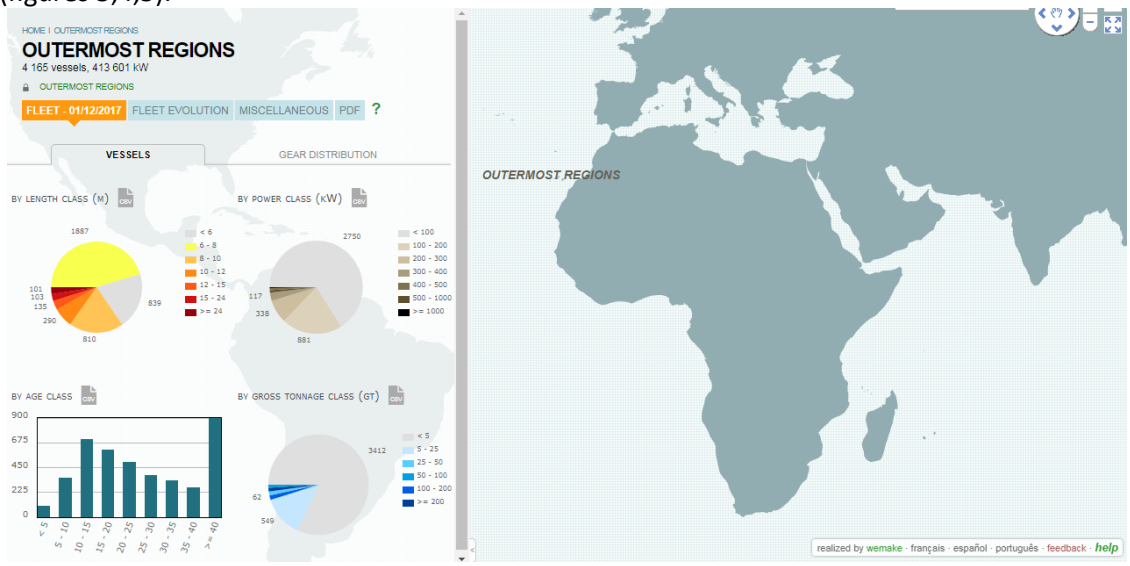


Figure 3: Current characteristics of the CFR fleet in all Outermost Regions.

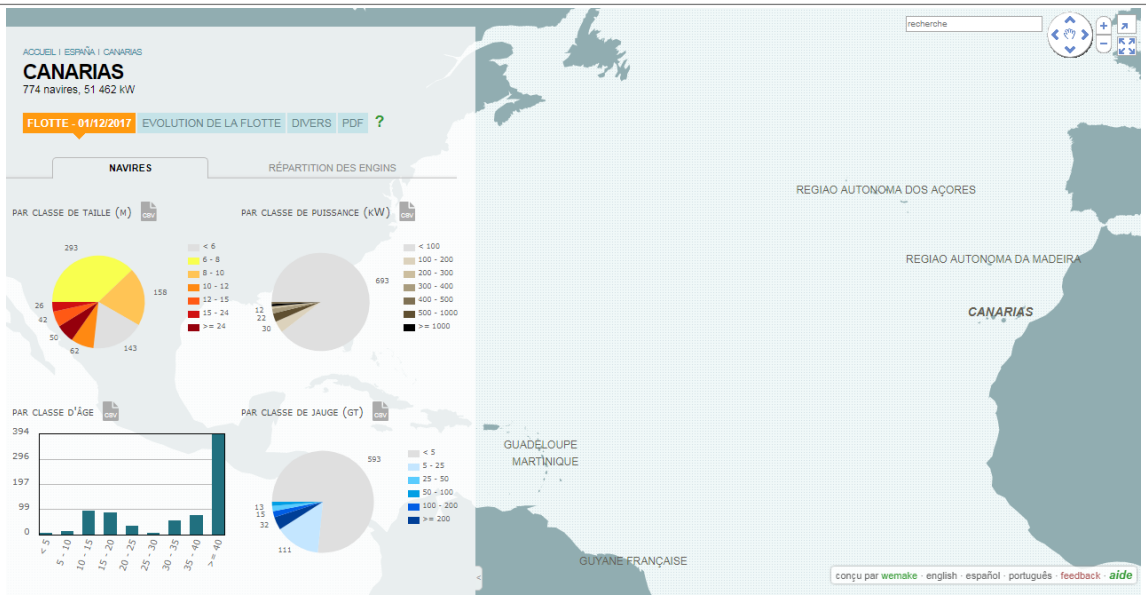


Figure 4: Current characteristics of the CFR fleet in Canarias.

The evolution of the characteristics of the fleet is also available (figure 5).

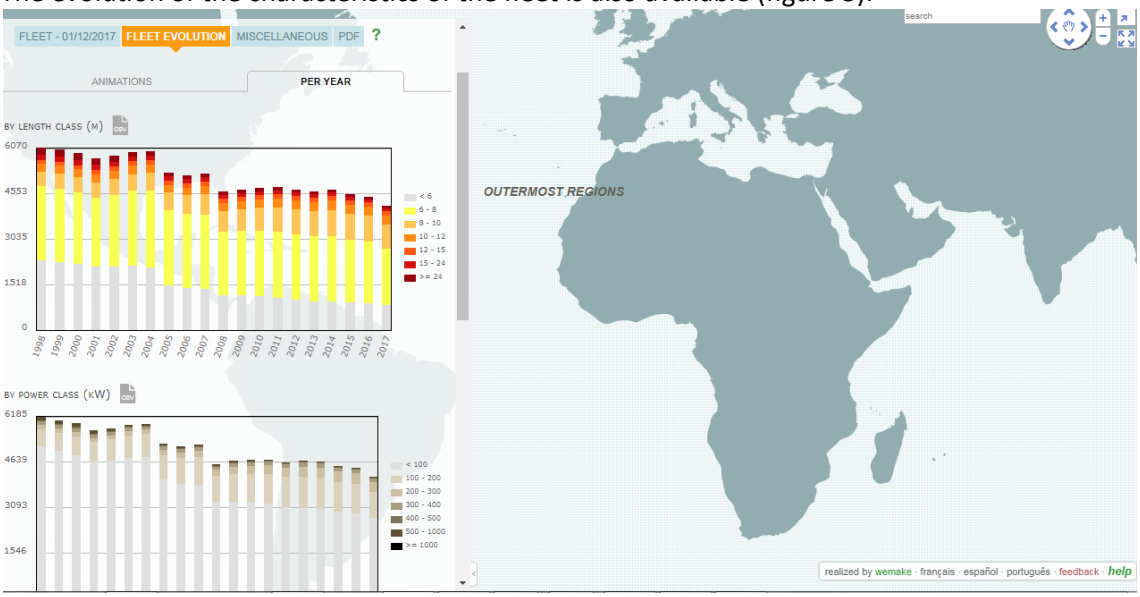


Figure 5: Fleet evolution of the CFR fleet in all Outermost Regions.

The miscellaneous section presents relationships between technical parameters of the fleet such as length, horse power in kW or tonnage in GT (see figure 6).

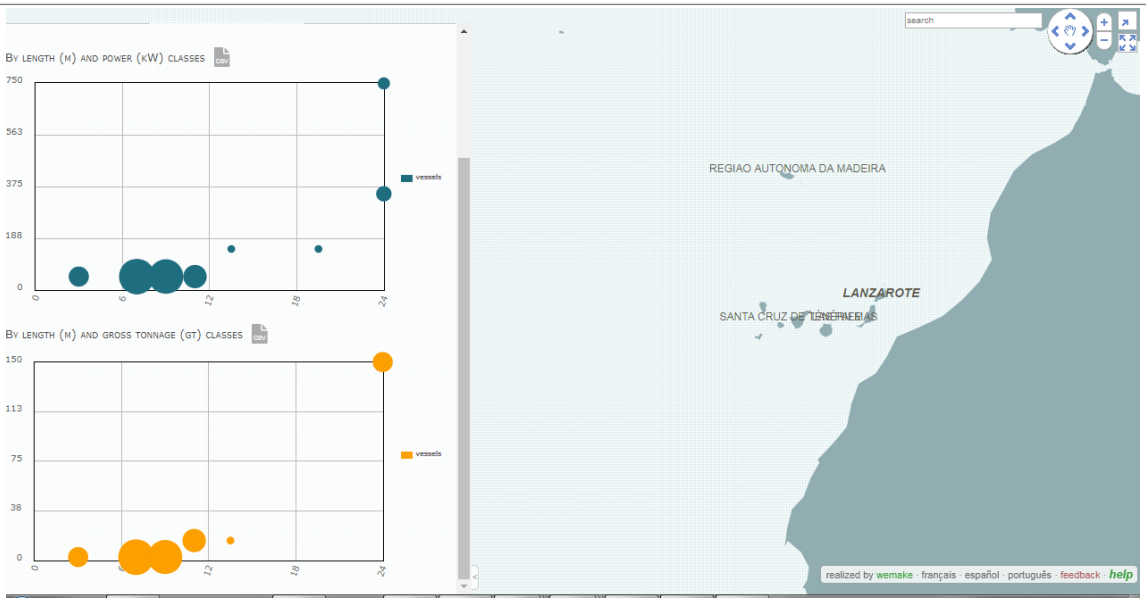


Figure 6: Relationships vessel length and engine power in Lanzarote.

The pdf section proposes summaries of the fleet characteristics at different scales (figure 7).

Figure 7: Choose your pdf.

4.1 Editing of leaflets per OR

Based on the data set available, leaflets were edited for the different regions. An example of these documents is available in the annex of this report. When finalized, these documents will be uploaded to the ORFISH website.

4.2 Structure and evolution of small-scale fisheries in ORs as a whole

4.2.1 Outermost Regions global CFR fleet structure and per length class

This section describes the evolution of the CFR fleet registered in all outermost regions as a whole. Considering all the outermost regions together, the total number of vessels has continuously decreased over time period from 6743 to 5974 units between 1998 and 2005. A significant drop to 5170 units can be noticed in 2006. The decline has been pursued to reach 4583 vessels in 2016 (Table 4). Between 1998 and 2016, the global average decrease is 32%. The ORFISH website provides an update vision of the evolution of the fleet.

DCF length class	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	*% in 2016*	*trend 1998/2016*
NA	123	69	61	46	5																
VL0010	5799	5641	5549	5433	5292	5335	5289	5256	4487	4349	4302	4119	4155	4212	4150	4069	4052	4174	3931	*86%*	*-32%*
VL1012	285	281	285	283	290	299	287	286	249	263	272	278	285	307	307	310	317	322	306	*7%*	*7%*
VL1218	169	183	196	204	209	213	206	199	206	203	208	200	192	187	185	182	183	182	182	*4%*	*8%*
VL1824	132	127	117	123	113	111	103	95	96	100	95	82	76	75	78	71	69	66	62	*1%*	*-53%*
VL2440	210	205	209	207	191	156	124	114	109	103	100	93	91	91	87	80	81	80	81	*2%*	*-61%*
VL40XX	25	26	22	24	24	28	23	24	23	22	20	20	20	22	17	17	22	22	21	*0%*	*-16%*
Total général	6743	6532	6439	6320	6124	6142	6032	5974	5170	5040	4997	4792	4819	4894	4824	4729	4724	4846	4583	*100%*	*-32%*

Table 4. Annual number of CFR vessels of Outermost Regions per DCF length class (m).

Taking into account the DCF length's structure, the decrease of the VL0010 meters class is also around 32%, when the VL1012 and VL1218 increase by 7 and 8%. These classes represent

respectively 86%, 7 and 4% of the overall ORs fleet in 2016. The use of more detailed ORFISH length classes (Figure 8) presents a more contrasted evolution of the OR's fleet.

For vessels under 12m, the < 6m vessels (20% of the OR fleets in 2016) have known a strong reduction by 63% since 1998, when the [6-8[m fleet (46 % of the OR fleets in 2016) has reduced only by 23%, and the [8-10[fleet (19 % of the OR fleets in 2016) has increased sharply by 66% (Table 5, Graph 1). the [10-12[m vessels (7 % of the OR fleets in 2016) decreased by 7%. These evolutions highlight significant changes in the structure of the fleet under 12 m and we may question about the evolution of the fishing capacity of the small-scale fleet over time.

For vessels over 12 meters, the [12-15[m vessels (3 % of the OR fleets in 2016) has increased by 19%. The [15-18[m vessels (1 % of the OR fleets in 2016) has decreased by 17%. The [18-24[and [24-40[m vessels (3% of the OR fleets in 2016) have known a strong decrease by 53 and 64%. The >= 40m vessels are more stable with a reduction by 16%.

DCF length class	ORFISH length class	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	*% in 2016*	*trend 1998/2016*
VL0010	< 6 m	2511	2413	2348	2286	2207	2187	2131	2071	1436	1344	1289	1188	1161	1137	1077	1004	972	977	936	**20%**	***-63%***
VL0010	[6-8[m	2755	2682	2644	2586	2534	2573	2566	2562	2420	2341	2289	2196	2215	2250	2234	2212	2212	2297	2112	**46%**	***-23%***
VL0010	[8-10[m	533	546	557	561	551	575	592	623	631	664	724	735	779	825	839	853	868	900	883	**19%**	***66%***
VL1012	[10-12[m	285	281	285	283	290	299	287	286	249	263	272	278	285	307	307	310	317	322	306	**7%**	***7%***
VL1218	[12-15[m	115	127	138	143	149	152	151	143	148	145	151	147	142	138	137	136	138	138	137	**3%**	***19%***
VL1218	[15-18[m	54	56	58	61	60	61	55	56	58	58	57	53	50	49	48	46	45	44	45	**1%**	***-17%***
VL1824	[18-24[m	132	127	117	123	113	111	103	95	96	100	95	82	76	75	78	71	69	66	62	**1%**	***-53%***
VL2440	[24-40[m	210	205	209	207	191	156	124	114	109	103	100	93	91	91	87	80	81	80	81	**2%**	***-61%***
VL40XX	>= 40 m	25	26	22	24	24	28	23	24	23	22	20	20	20	22	17	17	22	22	21	**0%**	***-16%***
NA	NA	123	69	61	46	5																
Total ORs		**6743**	**6532**	**6439**	**6320**	**6124**	**6142**	**6032**	**5974**	**5170**	**5040**	**4997**	**4792**	**4819**	**4894**	**4824**	**4729**	**4724**	**4846**	**4583**	***100%***	***-32%***

Table 5. Annual number of CFR vessels of Outermost Regions per DCF and ORFISH length classes (m).

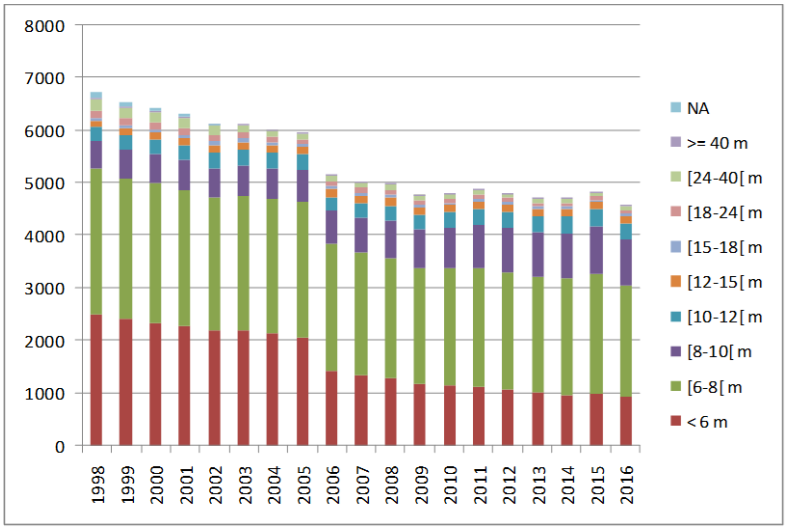


Figure 8. Annual number of CFR vessels of Outermost Regions per ORFISH length class (m).

4.2.2 Outermost Regions CFR Fleet engine power structure and per length class

If the size of the EU fishing fleet expressed in vessels number has followed a downward trend, this is not the case for the engine power which increased by 7% over the period (Table 6, Figure 9).

- the total engine power (kW) of the< 6m vessels (4% of the OR fleets kW in 2016 and 18kW on average) have known a strong reduction by 33% since 1998, when the [6-8[m fleet (36 % of the OR fleets kW in 2016, and 78 kW on average) has increased by 23%, and the [8-10[fleet

(27 % of the OR fleets in 2016, 140 kW on average) has increased sharply by 219%. This observation is a second indicator of a global increase in nominal fishing capacity of the SSF in outermost regions with the time.

- the total engine power (kW) of [10-12[m vessels (8 % of the OR fleets kW in 2016, 125 kW on average) has increased by 60%.
- the total engine power (kW) of [12-15[m vessels (3 % of the OR fleets kW in 2016, 105 kW on average) has increased by 15%.
- the total engine power (kW) of [15-18[m vessels (1 % of the OR fleets kW in 2016, 147 kW on average) has decreased by 19%.
- the total engine power (kW) of [18-24[and [24-40[m vessels (4 and 8% of the OR fleets kW in 2016, 267 and 462 kW on average) knows a strong decrease by 53 and 64%.
- the total engine power (kW) of >= 40m vessels (9% of the OR fleets kW in 2016, 1926 kW on average) has increased by 16% since 1996.

DCF length class	ORFISH length class	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	*% in 2016*	*average kW per vessel 2016*	*trend 1998/2016*
VL0010	< 6 m	25325	24228	24686	24401	24628	24624	23643	23638	21776	21697	21405	20672	20480	20720	19612	18683	18005	18104	17011	**4%**	**18**	***-33%***
	[6-8[m	136648	133528	134642	134246	138726	145121	148092	150427	148615	151028	152484	151560	158499	167007	169938	171783	173050	176063	165550	**36%**	**78**	***21%***
	[8-10[m	38892	39367	40622	40400	40097	44029	46690	52039	60014	68069	78579	84050	95339	104596	108151	113023	116218	122322	124048	**27%**	**140**	***219%***
VL1012	[10-12[m	23859	23053	23166	23629	24703	27119	26388	27423	27413	29497	30337	30926	32532	35681	36878	37966	38292	38645	38227	**8%**	**125**	***60%***
VL1218	[12-15[m	12547	13684	14977	15567	16234	16846	16554	15412	15717	15583	16943	16386	15598	14782	14287	14075	14405	14444	14376	**3%**	**105**	***15%***
	[15-18[m	8190	8887	8725	9385	9121	9420	8531	8983	9288	9253	9149	8287	7964	7702	7557	7136	6694	6430	6618	**1%**	**147**	***-19%***
VL1824	[18-24[m	36862	35920	33167	34719	32044	32200	29671	27129	27435	29456	27428	23357	21471	20880	21929	19712	18957	17817	16562	**4%**	**267**	***-55%***
VL2440	[24-40[m	114238	109772	111806	110173	99936	82088	63515	55929	52891	48469	47065	43278	42242	41685	40408	36591	37307	36812	37406	**8%**	**462**	***-67%***
VL40XX	>= 40 m	28061	28780	25528	27049	27049	31173	23313	24692	23772	22670	20263	20098	20098	28225	21347	22100	41500	41500	40436	**9%**	**1 926**	***44%***
NA	NA	5776	3448	2932	1649	860																	
Total général		**430398**	**420667**	**420251**	**421218**	**413398**	**412620**	**386397**	**385672**	**386921**	**395722**	**403653**	**398614**	**414223**	**441278**	**440107**	**441069**	**464428**	**472137**	**460234**	***100%***	***100***	***7%***

Table 6. Annual engine power of CFR vessels of Outermost Regions per DCF and ORFISH length classes (m).

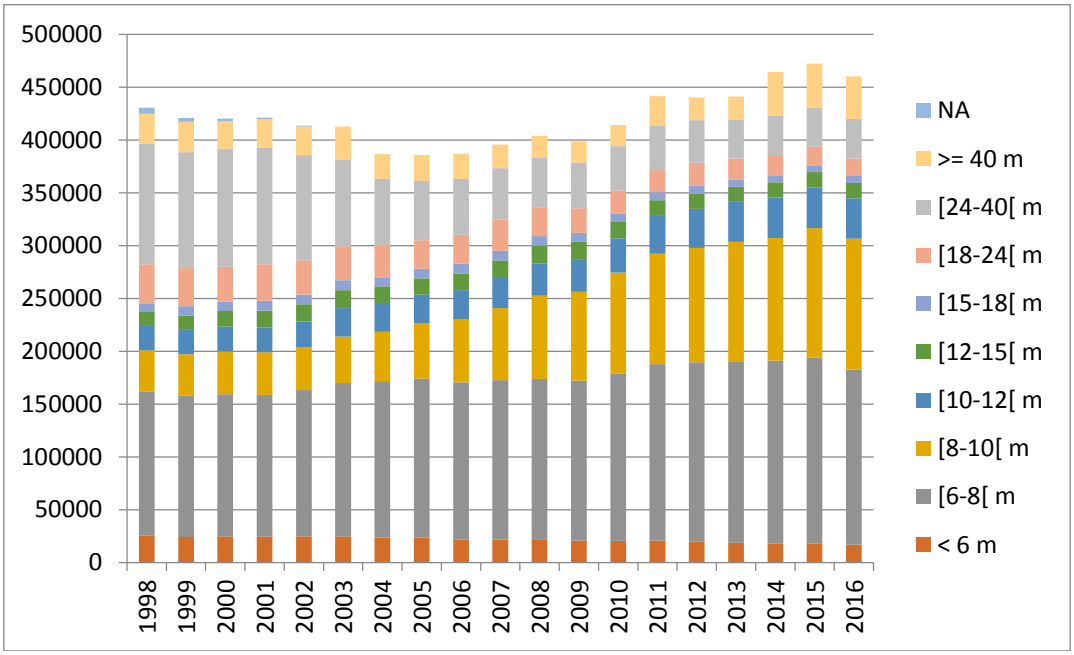


Figure 9. Annual engine power (kW) of CFR vessels of Outermost Regions per ORFISH length classes (m).

4.2.3 Outermost Regions CFR fleet vessel's age structure per length class

During the period of analysis, the vessel population ageing concerns all the groups of vessels in outermost regions. The average age increased from 18,6 years to 25 years between 1998 and 2016 (table 7).

DCF length class	ORFISH length class	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	*trend 1998/2016*
NA	NA	29,5	34,5	33,9	35,3																
VL0010	< 6 m	20,0	20,6	20,8	20,6	21,4	22,2	22,7	22,9	23,0	23,8	24,4	25,2	26,4	27,3	28,1	28,8	30,0	28,8	29,5	***47%***
	[6-8[m	21,2	21,2	21,6	22,2	22,3	22,5	22,3	22,8	22,5	22,5	23,2	23,1	23,4	24,1	24,8	25,5	26,2	26,0	25,8	***22%***
	[8-10[m	17,7	17,5	18,1	18,3	18,7	19,3	19,3	18,4	17,7	17,9	17,7	17,9	18,2	18,3	18,6	19,3	20,4	20,5	21,2	***20%***
VL1012	[10-12[m	19,2	19,2	19,8	20,4	21,0	20,7	21,5	21,4	20,1	19,9	20,3	19,9	20,3	20,2	20,7	21,3	22,3	23,1	22,5	***17%***
VL1218	[12-15[m	16,2	16,8	15,9	15,7	16,1	16,9	17,7	17,3	18,0	18,9	19,6	20,4	21,2	22,1	23,7	24,7	25,6	26,6	27,6	***70%***
	[15-18[m	16,0	12,8	13,0	13,6	14,3	18,7	19,1	19,9	20,6	17,1	17,9	16,1	16,6	15,5	16,3	17,3	18,3	19,1	19,9	***24%***
VL1824	[18-24[m	14,0	14,5	15,2	14,9	16,7	15,5	14,8	15,8	15,8	16,5	16,9	15,1	15,7	15,2	16,2	17,8	19,6	20,4	20,1	***43%***
VL2440	[24-40[m	11,2	10,7	10,9	11,4	12,3	13,2	13,2	13,7	14,5	14,9	15,8	16,7	17,5	18,2	19,3	21,5	22,3	22,4	22,3	***100%***
VL40XX	>= 40 m	15,2	16,2	16,8	16,8	17,8	22,7	17,5	16,8	17,7	18,4	19,4	20,4	21,4	18,4	17,0	17,6	15,6	16,6	17,6	***16%***
Total ORs		**18,6**	**18,8**	**19,1**	**19,5**	**19,8**	**20,4**	**20,9**	**21,3**	**21,1**	**21,3**	**21,5**	**21,7**	**22,2**	**22,7**	**23,3**	**23,8**	**22,6**	**24,5**	**25**	***34%***

Table 7. Annual average vessel age of CFR vessels of Outermost Regions per DCF and ORFISH length classes (m).

1.1.1.1 Fleet structure per year class

During the period of analysis, the age structure has changed significantly (Table 8, Figure 10). The number of vessels under 10 years old dropped from 29% in 1998 to 17% in 2016. Vessels under 5 years are subject to a sharp reduction of 84% during the period and 36% for the [5-10] years old.

VESSEL_YEAR_CLASS	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	*% in 1998*	*% in 2016*	*trend 1998/2016*
< 5 years	917	875	889	868	830	787	756	733	717	706	721	685	654	595	478	354	269	211	143	**14%**	**3%**	***-84%***
[5-10[years	993	905	797	753	745	813	828	848	845	810	774	741	710	749	764	805	771	738	635	**15%**	**14%**	***-36%***
[10-15[years	984	925	887	788	762	739	685	626	594	594	645	650	707	729	741	711	715	724	722	**15%**	**16%**	***-27%***
[15-20[years	1019	1007	842	845	830	777	749	700	605	571	526	491	476	491	509	585	628	709	705	**15%**	**15%**	***-31%***
[20-25[years	414	438	670	752	780	859	869	729	577	545	508	500	492	474	486	466	468	482	461	**6%**	**10%**	***11%***
[25-30[years	406	403	353	344	340	347	345	567	417	417	441	420	433	462	445	426	457	489	420	**6%**	**9%**	***3%***
[30-35[years	411	390	394	399	392	363	349	285	239	222	205	211	270	319	329	351	353	371	379	**6%**	**8%**	***-8%***
[35-40[years	293	304	335	328	339	367	333	337	261	254	236	212	191	175	167	162	185	239	248	**4%**	**5%**	***-15%***
>= 40 years	914	947	975	1013	1041	1090	1118	1149	915	921	941	882	886	900	905	869	878	883	870	**14%**	**19%**	***-5%***
NA	392	338	297	230	65																	
Total ORs	**6743**	**6532**	**6439**	**6320**	**6124**	**6142**	**6032**	**5974**	**5170**	**5040**	**4997**	**4792**	**4819**	**4894**	**4824**	**4729**	**4724**	**4846**	**4583**		***100%***	***-32%***

Table 8. Annual number of vessels of CFR vessels of Outermost Regions per vessel year class.

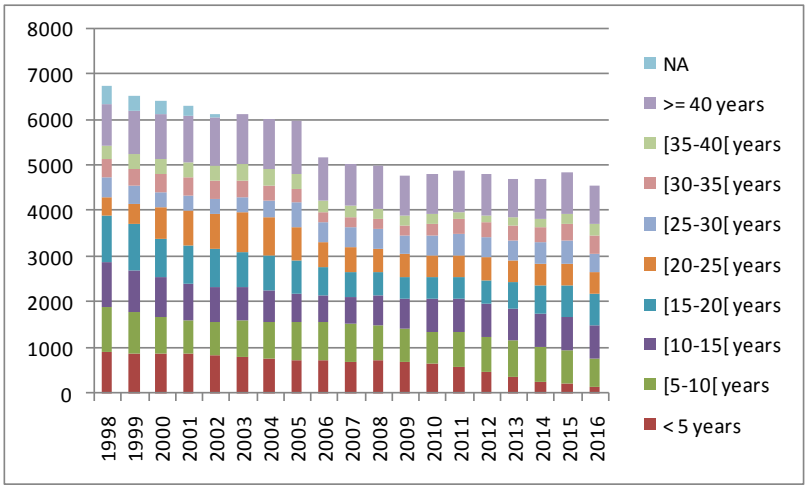


Figure 10. Annual age structure of CFR vessels of Outermost Regions per ORFISH year classes (m).

This following section proposes the key figures of the active fleet in the outermost regions from 2008 to 2016.

4.2.4 Outermost Regions active fleet: global structure and per length class

This section and the following present a set of indicators on the active fraction of the fishing fleet from 2008 to 2016. First of all, the active fleet can be compared to the registered fleet. In 2016, the registered fleet was composed of 4583 vessels and the active fleet included 3036 (66%). The total number of active vessels in the outermost regions presents a continuous decline from 2008 (3874 units) to 2016 (3036 units). The overall reduction is 22% during the period (Table 9). The number of vessels under 10 meters shows an average reduction of 23% (from 3329 to 2554) with strong fluctuations depending on the length class: the number of vessels under 6 meters decline by 42% (from 537 to 309), when the number of vessels between increase by 9%. The active fleet between 10 and 12m remains stable over the period.

DCF length class	ORFISH length class	2008	2009	2010	2011	2012	2013	2014	2015	2016	*% in 2008*	*% in 2016*	*trend 1998/2016*
VL0010	< 6 m	537	492	456	435	370	350	323	319	309	***14%***	**10%**	***-42%***
	[6-8[m	1687	1608	1560	1463	1342	1337	1296	1277	1250	***44%***	**41%**	***-26%***
	[8-10[m	493	491	506	541	512	510	518	532	535	***13%***	**18%**	***9%***
		612	605	598	574	527	505	487	481	460	***16%***	**15%**	***-25%***
Total VL0010		**3329**	**3196**	**3120**	**3013**	**2751**	**2702**	**2624**	**2609**	**2554**	***86%***	**84%**	***-23%***
VL1012	[10-12[m	159	148	144	155	139	144	144	151	153	***4%***	**5%**	***-4%***
		78	81	85	87	90	88	91	83	81	***2%***	**3%**	***4%***
Total VL1012		**237**	**229**	**229**	**242**	**229**	**232**	**235**	**234**	**234**	***6%***	**8%**	***-1%***
VL1218	[12-15[m	57	58	56	53	47	49	51	51	48	***1%***	**2%**	***-16%***
	[15-18[m	25	27	24	25	20	22	21	22	22	***1%***	**1%**	***-12%***
		67	68	68	60	59	59	59	64	62	***2%***	**2%**	***-7%***
Total VL1218		**149**	**153**	**148**	**138**	**126**	**130**	**131**	**137**	**132**	***4%***	**4%**	***-11%***
VL1824	[18-24[m	51	44	44	40	36	32	31	29	30	***1%***	**1%**	***-41%***
		9	9	8	9	7	6	6	10	10	***0%***	**0%**	***11%***
Total VL1824		**60**	**53**	**52**	**49**	**43**	**38**	**37**	**39**	**40**	***2%***	**1%**	***-33%***
VL2440	[24-40[m	56	51	48	44	34	26	32	32	33	***1%***	**1%**	***-41%***
		25	29	30	32	31	31	31	29	25	***1%***	**1%**	***0%***
Total VL2440		**81**	**80**	**78**	**76**	**65**	**57**	**63**	**61**	**58**	***2%***	**2%**	***-28%***
VL40XX	>= 40 m	18	17	18	17	17	14	19	21	18	***0%***	**1%**	***0%***
		0	0	0	0	0	0	0	0	0	***0%***	**0%**	
Total VL40XX		**18**	**17**	**18**	**17**	**17**	**14**	**19**	**21**	**18**	***0%***	**1%**	***0%***
Total ORs		**3874**	**3728**	**3645**	**3535**	**3231**	**3173**	**3109**	**3101**	**3036**	***100%***	**100%**	***-22%***

Table 9. Annual number of active vessels of Outermost Regions per DCF and ORFISH length classes (m).

4.2.1 Evolution of cumulated engine power (kW) of the active fleet

Total and per length class (m) annual engine power (kW) of the overall active fleet show a global stability during the study time series, with a slight reduction by 3% (Table 10).

Temporal trends vary greatly depending on the size class of the vessels:
- A strong reduction by 46% for the less than 6m long units
- A reduction by 15% for the vessels between 6 and 8 m long
- An increase by 34% for the vessels between 8 and 10 m long
- The power of vessels between 8 and 10 m long has an average reduction by 3 %
- The other vessels classes present a reduction of engine power, except the vessels up to 40 m long with an increase of 107% (partly due to the entry of 5 purse seiners registered in Mayotte during the period).

DCF length class	ORFISH length class	2008	2009	2010	2011	2012	2013	2014	2015	2016	% in 2016	average kW per vessel 2016	trend 2008/2016
VL0010	< 6 m	15 370,9	12 222,0	11 579,6	11 816,1	10 325,4	9 745,5	9 194,8	8 373,8	8 282,7	3%	27	-46%
	[6-8[m	123 398,2	122 341,9	122 561,8	120 163,2	116 162,7	114 558,2	110 730,3	105 740,5	104 496,9	32%	84	-15%
	[8-10[m	60 521,8	61 987,9	68 144,7	76 252,2	74 673,0	75 956,9	76 300,3	77 086,9	81 188,6	25%	152	34%
		20 252,3	21 386,4	22 488,3	22 438,5	21 493,9	20 751,7	19 778,3	19 309,8	18 555,9	6%	40	-8%
Total VL0010		219 543,2	217 938,2	224 774,4	230 670,0	222 655,0	221 012,3	216 003,7	210 510,9	212 524,1	65%	83	-3%
VL1012	[10-12[m	18 511,6	17 120,8	17 225,3	19 444,5	18 718,9	18 535,9	17 115,6	16 366,2	18 218,2	6%	119	-2%
		7 399,7	7 715,5	7 948,3	7 918,6	7 926,6	7 616,6	7 867,7	7 148,7	6 994,7	2%	86	-5%
Total VL1012		25 911,3	24 836,3	25 173,6	27 363,1	26 645,5	26 152,5	24 983,3	23 514,9	25 212,9	8%	108	-3%
VL1218	[12-15[m	5 969,7	5 866,4	5 678,5	5 267,3	4 631,0	4 722,9	4 973,5	4 928,5	4 580,7	1%	95	-23%
	[15-18[m	4 347,8	4 473,9	4 149,6	4 437,8	3 602,5	3 775,2	3 362,7	3 399,4	3 428,8	1%	156	-21%
		9 275,8	9 586,9	9 568,1	8 115,9	7 944,5	8 007,4	7 941,8	8 489,8	8 313,8	3%	134	-10%
Total VL1218		19 593,3	19 927,1	19 396,2	17 820,9	16 178,0	16 505,6	16 278,0	16 817,7	16 323,3	5%	124	-17%
VL1824	[18-24[m	15 346,0	13 232,2	13 518,6	11 935,6	11 004,6	9 176,5	8 431,8	7 934,8	8 222,1	3%	274	-46%
		2 305,1	2 319,7	2 090,6	2 343,6	1 900,8	1 562,3	1 551,5	2 481,5	2 481,5	1%	248	8%
Total VL1824		17 651,1	15 551,9	15 609,2	14 279,1	12 905,4	10 738,7	9 983,3	10 416,3	10 703,6	3%	268	-39%
VL2440	[24-40[m	26 936,9	24 012,1	22 361,3	20 254,6	15 967,4	11 263,8	15 079,8	15 079,8	14 546,7	4%	441	-46%
		11 265,1	13 358,7	13 486,8	14 148,8	13 533,8	13 447,9	13 439,9	13 145,4	11 665,9	4%	467	4%
Total VL2440		38 202,0	37 370,8	35 848,2	34 403,4	29 501,3	24 711,7	28 519,7	28 225,2	26 212,6	8%	452	-31%
VL40XX	>= 40 m	17 921,0	16 691,6	17 756,3	17 218,8	21 355,9	19 294,1	38 256,6	40 332,4	37 019,1	11%	2 057	107%
		0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0			
Total VL40XX		17 921,0	16 691,6	17 756,3	17 218,8	21 355,9	19 294,1	38 256,6	40 332,4	37 019,1	11%	2 057	107%
Total ORs		338 821,9	332 316,0	338 557,8	341 755,5	329 241,0	318 415,0	334 024,6	329 817,4	327 995,5	100%	108	-3%

Table 10. Annual engine power (kW) of the active vessels in Outermost Regions per DCF and ORFISH length classes (m).

4.2.2 Evolution of gross tonnage (GT) of the active fleet

Total and per length class (m) annual tonnage (GT) of the overall active fleet present also a global stability during the study time series, with a slight increase by 2% (Table 11).

Temporal trends vary greatly depending on the size class of the vessels:
- A strong reduction by 37% for the less than 6m long units
- A reduction by 24% for the vessels between 6 and 8 m long
- An increase by 10% for the vessels between 8 and 10 m long
- the GT of vessels between 8 and 10 m long has increased by 5 %
- the other vessels classes present a reduction of gross tonnage, except the vessels up to 40 m long with an increase by 92% (partly due to 5 purse seiners registered in Mayotte during the period).

DCF length class	ORFISH length class	2008	2009	2010	2011	2012	2013	2014	2015	2016	% in 2016	average GT per vessel 2016	trend 2008/2016
VL0010	< 6 m	467,96	426,19	394,96	379,46	322,42	309,1	286,79	299,76	294,84	1%	1	-37%
	[6-8[m	3176,95	3056,89	2915,91	2745,27	2528,66	2527,71	2463,73	2456,75	2412,31	5%	2	-24%
	[8-10[m	1750,88	1719,93	1749,3	1856,62	1748,33	1763,61	1780,92	1846,61	1929,78	4%	4	10%
		1323,11	1366,13	1428,81	1420,32	1366,92	1328,68	1276,43	1267,39	1199,11	2%	3	-9%
Total VL0010		6718,9	6569,14	6488,98	6401,67	5966,33	5929,1	5807,87	5870,51	5836,04	11%	2	-13%
VL1012	[10-12[m	1191,91	1129,54	1109,02	1189,18	1030,15	1107,36	1110,7	1128,01	1161,29	2%	8	-3%
		719,15	748,5	800,85	856,42	940,03	897,79	934,03	863,03	853,03	2%	11	19%
Total VL1012		1911,06	1878,04	1909,87	2045,6	1970,18	2005,15	2044,73	1991,04	2014,32	4%	9	5%
VL1218	[12-15[m	854,17	853,49	798,47	758,85	671,4	698,79	737,44	729,14	692,99	1%	14	-19%
	[15-18[m	923,5	954,35	859,92	905,62	740,24	790,38	724,76	757,03	755,57	1%	34	-18%
		1453,16	1516,46	1543,19	440,37	1229,37	1249,23	1229,23	1284,23	1287,21	2%	21	-11%
Total VL1218		3230,83	3324,3	3201,58	2104,84	2641,01	2738,4	2691,43	2770,4	2735,77	5%	21	-15%
VL1824	[18-24[m	5191,88	4531,88	4401,34	3958,33	3769,83	3173,04	2986,04	2716,94	2847,04	5%	95	-45%
		540,33	540,33	491,54	557,16	406,42	324,13	324,98	663,98	663,98	1%	66	23%
Total VL1824		5732,21	5072,21	4892,88	4515,49	4176,25	3497,17	3311,02	3380,92	3511,02	7%	88	-39%
VL2440	[24-40[m	15698,35	13496,76	12315,73	11132,97	9046,01	5470,21	7678,22	7678,22	7742,79	15%	235	-51%
		4060,76	4792,63	4679,72	5035,72	4778,85	4688,36	4688,36	4556,66	3889,38	7%	156	-4%
Total VL2440		19759,11	18289,39	16995,45	16168,69	13824,86	10158,57	12366,58	12234,88	11632,17	22%	201	-41%
VL40XX	>= 40 m	13695,2	13198,2	13717,2	13198,2	15450,2	14881,4	26501,4	28515,4	26245,4	50%	1 458	92%
		0	0	0	0	0	0	0	0	0			
Total VL40XX		13695,2	13198,2	13717,2	13198,2	15450,2	14881,4	26501,4	28515,4	26245,4	50%	1 458	92%
Total ORs		51047,31	48331,28	47205,96	44434,49	44028,83	39209,79	52723,03	54763,15	51974,72	100%	17	2%

Table 11. Annual gross tonnage (GT) of active vessels in Outermost Regions per DCF and ORFISH length classes (m).

2.1.1.1 Structure of active fleet in 2016

In 2016, 3016 active vessels operated in the ORs. Most of them (92%) were under 12 m, representing 72% of the total horse power (327 400 kW) and 71% of the total crew members (9100). Total landings from the ORs were estimated to 36 000 tons for total ex-vessel value of 138 million €. The small scale fleet under 12m represented respectively 51% and 65% of these values. Average price was around 3.4€/kg.

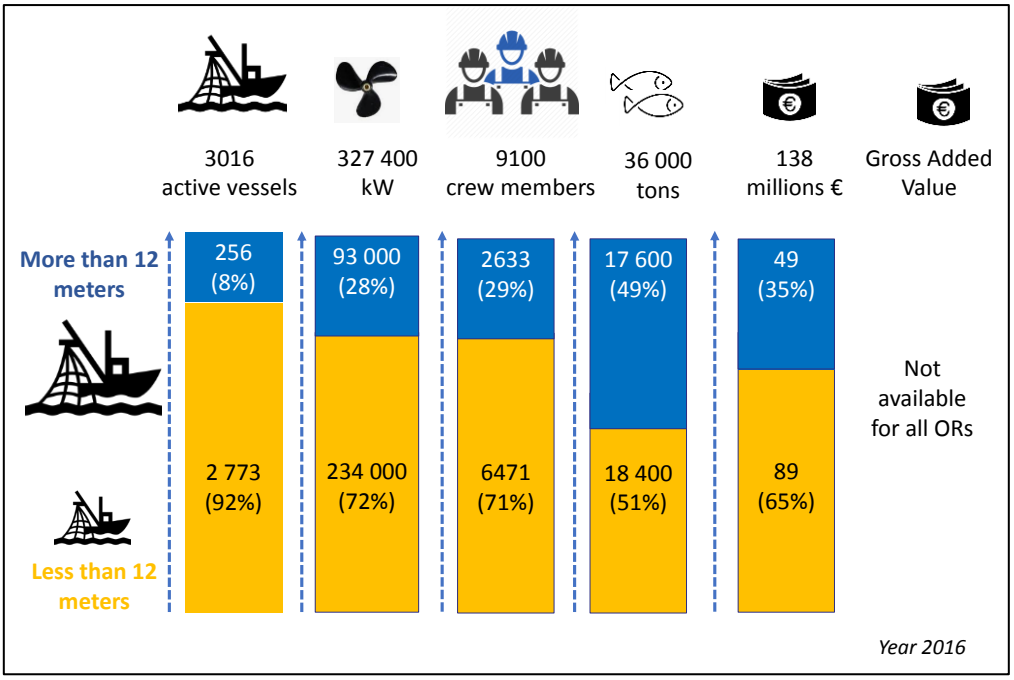


Figure 14. Key figures for the OR active fleet in in 2016.

The distribution of the active fleet is presented hereafter with the [6-8[m length category as the most important component of the fleet in vessels number followed by the [8-10[m category.

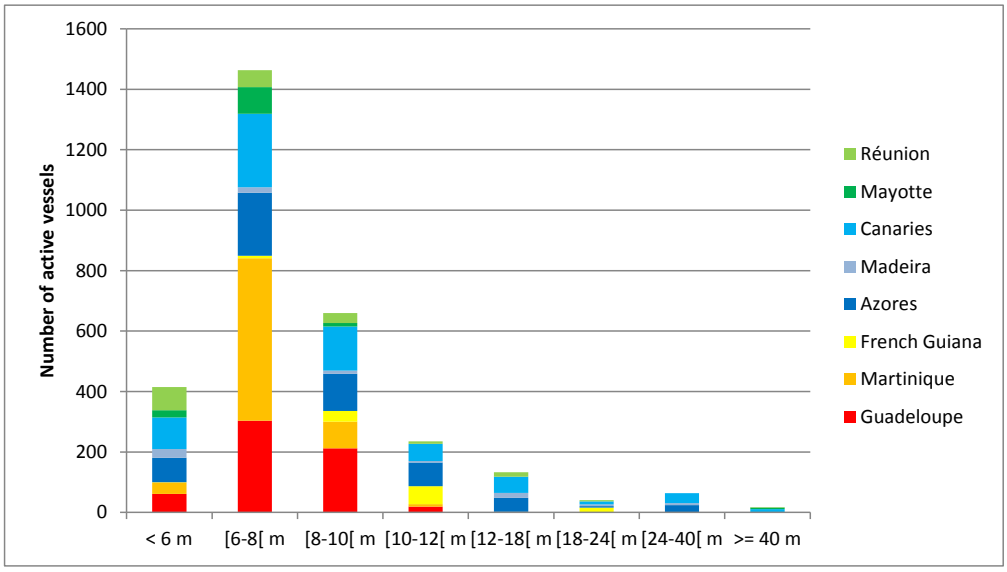


Figure 14. Number of active vessels per OR and length category.

In 2016 and for the fleet under 12 m, 1300 active vessels were located in Lesser Antilles (Guadeloupe and Martinique) and French Guyana. In Macaronesia Island, 1100 vessels were active with Azores and Canaries as the most important number of vessels. The most significant difference between the registered fleet and the active fleet was for Madeira. In the Indian Ocean, La Réunion and Mayotte Islands accounted for around 350 vessels. The largest length class in terms of vessel numbers was the 6-8m length class (1500 vessels, 52% of the fleet), then the 8-10m length class (680 vessels, 24% of the fleet). The less than 6m length class the 10-12m length class accounted for around 400 vessels (15%) and 235 vessels (8%) respectively.

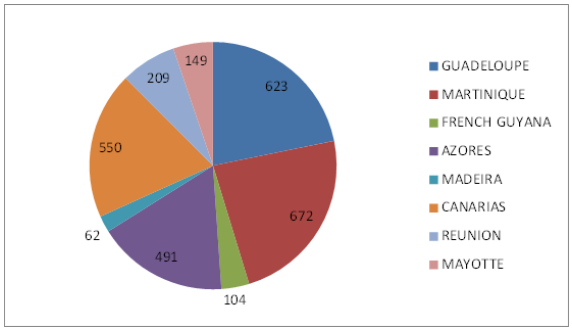


Figure 12. Number of active vessels under 12 m per OR (2016)

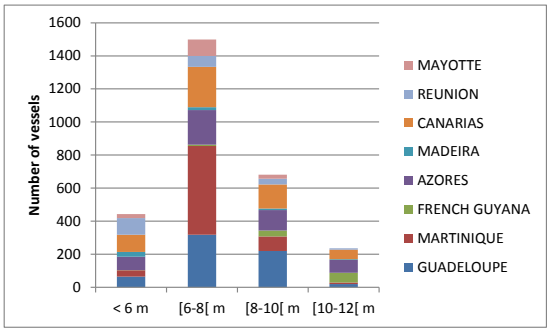


Figure 13. Number of active vessels under 12 m per length categories and OR (2016)

In 2016, Guadeloupe and Martinique fleet accounted for 70% the total engine power of the active fleet. In these regions as well as in the Réunion Island, the engine power of the vessels was higher than in the other regions. This structure is mainly explained by the past public policies and the objective to increase the size of the vessels operating on moored fishing aggregating devices and fishers' behavior who invested in more powerful outboard engines, especially to operate on large pelagic fisheries with hooks and line. As the engine power increases with the size of the vessel, the relative importance of 8-10m length classes increases and accounted for 34% of the total horse power in 2016.

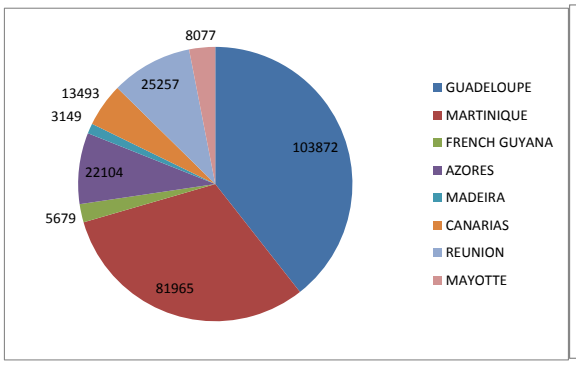


Figure 15. Total horse power (kW) for the active vessels under 12 m (per OR in 2016)

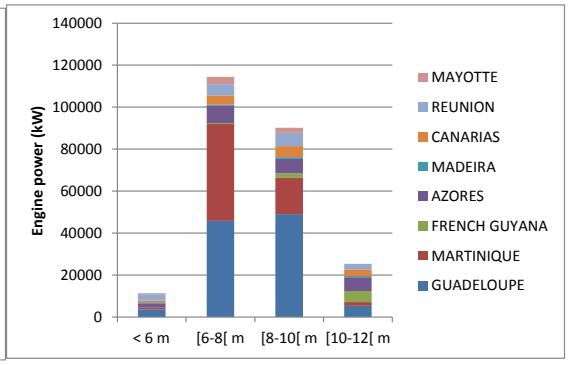


Figure 16. Total horse power (kW) for the active vessels under 12 m (per length categories and OR in 2016)

In Guadeloupe and Martinique, the average horse power was 160kW and 120kW respectively. The average power was also 120 kW in The Réunion and the horse power structure was quite similar to Martinique. In Macaronesia, the average horse power was between 25 kW (Canaries) and 51 kW (Madeira). French Guyana and Mayotte was around 55kW.

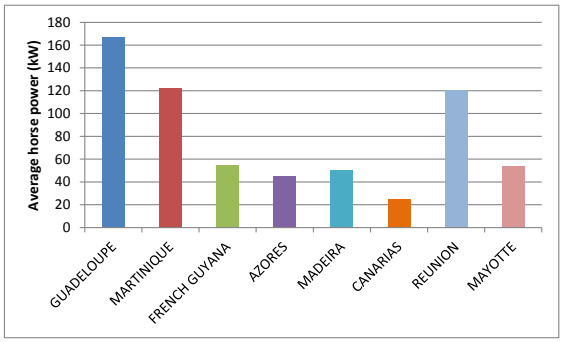


Figure 17. Average horse power (kW) for the active vessels under 12 m (per OR in 2016)

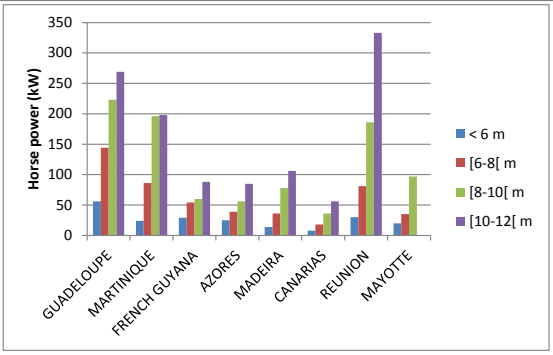


Figure 18. Average horse power (kW) for the active vessels under 12 m (per length categories and OR in 2016)

The average age of the vessels less than 12m was quite similar within the French ORs. It was between 14 and 18 years old which is quite high for fiber glass vessels operating in Martinique and Guadeloupe. Average age was around 25 years in Azores and Madeira and reached 37 years in Canaries. Trends in the evolution of age structure of the fleet are provided within the ORs documents. Average ages are quite different according to the size categories, which highlights the dynamics of different fleets within each region. For example, in Guadeloupe, the average age is lower for the 8-10m vessels than the other categories because the renewal of vessels has been more important in this category.

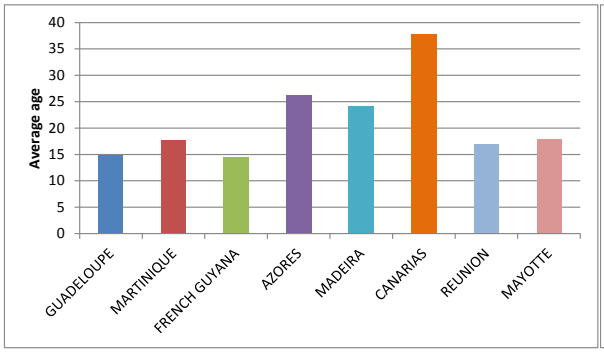


Figure 19. Average age for the active vessels under 12 m (per OR in 2016)

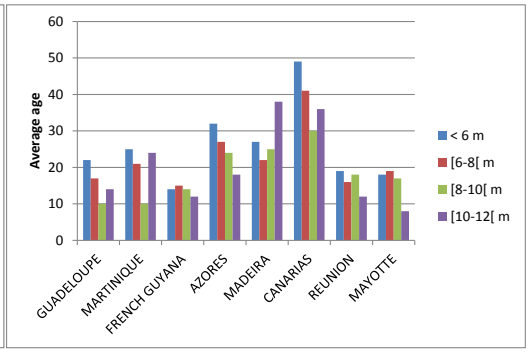


Figure 20. Average horse power (kW) for the active vessels under 12 m (per length categories and OR in 2016)

The ownership structure of the total fleet was analyzed in 2016 and for the time series when available. We distinguished the total fleet or each OR and the fleet less than 12 m. For the analysis of ownership issue, we have to be cautious insofar as information on the owners may be biased to the extent that some countries only inform the operator of the vessels. It is the case in France. In many cases, the operator is also the owner of the vessels but this is not always the case especially for the largest vessels.

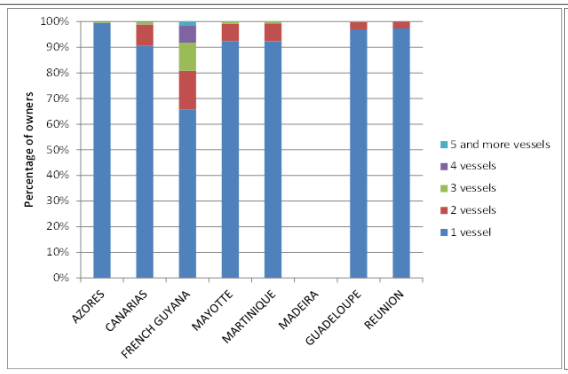


Figure 21. Ownership structure of the total fleet (per OR in 2016)

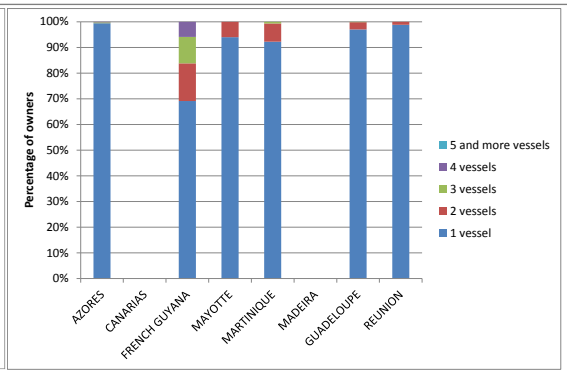


Figure 22. Ownership structure of the fleet under 12m (per OR in 2016)

In most of the ORs, owners hold only one vessel which could be explained by the small-scale nature of the fishing activity. Except French Guyana where owners are in most of the cases not skippers of their vessels, multiple ownership is mainly explained by the multipurpose nature of the activity. Owners have two or three vessels to operate in different fisheries that require different vessels. Of course, some owners may have too or more vessels for other reasons. In the Azores, 97% of the owners hold one vessel. This percentage is 92% in Guadeloupe and La Réunion and is around 90% in Mayotte, Martinique and Canaries Islands.

4.2.3 Number of months of activity of the active fleet

This information is only available in the French context (see the leaflets for more details per region) and the next table presents synthetic results for the French ORs.

DCF length class	ORFISH length class	2008	2009	2010	2011	2012	2013	2014	2015	2016	*average number of months in 2008*	*average number of months in 2016*
	< 6 m	3953	3541	2926	2891	2718	2570	2192	2149	2116	11,2	10,3
	[6-8[m	14815	13760	12847	12123	11521	10888	10446	10441	10219	11,0	10,1
	[8-10[m	3316	3358	3432	3822	3772	3807	3802	4015	4056	10,4	10,4
Total VL0010		**22084**	**20659**	**19205**	**18836**	**18011**	**17265**	**16440**	**16605**	**16391**	10,9	10,2
Total VL1012		**883**	**816**	**794**	**878**	**821**	**853**	**855**	**891**	**979**	9,9	10,2
	[12-15[m	165	147	131	113	90	108	111	119	120	11,8	12,0
	[15-18[m	102	96	93	96	84	93	81	75	78	11,3	11,1
Total VL1218		**267**	**243**	**224**	**209**	**174**	**201**	**192**	**194**	**198**	11,6	11,6
Total VL1824		**345**	**321**	**318**	**253**	**210**	**276**	**169**	**143**	**166**	8,8	8,3
Total VL2440		**35**	**45**	**24**	**10**						8,8	
Total VL40XX		**5**	**6**	**6**	**6**	**13**	**17**	**71**	**71**	**75**	5,0	10,7
Total général		**23619**	**22090**	**20571**	**20192**	**19229**	**18612**	**17727**	**17904**	**17809**	10,9	10,2

Table 13. Total and average numbers of months of activity in the active vessels of French Outermost Regions per DCF and ORFISH length classes (m).

4.2.4 Number of days at sea

As indicated in the next table, the total number at sea is 152000 for the fleet less than 12 meters (Azores and Madeira excluded).

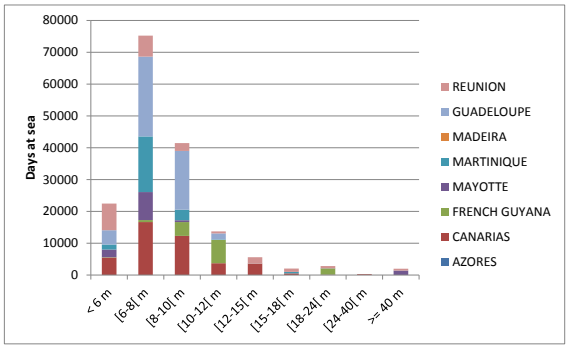


Figure 23. Days at sea per OR and per length categories (2016)

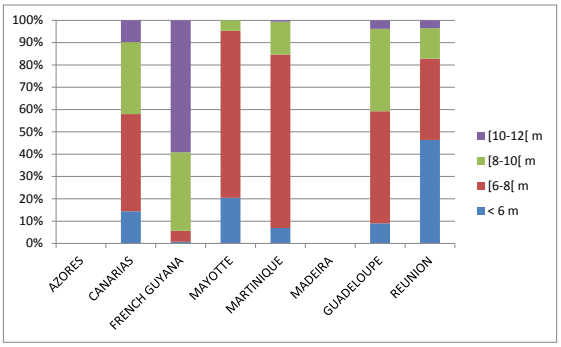


Figure 24. Percentage of days at sea for fleet under 12m (2016)

The next tables and figures present the distribution days at sea (total and mean) per length categories

Total days at sea	GUADELOUPE	MARTINIQUE	FRENCH GUYANA	AZORES	MADEIRA	CANARIAS	REUNION	MAYOTTE	Total
< 6 m	4518	1556	96	na	na	5507	8390	2415	22482
[6-8[m	25077	17458	601	na	na	16669	6588	8828	75221
[8-10[m	18471	3293	4352	na	na	12317	2483	554	41470
[10-12[m	1921	148	7304	na	na	3742	636		13751
Total <12 m	**49987**	**22455**	**12353**	na	na	**38235**	**18097**	**11797**	**152924**
[12-15[m		11		na	na	3559	2062		5632
[15-18[m		427		na	na	564	1064		2055
[18-24[m		21	1974	na	na	119	741		2855
[24-40[m				na	na	267			267
>= 40 m				na	na		566	1437	2003
Total	**49987**	**22914**	**14327**	**na**	**na**	**42744**	**22530**	**13234**	**165736**

Table 14. Number of days at sea per OR and per length categories

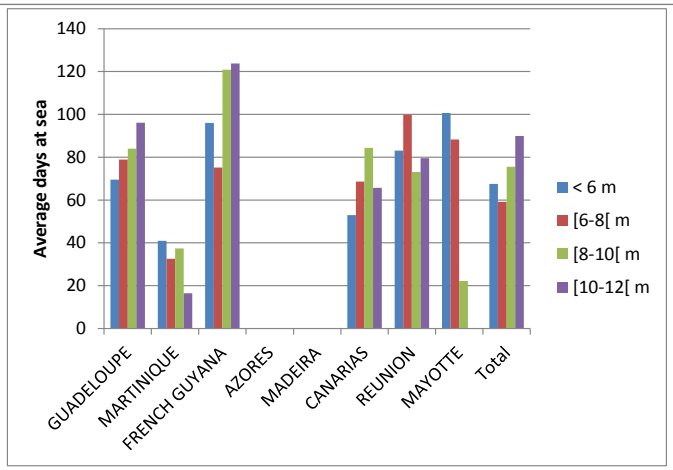


Figure 25. Average days at sea per vessel per length categories and 0R (2016).

Average days at sea	GUADELOUPE	MARTINIQUE	FRENCH GUYANA	AZORES	MADEIRA	CANARIAS	REUNION	MAYOTTE	Total
< 6 m	70	41	96			53	83	101	68
[6-8[m	79	33	75			69	100	88	59
[8-10[m	84	37	121			84	73	22	76
[10-12[m	96	16	124			66	80		90
Total <12m	80	33	119			70	87	79	66

Table 15. Average days at sea per length category and OR (2006)

What is important to note is on average the low level of activity of the vessels. However, most of the regions are characterized by very heterogeneous levels of activity between the vessels. This specificity has to be considered in the analysis of the fleet level of activity.

4.2.1 Gears used

This information is only available in the case of the French ORs. The situation is characterized by a high level of diversity in the gears and métiers practiced by the vessels especially in the Caribbean and Indian Ocean. The diversity is more limited in French Guiana where nets are the main gear used by the small-scale fleet.

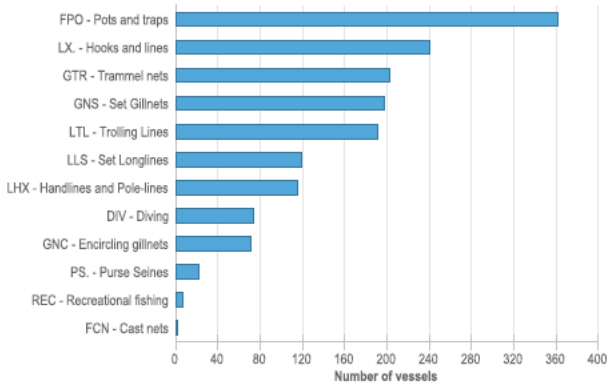


Figure 26. Number of vessels per gear DCF level 4 (Guadeloupe 2016)

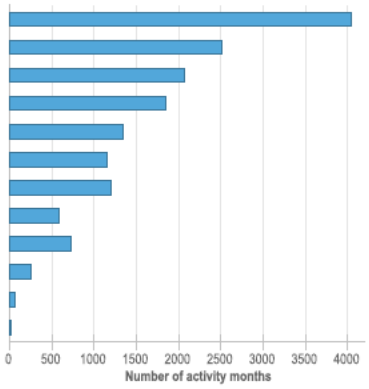


Figure 27. Number of activity months per gear DCF level 4 (Guadeloupe 2016)

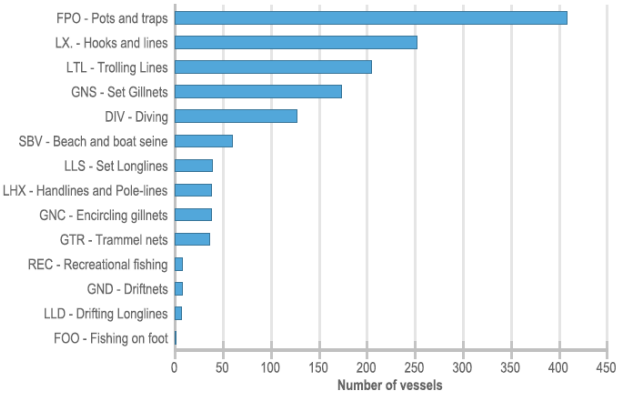


Figure 28. Number of vessels per gear DCF level 4 (Martinique 2016)

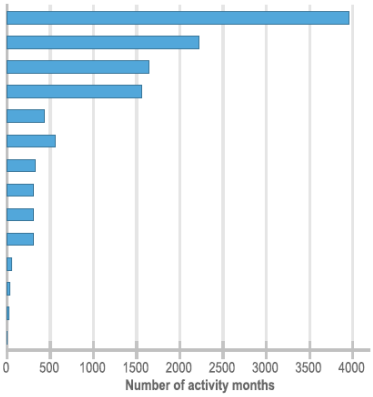


Figure 29. Number of activity months per gear DCF level 4 (Martinique 2016)

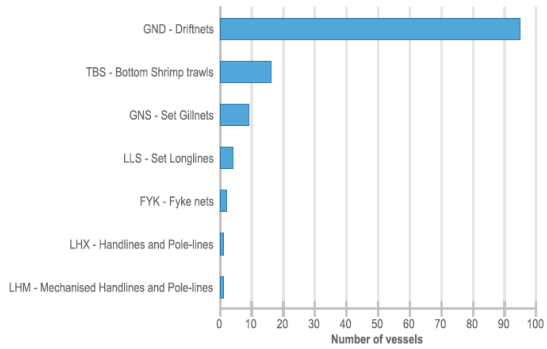


Figure 30. Number of vessels per gear DCF level 4 (French Guyana 2016)

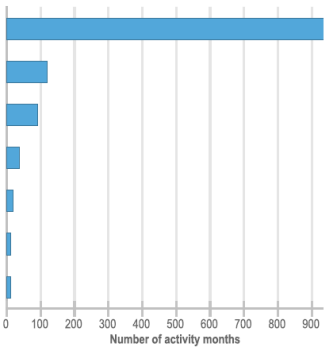


Figure 31. Number of activity months per gear DCF level 4 (French Guyana 2016)

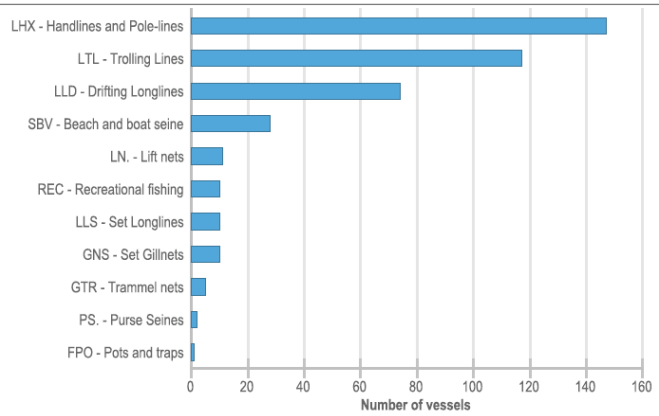


Figure 32. Number of vessels per gear DCF level 4 (La Réunion 2016)

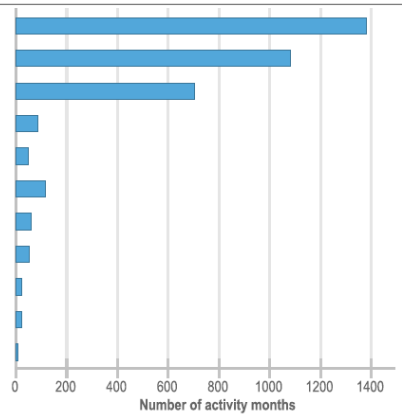


Figure 33. Number of activity months per gear DCF level 4 (La Réunion 2016)

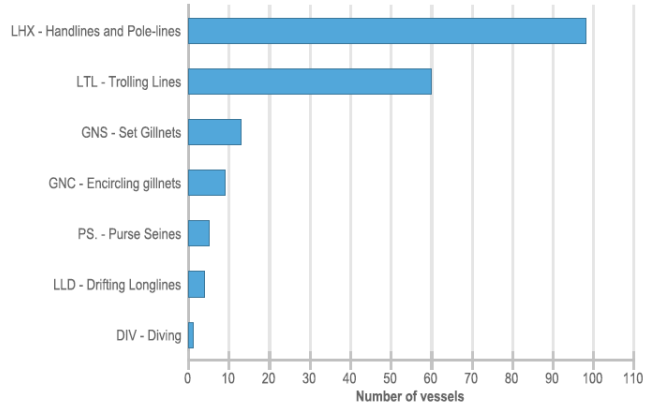


Figure 34. Number of vessel per gear DCF level 4 (Mayotte 2016)

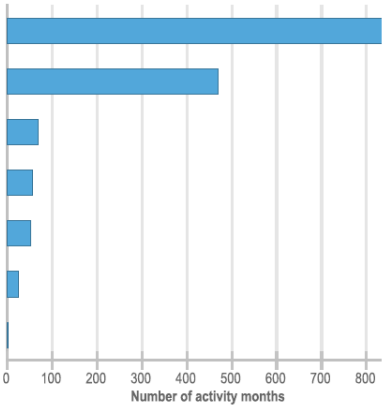


Figure 35. Number of activity months per gear DCF level 4 (Mayotte 2016)

4.2.2 Métiers practiced

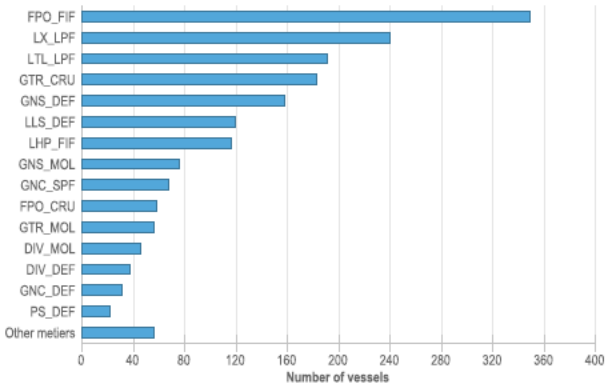


Figure 36. Number of vessel per métier DCF level 5 (Guadeloupe 2016)

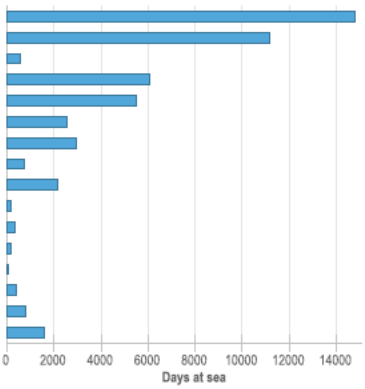


Figure 37. Number of days at sea per métier DCF level 5 (Guadeloupe 2016)

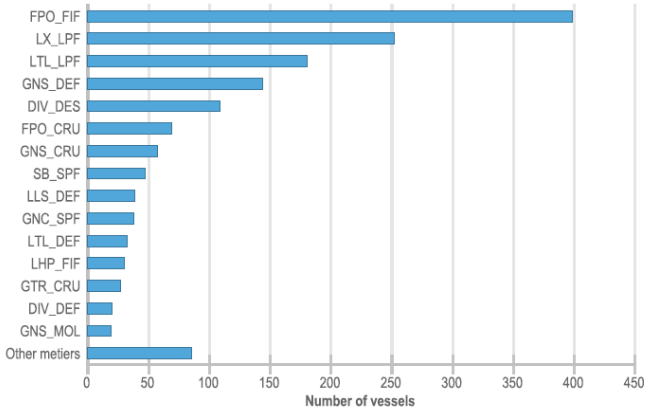


Figure 38. Number of vessel per métier DCF level 5 (Martinique 2016)

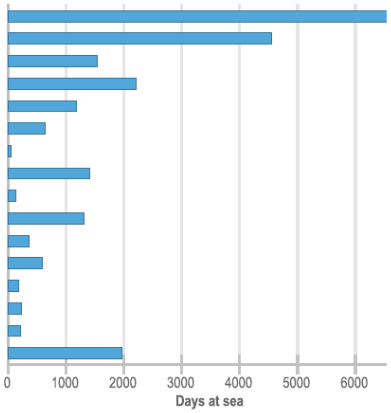


Figure 39. Number of days at sea per métier DCF level 5 (Martinique 2016)

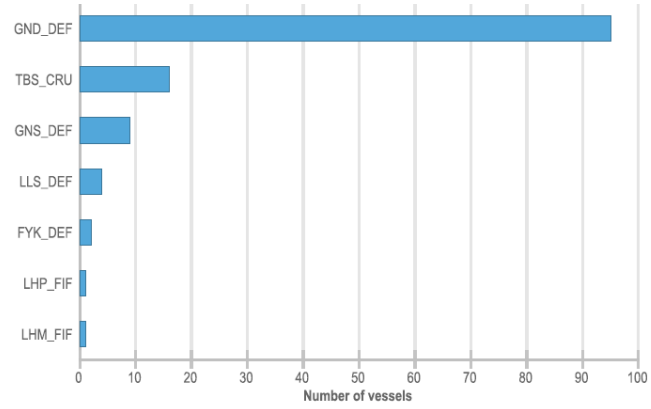


Figure 40. Number of vessel per métier DCF level 5 (French Guiana 2016)

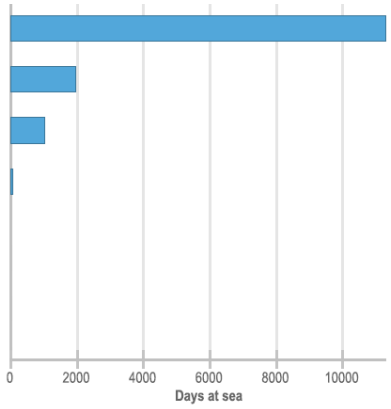


Figure 41. Number of days at sea per métier DCF level 5 (French Guiana 2016)

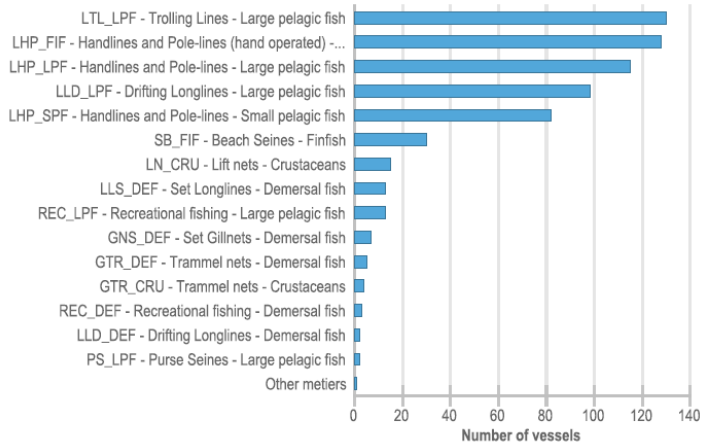


Figure 38. Number of vessel per métier DCF level 5 (La Réunion 2016)

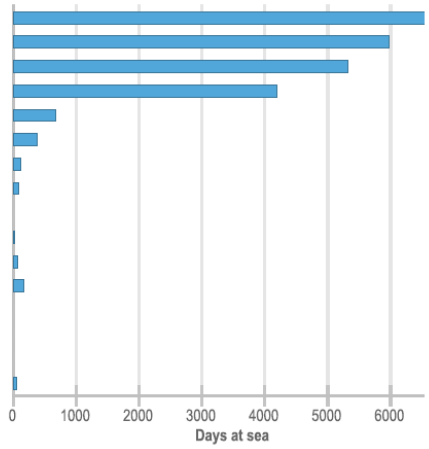


Figure 39. Number of days at sea per métier DCF level 5 (La Réunion 2016)

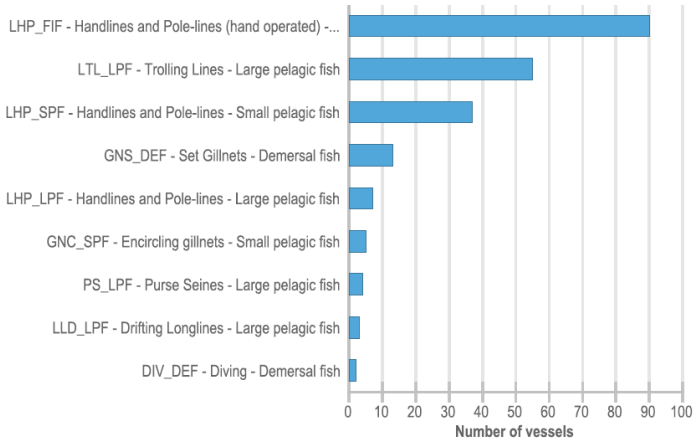


Figure 38. Number of vessel per métier DCF level 5 (Mayotte 2016)

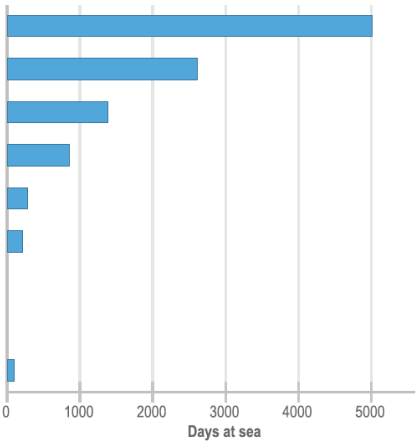


Figure 39. Number of days at sea per métier DCF level 5 (Mayotte 2016)

4.2.3 Landings and values

As mentioned previously, total landings from the ORs were estimated to 36 000 tons for total ex-vessel value of 138 million € in 2016[8]. 42 000 tons were reached over the period 2010-2012, then landing declined to around 35 000 tons over the most recent years. The main reasons of fluctuations in landings seem to be mainly conditioned by the change in landings of the [12-40[m fleet component, especially the [24-40[m length category which is highly dependent on tuna catches. Over the period, total landings for the under 12 m vessels increased from 15 000 to 18 500 tons[9].

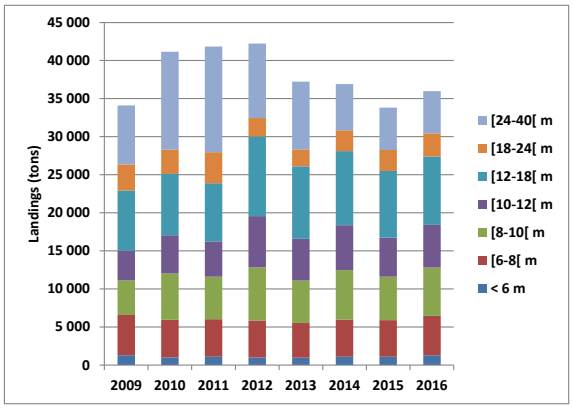


Figure 40. Evolution of landings per length category

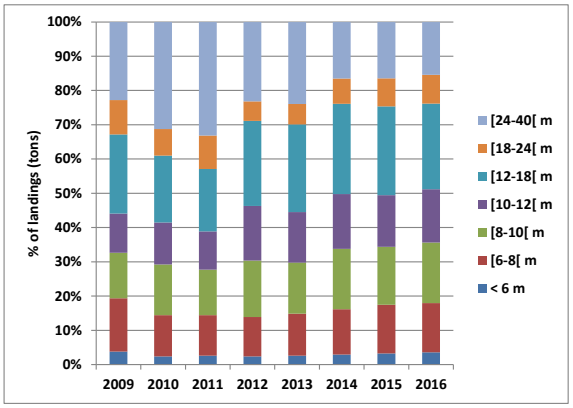


Figure 41. Evolution of the percentage landings per length category

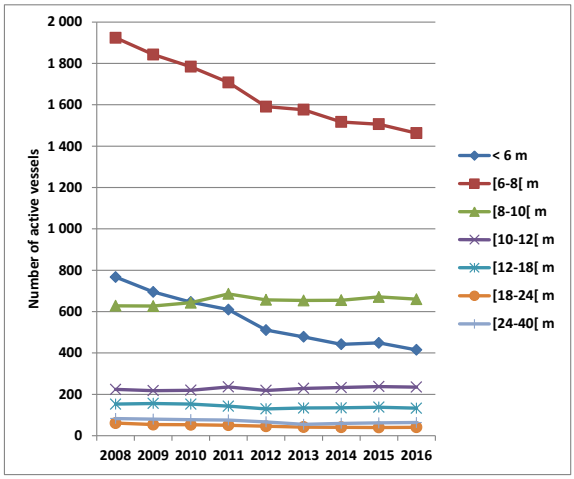


Figure 40. Evolution of active vessels per length category

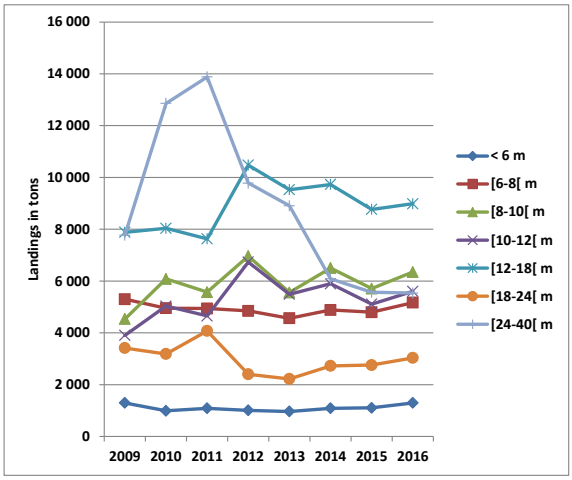


Figure 41. Evolution of landings per length category

Despite a decline in the number of active vessels for the <6m and [6-8[m categories, total landings of these categories remained quite stable over the period. A positive trend in the landings is observed for the [8-10[m and [10-12[m categories, categories which remained quite stable in terms of vessels number. However, a more detailed analysis of this evolution per region would be required because trends are different per region, per fleet size categories and per species.

[8] These figures excludes the landings of the distant water fleet registered in some regions (La Réunion & Mayotte purse seiners) and the landings of foreign fleets within in some regions (case of French Guiana)
[9] Part of the increase may be explained by the improvement of the data collection system (i.e. Canaries case)

The next figure presents the distribution of total landings (tons and value) per OR. Over the 2012-2016 period, Macaronesian regions accounted for nearly 75% of the total landings and 50% of the total value. Azores and Canaries are the most significant contributors with respectively 34% and 25% of the landings followed by Madeira (14%). Atlantic French ORs represented around 18% of the total landings (32% in value) and 10% (19%) for the Indian Ocean French ORs.

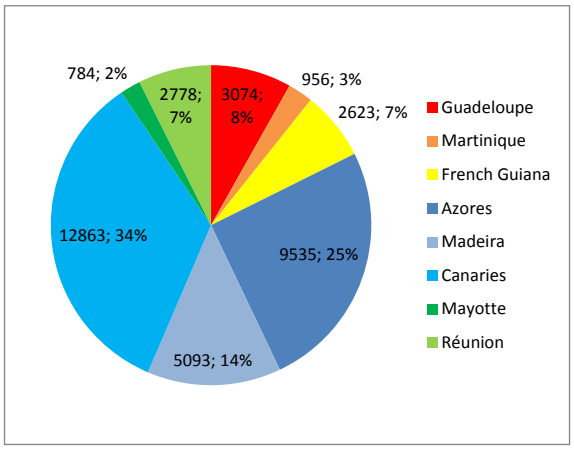


Figure 44. Landings (tons) per OR (average 2012-2016)

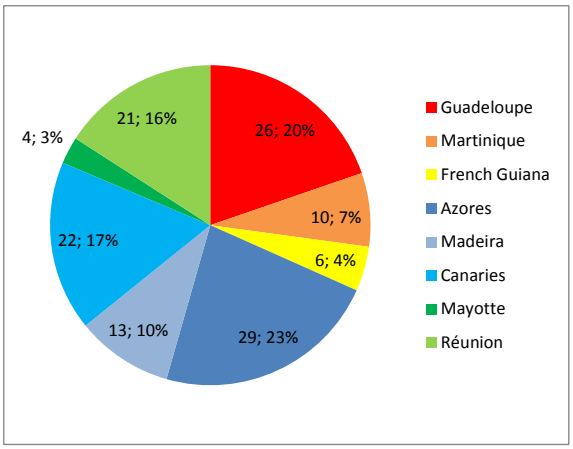


Figure 45. Landings (value) per OR (average 2012-2016)

Over the period 2012-2016, Landings in tons were mainly structured by large pelagic species (19 700 tons/53%), fishes (12 700 tons/34%) and small pelagic species (3 600 tons/9%). Due to lower average price (3€/kg), the share of large pelagic species is more limited (47%) for a total value of 60M€, compared to fishes (3.9€/kg) providing a total value (50M€/39%). With 2.2€/kg, small pelagic species represented 6% of the landings value (8M€). Crustaceans and gasteropods represented respectively 1.6% and 0.6% of the landings accounted for 4.3% and 1.6% of the value. For the same group of species, the differences in price per region are high.

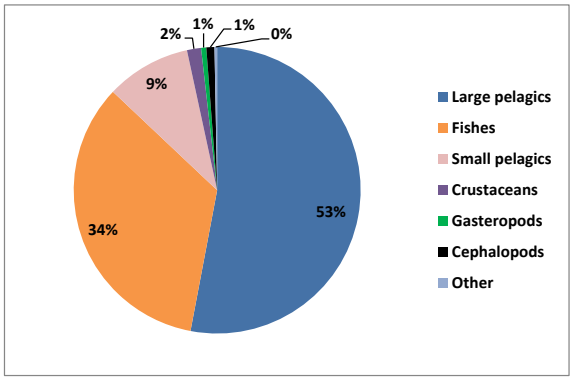


Figure 40. Landings (tons) structure per species group (average 2012-2016)

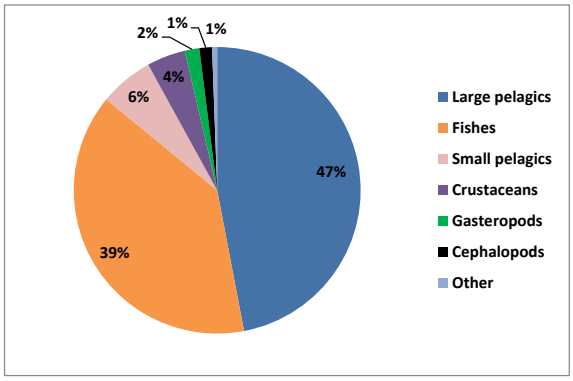


Figure 41. Value of landings structure per species group (average 2012-2016)

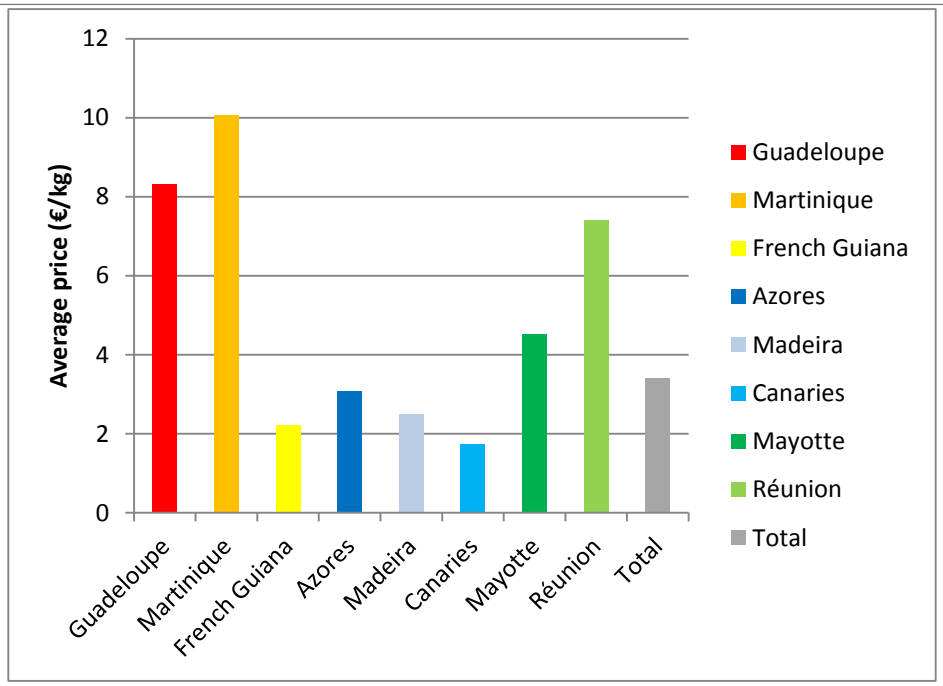


Figure 25. average price per OR (average 2012-2016)

The next figures are of interest to show the distribution of the landings per fleet size category and species group for each region. It highlights the structure of the fleet and dependence on the main group of species. Even if Azores and Canaries are similar in terms of global landings structure per fleet size category, target species are very different. Except the [24-40[m vessels, Canaries Islands are far more dependent on large pelagic species than Azores which is dependent on fishes (demersal-deep sea stocks). Madeira landings are mainly structured by the landings of the vessels above 12 m[10]. Guadeloupe and Martinique and to some extent Mayotte are similar in terms of species group structure even if the 8-10m landings are more developed in Guadeloupe compared to Martinique. La Réunion is characterized by a high level of dependence to large pelagic species, for the under 12m fleet as well as the above 12m fleet component. More detailed landings structures are provided within the leaflets. Contribution of small pelagic species to landings is not negligible for some regions. In value, the landings of gasteropods (conchs) and crustaceans (spiny lobters) is also significant for regions like Guadeloupe and Martinique.

[10] In the case of Madeira, black scabbard fish even pelagic is classified as fishes.

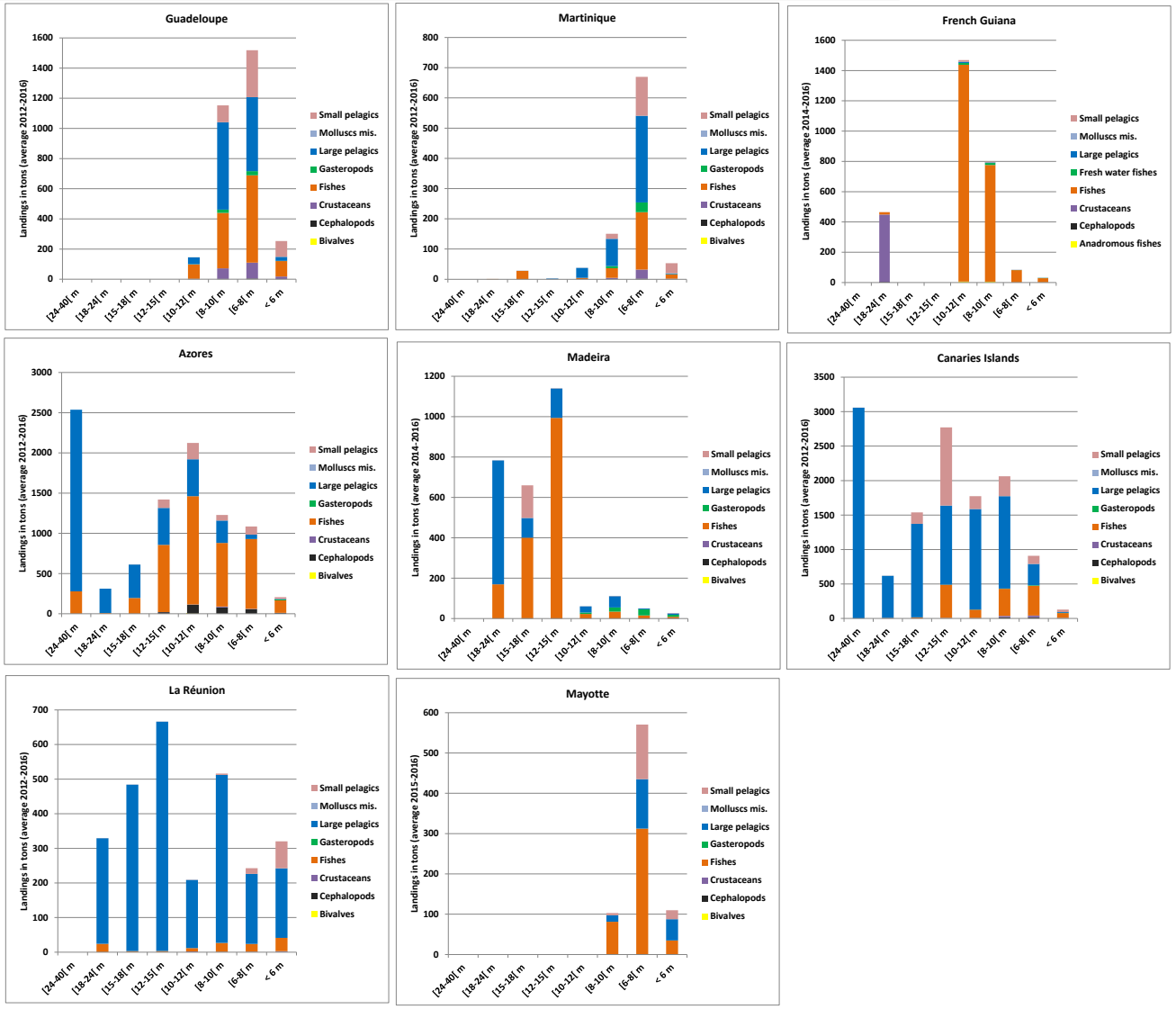


Figure 25. Landings (tons) per OR, fleet size category and species group (average 2012-2016)

Comparisons of global average price indicate significant differences between regions. Martinique, Guadeloupe and La Reunión got máximum prices with respectively 10.1, 8.3 and 7.4€/kg, followed by Mayotte at 4.5€/kg. In Macaronesian regións and French Guiana, prices are much lower. The average prices were 3.1, 2.5 and 1.7€/kg in Azores, Madeira and Canaries. In French Guiana, average price was 2.2€/kg (shrimps excluded) over the period. Heterogeneity of landings structures seems not to be the main factor explaing differences in price. Differences in prices per region remain for all the group of species, especially for the most significant group like large pelagic species or for fishes (demersal or bethic),

	Guadeloupe	Martinique	French Guiana	Azores	Madeira	Canaries	Mayotte	Réunion	Total
Large pelagics	7,8	9,8	1,8	2,1	2,4	1,5	4,1	7,4	3,0
Fishes	8,1	9,9	2,4	4,0	2,6	3,2	5,0	11,2	3,9
Small pelagics	4,7	5,6	1,5	1,9	0,9	1,4	3,7	2,3	2,2
Crustaceans	19,7	21,4	0,4	16,2	6,3	7,4		14,2	9,4
Gasteropods	17,5	16,7		2,4	3,8	5,4			9,6
Cephalopods	8,8	9,4	2,7	5,6	3,8	3,3	2,4		5,3
All ORs	8,3	10,1	2,2	3,1	2,5	1,7	4,5	7,4	3,4

Table 15. Average price per species group and OR (average 2012-2016)

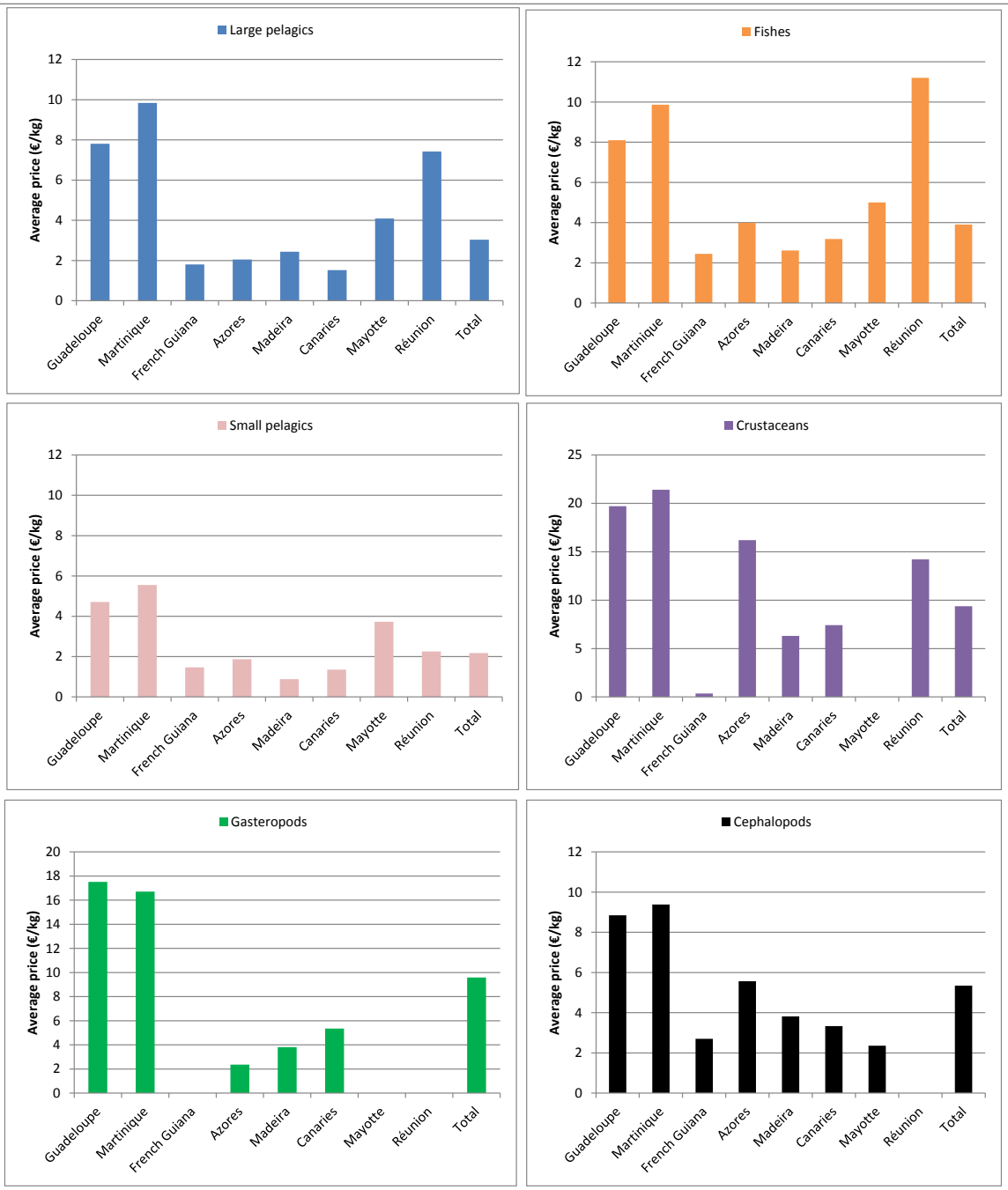


Figure 25. Average prices per species group & OR (average 2012-2016)

4.3 Structure and evolution of small-scale fisheries per OR – Example of Canaries Islands

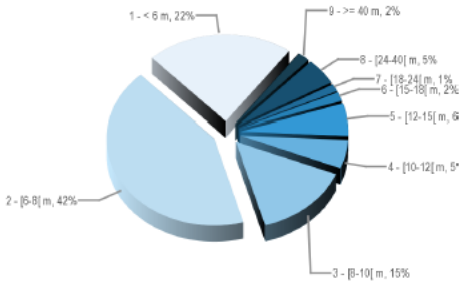
For each region, a standardized approach has been developed to present and analyse the current situation and trends in the fleet and fisheries, based on data provided to date by ORFISH regional partners.
The example of Canaries is provided hereafter as an example, the report for the other ORs are provided in annex (pdf file).

Key figures 2016 in the region CANARY ISLANDS

General technical characteristics

Number of vessels	Total power (kW)	Total gauge (U.M.S.)
710	44 525	20 575

Number of vessels per length class



Technical characteristics of the mean vessel

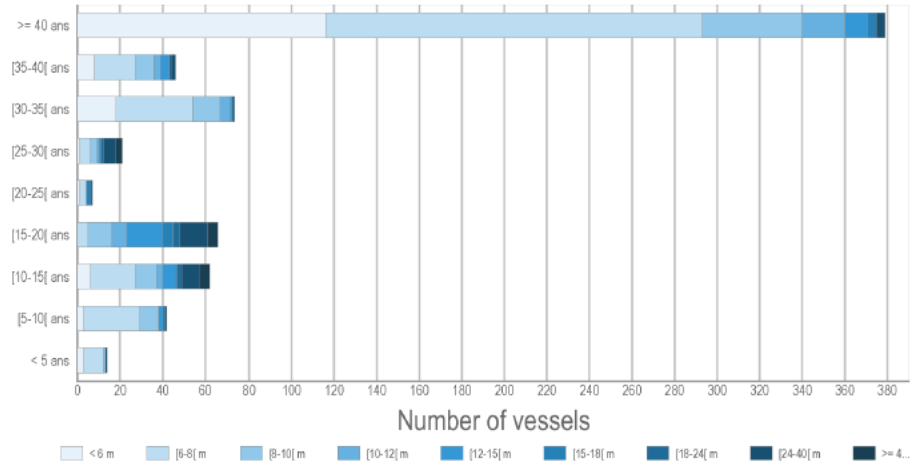
Length (m)	Power (kW)	Gauge (U.M.S.)	Age (years)
9,6	63	29	41

Technical characteristics of the mean vessel per length class

Technical characteristics of the mean vessel

Category of length	Number of vessels	Average length (m)	Average power (kW)	Average age (years)	Average Gauge (U.M.S.)
< 6 m	156	5,2	6	52	0,8
[6-8[m	301	7,0	17	43	1,7
[8-10[m	103	8,5	26	35	3,1
[10-12[m	38	10,4	49	41	6,0
[12-15[m	42	13,3	73	27	13,5
[15-18[m	12	16,0	94	25	24,7
[18-24[m	10	20,4	136	23	52,8
[24-40[m	35	30,7	454	21	228,4
>= 40 m	13	48,1	943	16	771,1

Age pyramid of vessels

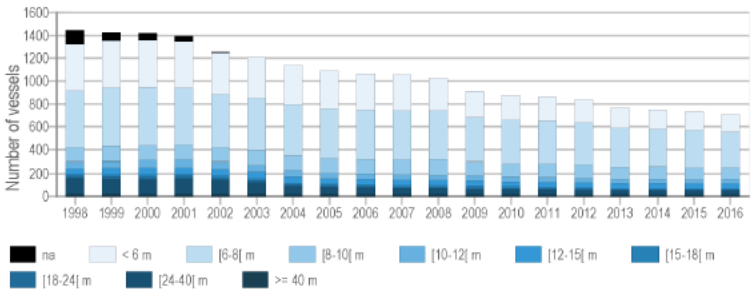


Evolution 1998 - 2016

Evolution 1998 - 2016 of the number of vessels per length class

Category of length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
na	123	69	61	46	5														
< 6 m	408	417	417	408	364	354	340	329	318	317	288	225	218	207	201	180	170	164	156
[6-8[m	499	512	507	502	467	457	447	438	434	428	424	385	374	367	360	330	318	314	301
[8-10[m	120	126	129	128	120	123	121	119	117	122	127	115	114	116	114	107	108	102	103
[10-12[m	56	54	57	57	59	57	54	47	45	45	44	46	43	43	42	38	38	38	38
[12-15[m	47	59	62	56	57	59	55	49	49	47	48	45	43	43	43	43	43	42	42
[15-18[m	18	18	21	20	20	19	15	13	14	14	14	17	14	14	13	13	13	12	12
[18-24[m	16	18	18	21	20	16	14	12	12	12	13	12	10	10	10	10	10	10	10
[24-40[m	138	130	130	134	121	97	69	61	57	51	51	46	44	42	40	35	35	33	35
>= 40 m	22	23	19	21	21	24	20	21	20	19	17	17	17	17	14	14	14	14	13
Total	**1447**	**1426**	**1421**	**1393**	**1254**	**1206**	**1135**	**1089**	**1066**	**1055**	**1026**	**908**	**877**	**859**	**837**	**770**	**749**	**729**	**710**

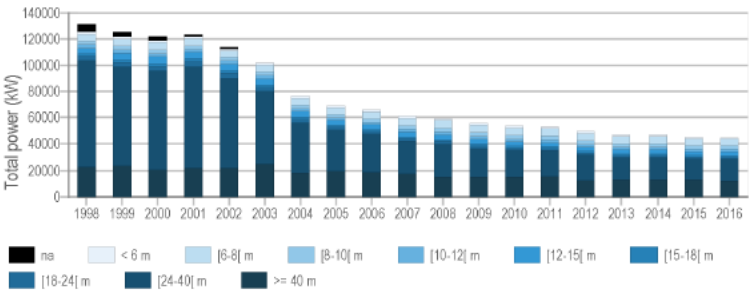
Category of length	Evolution 1998 - 2016
< 6 m	-62 %
[6-8[m	-40 %
[8-10[m	-14 %
[10-12[m	-32 %
[12-15[m	-11 %
[15-18[m	-33 %
[18-24[m	-37 %
[24-40[m	-75 %
>= 40 m	-41 %
Total	**-46 %**



Evolution 1998 - 2016 of the total power (kW) per length class

Category of length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
na	5776	3448	2932	1649	860														
< 6 m	1627	1648	1648	1637	1471	1437	1376	1362	1493	1509	1371	1280	1284	1238	1240	1140	1108	1063	1032
[6-8[m	5417	5546	5459	5403	5132	5153	5186	5132	5270	5372	5793	5660	5736	5679	5642	5380	5273	5237	5151
[8-10[m	2740	2881	2942	2728	2552	2661	2660	2589	2563	2859	3100	2935	2850	3008	2965	2836	2872	2727	2736
[10-12[m	2754	2441	2380	2345	2662	2635	2501	2097	2085	2117	2063	2162	2060	2060	1989	1864	1864	1864	1864
[12-15[m	4068	5087	5196	4839	4750	4886	4205	3744	3744	3551	3693	3401	3200	3200	3149	3149	3149	3069	3069
[15-18[m	2005	2063	2260	2168	2168	2080	1625	1427	1478	1478	1478	1851	1528	1522	1377	1344	1344	1130	1130
[18-24[m	3329	3563	3556	4046	4030	2998	2562	2011	2011	2000	2147	1956	1388	1388	1388	1388	1388	1388	1362
[24-40[m	80596	74865	75022	76715	67910	54781	37711	30826	28431	24117	24117	21078	20046	18907	18768	16039	16116	15021	15922
>= 40 m	23097	23816	20564	22085	22085	25144	18349	19728	18809	17707	15300	15135	15135	15662	12570	13323	13323	13323	12259
Total	**131409**	**125358**	**121959**	**123615**	**113620**	**101775**	**76175**	**68916**	**65884**	**60710**	**59062**	**55458**	**53227**	**52664**	**49088**	**46463**	**46437**	**44822**	**44525**

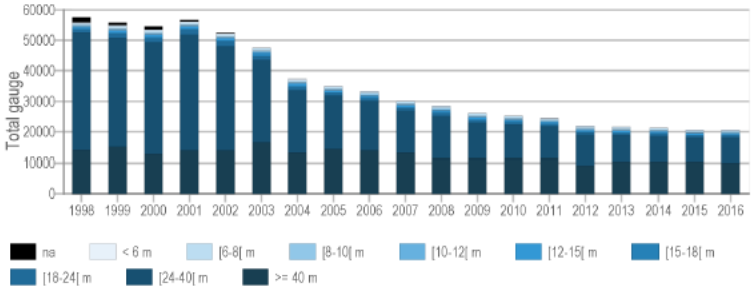
Category of length	Evolution 1998 - 2016
< 6 m	-37 %
[6-8[m	-5 %
[8-10[m	0 %
[10-12[m	-32 %
[12-15[m	-25 %
[15-18[m	-44 %
[18-24[m	-59 %
[24-40[m	-80 %
>= 40 m	-47 %
Total	**-65 %**



Evolution 1998 - 2016 of the total Gross tonnage (GT) per length class

Category of length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
na	1537	888	840	303	212														
< 6 m	276	286	286	280	248	242	234	229	221	222	202	165	159	153	149	135	129	124	118
[6-8[m	743	777	764	756	702	691	688	675	674	663	670	621	609	600	591	549	532	524	503
[8-10[m	352	370	375	368	343	356	353	348	341	357	375	347	343	349	343	325	329	312	316
[10-12[m	334	327	345	343	352	343	323	276	264	264	256	271	254	254	248	227	227	227	227
[12-15[m	618	818	867	797	783	805	743	666	666	637	659	612	582	582	583	583	583	568	568
[15-18[m	434	438	523	539	539	517	417	354	394	394	394	454	359	359	330	330	330	296	296
[18-24[m	688	1138	1138	1322	1272	1006	845	706	706	706	782	723	522	522	522	528	528	528	528
[24-40[m	38517	35897	36614	37927	34114	27236	20665	17380	16155	13842	13842	11495	11026	10326	9842	8327	8088	7555	7995
>= 40 m	14052	14953	12710	13932	13932	16444	12995	14418	13916	13060	11352	11374	11374	11374	9244	10514	10514	10514	10024
Total	**57550**	**55892**	**54461**	**56566**	**52497**	**47640**	**37263**	**35053**	**33339**	**30146**	**28533**	**26062**	**25227**	**24518**	**21852**	**21517**	**21259**	**20648**	**20575**

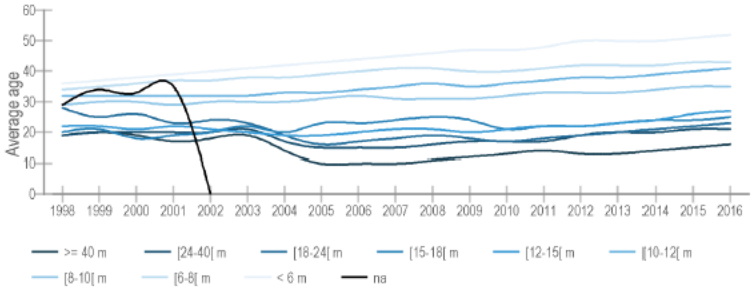
Category of length	Evolution 1998 - 2016
< 6 m	-57 %
[6-8[m	-32 %
[8-10[m	-10 %
[10-12[m	-32 %
[12-15[m	-8 %
[15-18[m	-32 %
[18-24[m	-23 %
[24-40[m	-79 %
>= 40 m	-29 %
Total	**-63 %**



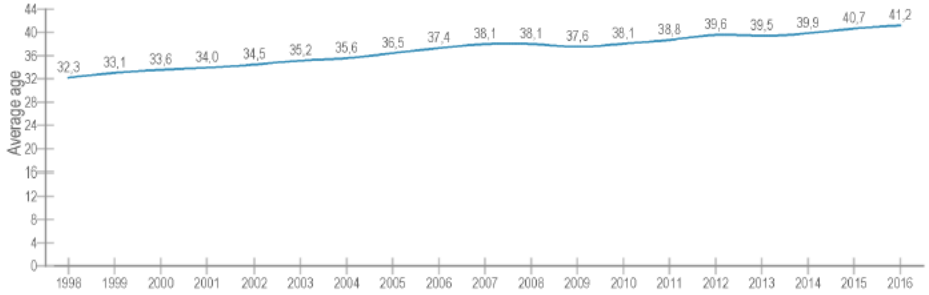
Evolution 1998 - 2016 per average age per length class

Category of length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
na	29	34	33	35	0														
< 6 m	36	37	38	39	40	41	42	43	44	45	46	47	47	48	50	50	50	51	52
[6-8[m	34	35	36	37	37	38	38	39	40	41	41	40	40	41	42	42	42	43	43
[8-10[m	29	30	30	29	30	30	30	31	32	31	31	31	32	33	33	33	34	35	35
[10-12[m	32	32	32	32	32	32	33	33	34	35	36	35	36	37	38	38	39	40	41
[12-15[m	22	22	21	22	21	20	19	19	20	21	21	20	21	22	22	23	24	26	27
[15-18[m	20	21	18	19	20	22	20	23	23	24	25	24	21	22	22	23	24	24	25
[18-24[m	28	25	26	23	24	23	19	16	17	18	19	18	17	18	19	20	21	22	23
[24-40[m	19	20	20	20	20	21	17	15	15	15	16	17	17	17	19	20	20	21	21
>= 40 m	19	20	19	17	18	19	14	10	10	10	11	12	13	14	13	13	14	15	16

Category of length	Evolution 1998 - 2016
< 6 m	+16
[6-8[m	+9
[8-10[m	+6
[10-12[m	+9
[12-15[m	+5
[15-18[m	+5
[18-24[m	-5
[24-40[m	+2
>= 40 m	-3
Total	**+5**



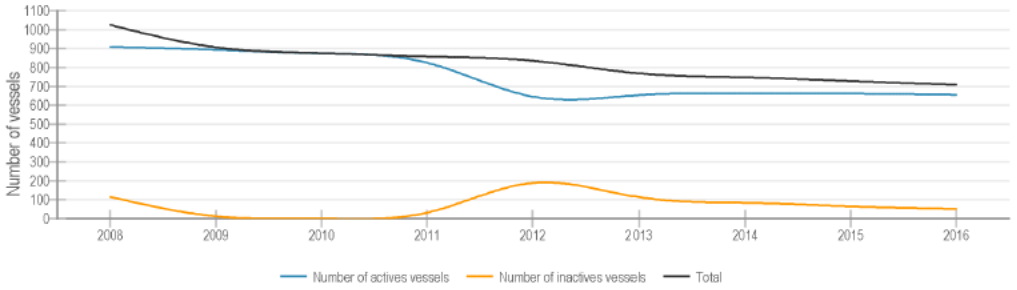
Evolution 1998 - 2016 per average age



Key figures 2016 of the active fleet in the region CANARY ISLANDS

	Number of vessels
Active vessels (at least one month fishing)	657
Inactive vessels (all the year)	53
Total	**710**

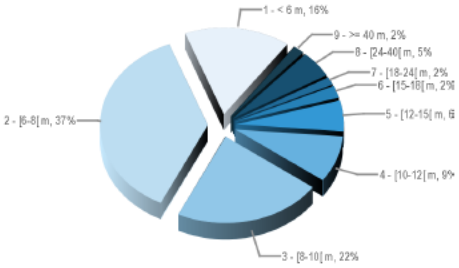
		2008	2009	2010	2011	2012	2013	2014	2015	2016
CA	Active vessels (at least one month fishing)	910	895	876	826	647	655	664	663	657
	Inactive vessels (all the year)	116	13	1	33	190	115	85	66	53
	Total	**1026**	**908**	**877**	**859**	**837**	**770**	**749**	**729**	**710**



General technical characteristics

Number of vessels	Total power (kW)	Total gauge (U.M.S.)
657	43 930	18 936

Number of vessels per length class



Technical characteristics of the mean vessel

Power (kW)	Gauge (U.M.S.)	Age (years)
67	29	36

Technical characteristics of the mean vessel per length class

Technical characteristics of the mean vessel

Category of length	Number of vessels	Average power (kW)	Average age (years)	Average Gauge (U.M.S.)	Average enrollment (persons)
< 6 m	104	8	49	0,8	
[6-8[m	243	18	41	1,7	
[8-10[m	146	36	30	3,5	
[10-12[m	57	56	36	6,7	
[12-15[m	38	70	24	13,4	
[15-18[m	15	104	23	26,9	
[18-24[m	10	157	24	61,9	
[24-40[m	33	441	21	234,6	
>= 40 m	11	911	15	752,5	

Key figures 2016 of the active fleet per range of operation.: inshore mixed offshore

Distance to coast gradient	Number of vessels
Total	100%

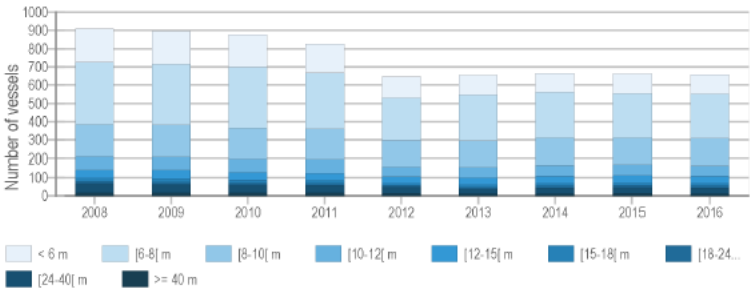
Evolution 2008 - 2016

Evolution 2008 - 2016 of the number of vessels per length class

Category of length	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	184	179	177	158	115	107	101	107	104
[6-8[m	343	336	334	309	234	253	252	244	243
[8-10[m	173	173	170	169	138	139	144	143	146
[10-12[m	70	68	65	66	54	56	58	58	57
[12-15[m	43	45	44	41	38	40	41	40	38
[15-18[m	16	19	16	16	12	14	14	15	15
[18-24[m	12	12	9	9	7	8	10	10	10
[24-40[m	52	47	44	42	34	26	32	32	33
>= 40 m	17	16	17	16	15	12	12	14	11
Total	**910**	**895**	**876**	**826**	**647**	**655**	**664**	**663**	**657**

e

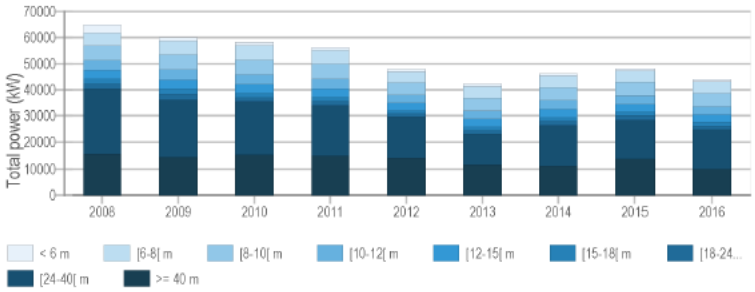
Category of length	Evolution 2008 - 2016
< 6 m	-43 %
[6-8[m	-29 %
[8-10[m	-16 %
[10-12[m	-19 %
[12-15[m	-12 %
[15-18[m	-6 %
[18-24[m	-17 %
[24-40[m	-37 %
>= 40 m	-35 %
Total	**-28 %**



Evolution 2008 - 2016 of the total power (kW) per length class

Category of length	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	2922	1201	1252	1169	924	829	807	835	816
[6-8[m	5171	5320	5511	5252	4047	4505	4421	4307	4343
[8-10[m	5530	5882	5648	5843	4835	4950	5132	5215	5209
[10-12[m	3882	3877	3746	3835	3099	3235	3389	3309	3191
[12-15[m	3390	3411	3294	3089	2893	2985	3081	2897	2675
[15-18[m	1723	2106	1782	1776	1240	1413	1443	1529	1559
[18-24[m	2014	2091	1435	1435	1032	1340	1598	1598	1572
[24-40[m	24992	22067	20416	19398	15967	11264	15080	15080	14547
>= 40 m	15311	14082	15146	14609	13756	11694	11257	13332	10019
Total	**64934**	**60037**	**58230**	**56405**	**47793**	**42215**	**46206**	**48102**	**43930**

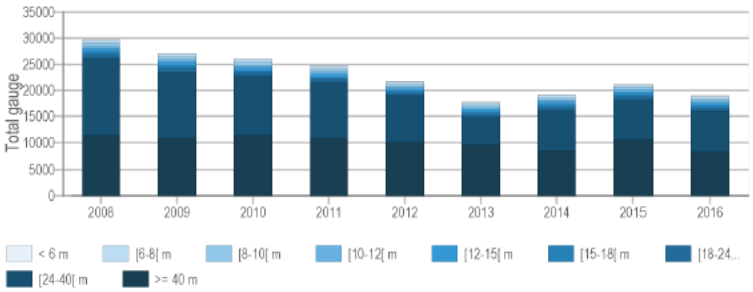
Category of length	Evolution 2008 - 2016
< 6 m	-72 %
[6-8[m	-16 %
[8-10[m	-6 %
[10-12[m	-18 %
[12-15[m	-21 %
[15-18[m	-10 %
[18-24[m	-22 %
[24-40[m	-42 %
>= 40 m	-35 %
Total	**-32 %**



Evolution 2008 - 2016 of the total Gross tonnage (GT) per length class

Category of length	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	133	133	132	119	88	82	79	82	79
[6-8[m	560	551	548	514	396	430	430	415	413
[8-10[m	595	597	584	582	477	485	500	497	507
[10-12[m	451	455	433	441	360	379	393	391	382
[12-15[m	596	608	590	545	508	536	555	534	511
[15-18[m	474	542	448	448	322	372	373	406	404
[18-24[m	776	788	528	528	398	497	619	619	619
[24-40[m	14825	12623	11442	10742	9046	5470	7678	7678	7743
>= 40 m	11352	10855	11374	10855	10050	9481	8500	10514	8277
Total	**29762**	**27152**	**26080**	**24774**	**21645**	**17732**	**19128**	**21137**	**18936**

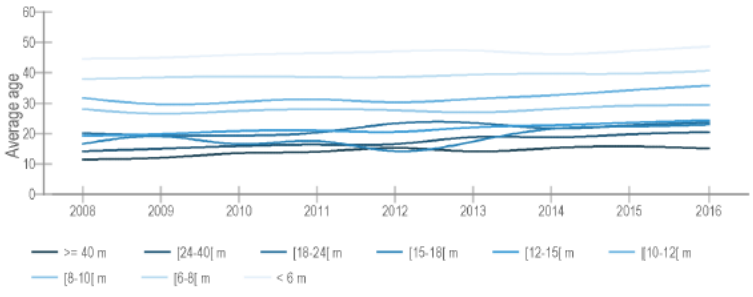
Category of length	Evolution 2008 - 2016
< 6 m	-41 %
[6-8[m	-26 %
[8-10[m	-15 %
[10-12[m	-15 %
[12-15[m	-14 %
[15-18[m	-15 %
[18-24[m	-20 %
[24-40[m	-48 %
>= 40 m	-27 %
Total	**-36 %**



Evolution 1998 - 2016 per average age per length class

Category of length	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	45	45	46	47	47	47	46	47	49
[6-8[m	38	39	39	39	39	39	40	40	41
[8-10[m	28	27	28	28	28	27	28	29	30
[10-12[m	32	30	30	31	30	32	33	34	36
[12-15[m	19	20	21	21	21	22	23	24	24
[15-18[m	17	19	17	18	14	18	22	22	23
[18-24[m	20	20	19	20	23	24	22	23	24
[24-40[m	14	15	16	16	17	19	19	20	21
>= 40 m	12	12	14	14	15	14	15	16	15

Category of length	Evolution 2008 - 2016
< 6 m	+4
[6-8[m	+3
[8-10[m	+1
[10-12[m	+4
[12-15[m	+5
[15-18[m	+6
[18-24[m	+4
[24-40[m	+6
>= 40 m	+4
Total	**+4**



Number of months of activity in the active fleet per length categories

Category of length	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	12	12	12	12	12	12	12	12	12	12
[6-8[m	12	12	12	12	12	12	12	12	12	12
[8-10[m	12	12	12	12	12	12	12	12	12	12
[10-12[m	12	12	12	12	12	12	12	12	12	12
[12-15[m	12	12	12	12	12	12	12	12	12	12
[15-18[m	12	12	12	12	12	12	12	12	12	12
[18-24[m	10	12	12	12	10	9	10	11	12	12
[24-40[m	12	10	12	10	10	9	11	11	10	9
Total	**94**	**94**	**96**	**94**	**92**	**90**	**93**	**94**	**94**	**93**

Number of days at sea in the active fleet per length categories

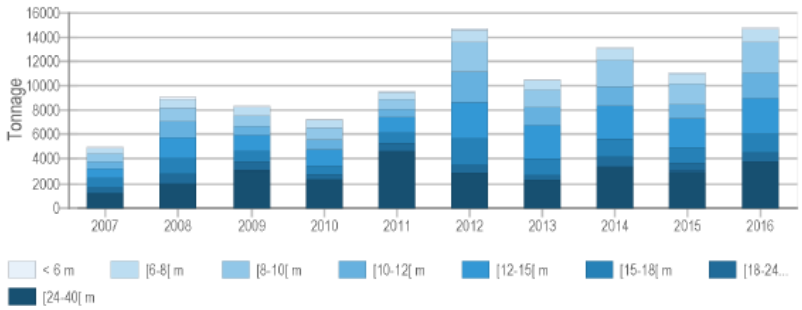
Category of length	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	4565	5826	4632	4443	4311	4534	5407	5717	5784	5507
[6-8[m	10785	14842	15664	13218	14017	13317	16425	17101	16585	16669
[8-10[m	5847	8166	9406	9850	10222	10303	10664	11179	11482	12317
[10-12[m	2524	3995	3886	4006	3345	3966	3539	3558	3505	3742
[12-15[m	1772	2646	3172	3186	2667	3500	3609	3761	3475	3559
[15-18[m	558	798	513	494	484	823	648	618	562	564
[18-24[m	99	206	122	147	113	104	118	132	139	119
[24-40[m	194	224	218	244	249	192	282	322	304	267
Total	**26344**	**36703**	**37613**	**35588**	**35408**	**36739**	**40692**	**42388**	**41836**	**42744**

Average days at sea in the active fleet per length categories

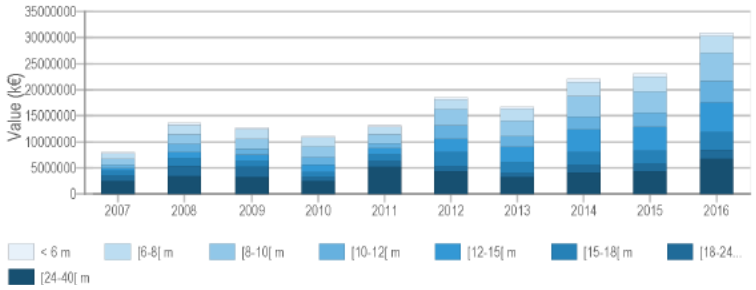
Category of length	2008	2009	2010	2011	2012	2013	2014	2015	2016
< 6 m	32	26	25	27	39	51	57	54	53
[6-8[m	43	47	40	45	57	65	68	68	69
[8-10[m	47	54	58	60	75	77	78	80	84
[10-12[m	57	57	62	51	73	63	61	60	66
[12-15[m	62	70	72	65	92	90	92	87	94
[15-18[m	50	27	31	30	69	46	44	37	38
[18-24[m	17	10	16	13	15	15	13	14	12
[24-40[m	4	5	6	6	6	11	10	10	8
Total	**41**	**43**	**41**	**44**	**58**	**63**	**65**	**64**	**66**

Evolution landings per length categories

Evolution landings (tons) per length categories

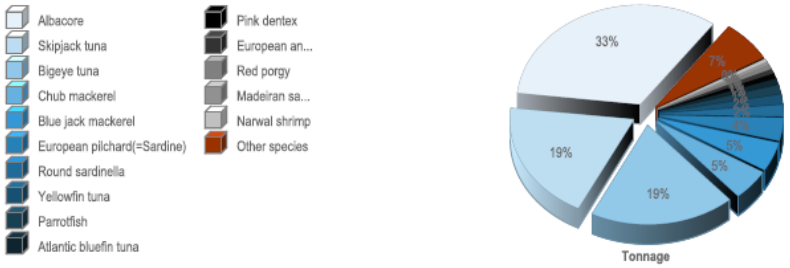


Evolution landings (value k€) per length categories



Landings per species

Species	Tonnage (T)		Value (k€)		Average price calculated (€ / kg)
ALB - Albacore	4 905	33%	11 006	36%	0,45
SKJ - Skipjack tuna	2 874	19%	2 526	8%	1,14
BET - Bigeye tuna	2 792	19%	5 861	19%	0,48
MAS - Chub mackerel	722	5%	974	3%	0,74
JAA - Blue jack mackerel	683	5%	1 074	3%	0,64
PIL - European pilchard(=Sardine)	538	4%	1 018	3%	0,53
SAA - Round sardinella	266	2%	446	1%	0,60
YFT - Yellowfin tuna	223	2%	552	2%	0,40
PRR - Parrotfish	206	1%	1 071	3%	0,19
BFT - Atlantic bluefin tuna	138	1%	671	2%	0,21
DEP - Pink dentex	121	1%	601	2%	0,20
ANE - European anchovy	99	1%	161	1%	0,62
RPG - Red porgy	93	1%	567	2%	0,16
SAE - Madeiran sardinella	81	1%	86	0%	0,94
PVJ - Narwal shrimp	60	0%	428	1%	0,14
Other species	986	7%	3 932	13%	0,25
Total	**14 789**	**100%**	**30 974**	**100%**	



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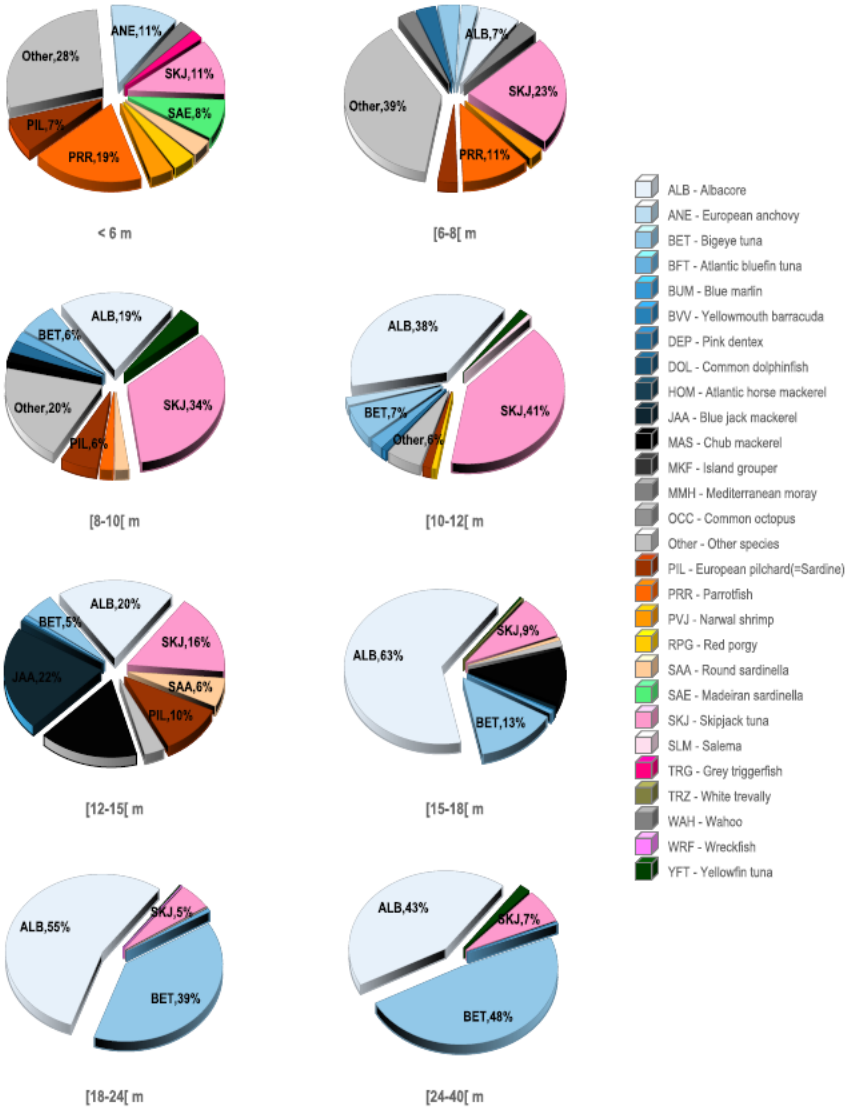
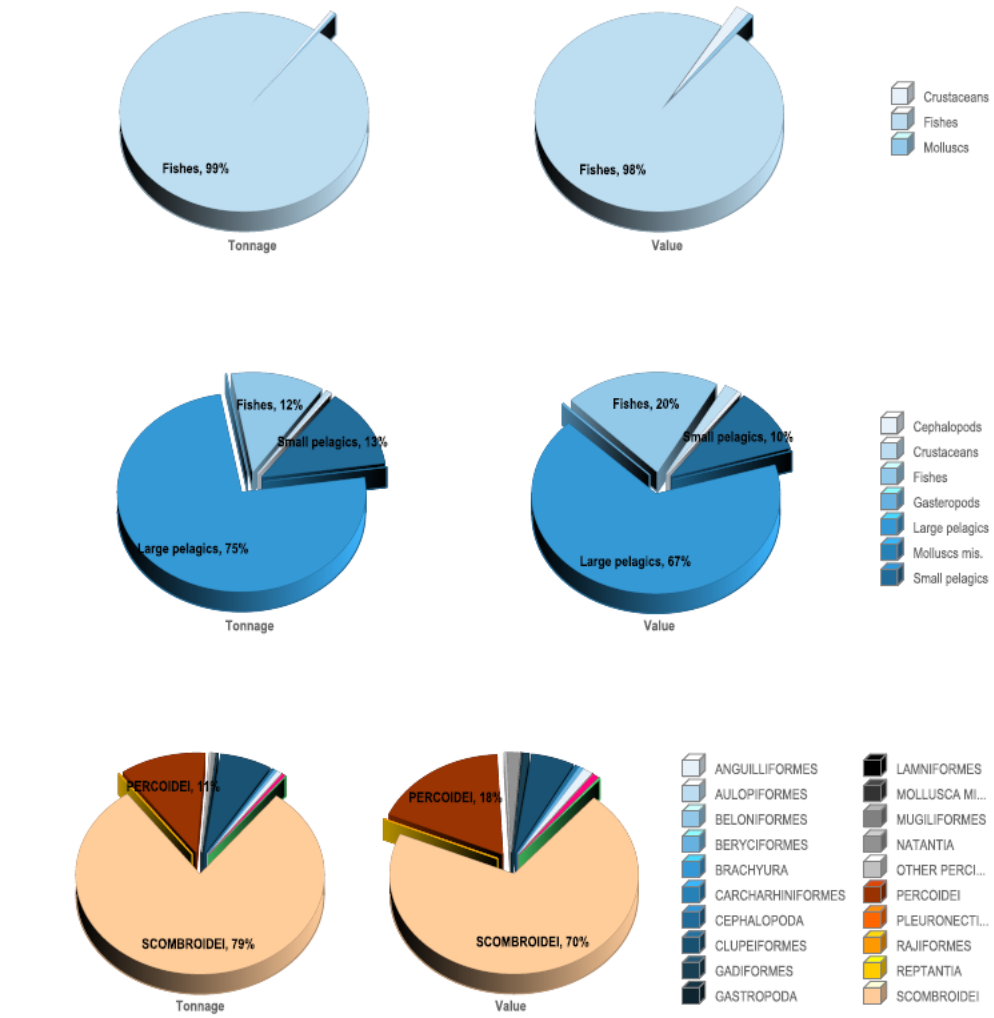
Landings per species group per length categories



Landings per species group



PART II: Activity 2. Identification of competitors interactions

I. Introduction

In many small-scale fisheries in Europe, policy may have sometimes left small scale fisheries (SSF) exposed to the "race for fish" and so to competition from within the sector, and also to pressures from other sectors such as large-scale fleets, recreational fishing, tourism, aquaculture, and other users of the coastal zone and activities carried out on land. These competitions and pressures may create potential negative externalities for the small-scale fleet may threaten the viability of these fishing activities. It seems important to be able to better identify the different sources of interactions with the fleets, to better assess the sustainability conditions of these fisheries. The identification of competitor's interactions is complementary to the analysis of fisheries management measures and sea governance which is not the aim of this work package.

The main goals under this activity are to:

- Identify competitors' interactions for access to stocks (internal competition within the segment, large scale vessels, recreational or/and informal vessels, other fisheries resources use (birds, mammals, etc.)
- Identify competitors' interactions for access to the grounds (internal competition, large scale vessels, other fishing activities, aquaculture, aggregate removal renewable marine energy, navigation, water quality pollution, biodiversity conservation etc.)
- Provide a matrix of interactions described qualitatively or semi-quantitatively with respect to the intensity and impact of the interactions with small scale fisheries in each OR. Expert knowledge available in the consortium will be mobilized to fill the matrix of interactions.

II. Material and methods

Identification of competitors-interactions was organized according a common typology developed by Guyader et al. (2013)[11] for the study of scale fisheries at the EU level. They identified two main sources of competition: competition for access to stocks that may originate from a number of areas (internal competition within the segment, large scale vessels, recreational or/and informal vessels, other fisheries resources use (birds, mammals, …) and competition for access to the grounds (internal competition, large scale vessels, other fishing activities Aquaculture, aggregate removal, renewable marine energy, navigation, water quality-pollution, biodiversity conservation, …). This typology is extended to provide a matrix of interactions described qualitatively or semi-quantitatively with respect to the intensity and impact of the interaction with SSF in each OR. Expert knowledge available in the consortium or outside and literature review was mobilized to fill the following matrix of interactions.

[11] Guyader Olivier, Berthou Patrick, Koutsikopoulos Constantin, Alban Frederique, Demaneche Sebastien, Gaspar M. B., Eschbaum R., Fahy E., Tully O., Reynal Lionel, Curtil Olivier, Frangoudes Katia, Maynou F. (2013). Small scale fisheries in Europe: A comparative analysis based on a selection of case studies. Fisheries Research, 140, 1-13. Publisher's official version: http://doi.org/10.1016/j.fishres.2012.11.008, Open Access version http://archimer.ifremer.fr/doc/00118/22934/

In order to ensure the homogeneity and the comparability of indicators between the case studies, the scale and the unit of measures were standardized across the case studies. Knowledge about the level of interactions was transformed to an adapted Likert scale from 0 to 4 (No competition to Very high level of competition). The first objective was to fill the matrix for each ORs in order to identify interactions between the small- scale fleet and competitors in each region, and secondly to compare and synthetize the results for all the ORs to identify common issues shared by the ORs.

Table 1: Matrix of interactions

Level of competition for access to fishing stocks	Index
Internal competition within the segment (<12m)	
Other small scale vessels not in the segment	
Large scale vessels (>12m)	
Recreational fishing for the same stock	
Illegal fishing for the same stock	
Other fisheries resource use (birds, mammals, …)	
Level of competition for access to fishing grounds	
Internal competition within the segment (<12m)	
Large scale vessels (>12m)	
Recreational fishing	
Other métiers (gears)	
Aquaculture	
Landing points with marine leisure sector	
Agregate removal	
Marine energy (wind farms, …)	
Navigation (industrial or leisure)	
Coastal development and the effect on coastal water quality (pollution)	
Ecosystem biodiversity, conservation (MPAs)	

Adapted Likert index scale: 0=no competition / 1=low level of competition / 2=medium level of competition / 3=high level of competition / 4=very high level of competition

III. Global synthesis for all the ORs and comparisons

Based on the data collected per OR, different indicators have been processed and globally, per type of interaction and per OR to give of broad overview of the current situation in the ORs. However, average and total number have to be interpreted cautiously since it does not consider the relative importance of factors of interaction in the assessment

3.1 Level of competition for access to fishing stocks

One of the main results is that the level of interaction for access to fishing stocks is significant for the small-scale fleets of all the ORs (see figure 3.1.1). First of all, the internal competition within the small-scale segment is estimated medium to very high in most of the regions. The average level of interaction is 2.5 over of scale of 4. When high it is mainly explained by the lack of access regulation to the fisheries and the quasi-open access situation of the fisheries. Difficulties related to regulations enforcement is also identified as key issues for the management of these fisheries. Interaction with the large-scale fleet >12m (index=1.9) is mainly related to the catch of large pelagic species for which a significant part of the small-scale vessels of the ORs are dependent. Demersal resources of the insular shelves are not really concerned by this issue. The competition with the recreational fisheries is also significant for the harvesting demersal and large pelagic resource. The index of interaction is 2,5 (between medium and high level of interaction) with as indicated in figure 3.1.2 very high levels of interactions in some regions like Canaries and La Réunion and low level in French

Guiana[12]. The interactions are even stronger with the illegal fisheries and it concerns all the regions with no exceptions. The nature of illegal fishing activities may differ from recreational fishers selling their catches even prohibited, local non-declared fishers avoiding the official registration system or foreign vessels harvesting in ORs EEZ. Competition for the resource from animals (birds, mammals, sharks, etc) is assessed to be less significant even if they may create troubles in some areas.

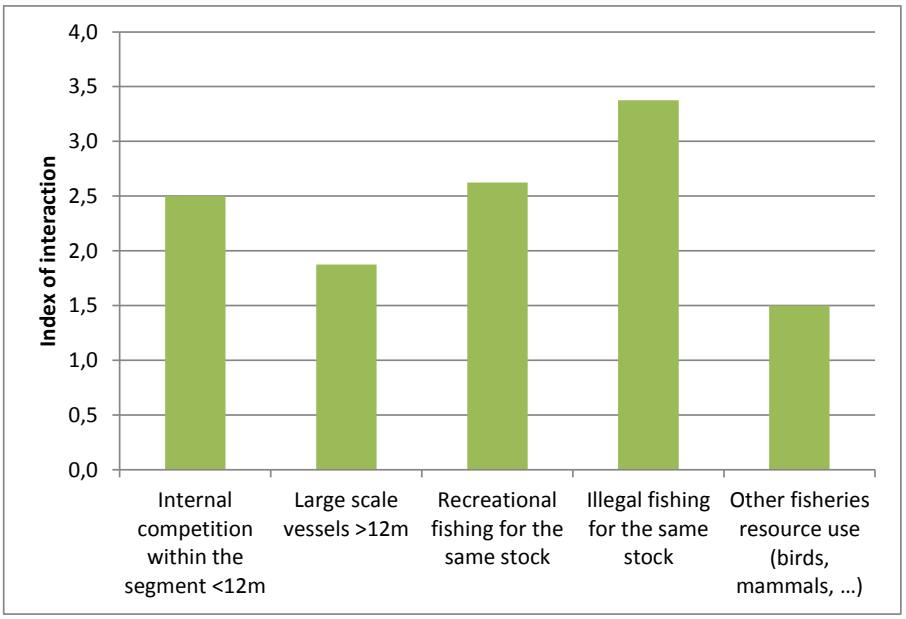


Figure 1 Level of interaction for access to fishing stocks over all the ORs

When access to fishing stocks is considered globally whatever the factors of interactions, the average level of interaction is quite similar (around 2) between most of the regions except French Guiana (Index=1) and La reunion (nearly 3). We have to be cautious with such figures as they may hide variability between factors of interactions within a given OR and a factor of interaction in an OR may led to more negative impacts than the cumulated impacts of factors in another OR.

[12] Recreational fishing can be related to the density of the population in each region.

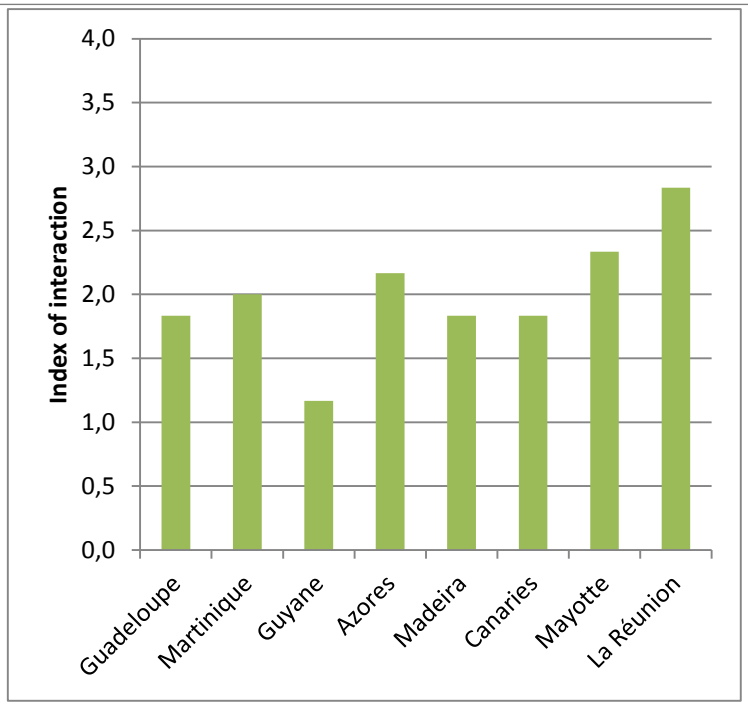


Figure 2 Global index of interaction for access to fishing stocks in each OR

Synthesis figures per type of interaction and per OR and is provided hereafter to provide a more detailed overview of the factors of interaction per OR. As mentioned before, the internal interactions for stocks within the SSF are globally medium to high but some ORs are more concerned. The level of interaction for Guadeloupe, Martinique in the Atlantic Ocean, Mayotte and La Réunion in the Indian Ocean are very high and high respectively. It is considered medium for Azores and Madeira and low in Canaries and French Guiana. The level of competition depends also and mainly on the fisheries management and the capacity of the governing structures to establish and enforce and access regulations to the fisheries.

As mentioned before, interaction with the large-scale fleet >12m is mainly related to the catch of large pelagic species (tunas, billfish, dolphinfish, etc.) for which a significant part of the small-scale vessels of the ORs are dependent. This is especially the case in Madeira (Index=4) and Mayotte (Index=3) because large scale fleets (Portuguese pole and line vessels and purse seiners using drifting FADs respectively) operates in the EEZ of these regions and are presumed to reducing tuna catchability for the small-scale vessels. The index of interaction is medium (2) for Canaries, Azores, Martinique, Guadeloupe and several reasons explain this situation. Either quota allocated to the region of the Azores is small (case of Azores) or dependence to the species of interest is limited (case of albacore tuna for Martinique Guadeloupe). In Canaries, tunafishing large-scale vessels have a very high degree of competition with small-scale vessels for the access to tunafish stocks, with a seasonal pattern depending on stock availability. *Thunnus thynnus* and *Thunnus alalunga* catches are restricted by EU TACs, meaning a worsening of competition at seasonal scale. There is no competition in French Guiana because the small-scale fleet does target the same species as the large-scale fleets.

Recreational and/or illegal fishing are a major source of interactions with the small-scale fleets. The distinction between recreational and illegal is sometimes tenuous when recreational fishers sold their catch even if it is prohibited. Subsistence fisheries also exist in some regions even difficult to characterize. Interactions with recreational fishers are very high in Canaries and La Réunion where recreational and commercial fishers use the same type of gear. It is also high but not source of conflicts in Mayotte with recreational and subsistence activities and also high in Azores. It is considered as medium in Guadeloupe and Martinique and in these ORs the interaction is coastal areas mainly limited to specific resources like spiny lobster or reef species targeted by snorkelling practices. However, interaction with recreational billfish fisheries is

considered as a stake, especially with foreign recreational vessels or charters - mainly US and tournaments fishers targeting blue marlin - and at local level with vessels operating around MFADs. In Madeira (index=2), recreational fishing was an unregulated practice until recent years but an effort was done to control this activity by means of implementing recreational fisheries regulation. In French Guiana, the interaction is assessed to be low (Index=1) as the intensity of the recreational fishing activity, essentially fishing rods on the beaches and on boats is considered as moderate.

The interactions are even stronger with the illegal fisheries and their level is estimated to high or very high in all the regions. In most of cases, the phenomenon is explained by the existence of an underground economy for which fishing is a component and the lack of enforcement. Beyond contributing to fishing mortality to the stocks, illegal fishers are competitors for the markets and tax/social security evasion create distortion of competition with legal fishers. In Azores, it is considered that the illegal fishing has increased over the last years as a way to evade taxes. In Madeira, Illegal fishing is one of the main causes regarding stock overexploitation, especially in the Scabbardfish fishery. In Canaries, It's also one of the main problems identified for the participatory management in islands. National illegal fishing is observed on the west side of the coastal shelf in French Guiana but foreign illegal fishing is also critical with as much foreign vessels as national legal ones. In Mayotte, illegal marketing of fishing catches by unregistered fishermen and resellers is very important (Index=3) and is a source of strong competition and conflicts with registered fishers. The situation is quite similar in Guadeloupe and Martinique even if it is difficult to estimate the extent of this activity. Illegal fishing concerns the coastal fishing but also the operation on MFADs.
Competition for the resource from animals (birds, mammals, sharks, etc.) is considered to be less significant even if they may create trouble in some areas. If difficult to quantify in La Réunion, the level of competition with other fisheries resource use (Sharks, mammals, birds…) has to be considered with potential interaction with sharks' depredation, mostly on demersal fishery using handline seasonally, exceptionally on moored FADs. In Mayotte, competition with "natural" competitors for resources is low (Index=1), marine mammal depredation rarely occur in the longline fishery, shark depredation is a bit more frequent in the demersal handline fishery, especially on outer reefs. In French Guiana, the interaction is not well known but estimated to be low (Index=1). The diet of coastal dolphin schools (*Sotalia guianensis*) is not known but dolphins observed are predators eating fish and potentially species among those that are fished. Recent research on the interaction between fisheries and whales, suggest that baleen whales are not a threat to fisheries in Caribbean waters, while toothed cetaceans seem to be more impacted by fisheries than they actually impacting them. Whales target different types of food resources and consume significantly less than what is taken by fisheries. In terms of spatial interaction in Martinique and Guadeloupe, Marine mammals are a nuisance for fishermen on some coastal MFADs. The presence of these mammals is however very irregular.

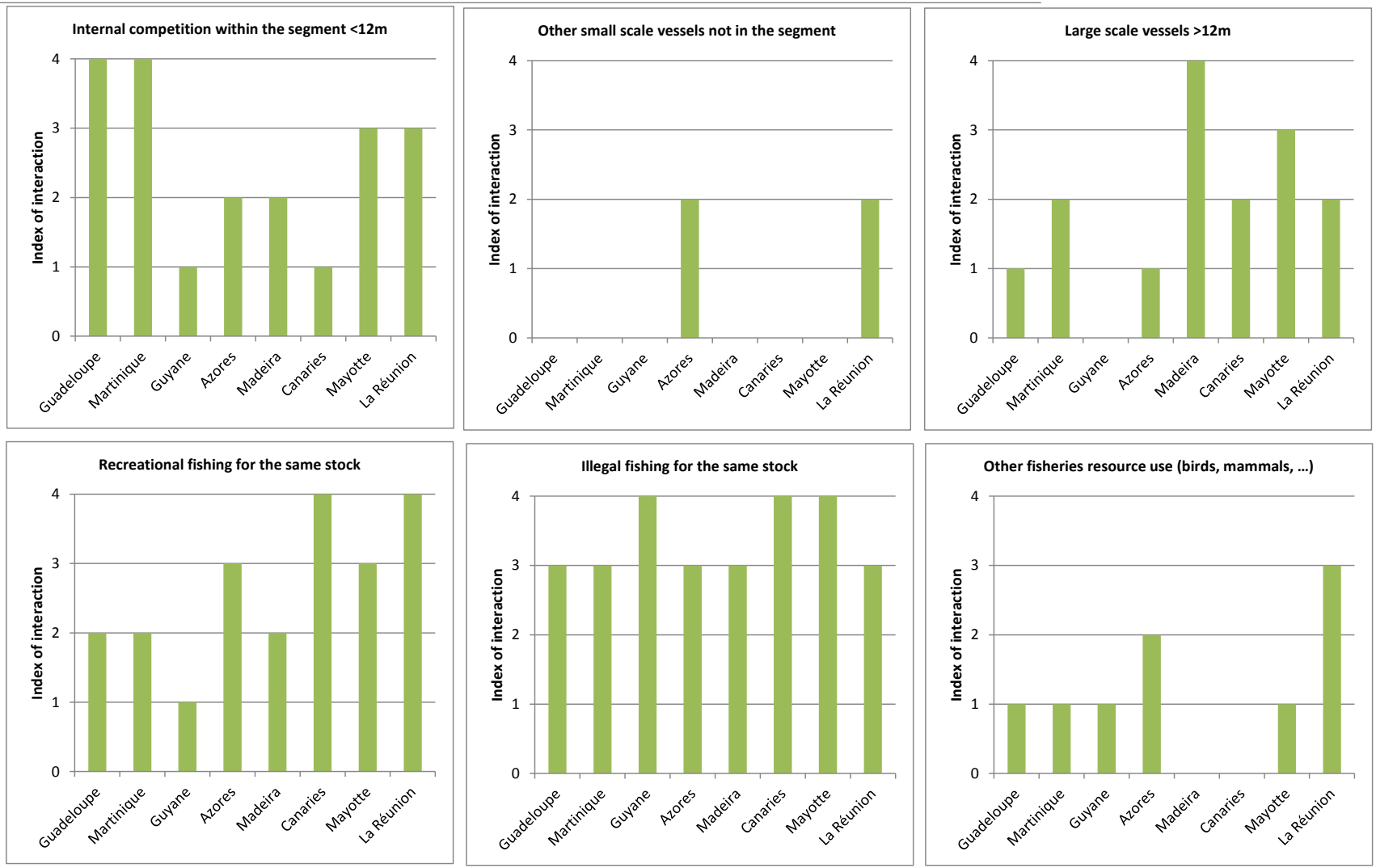


Figure 3 Levels of interaction by item for access to fishing stocks for the ORs

3.2 Level of competition for access to fishing grounds

One of the main results is that the level of interaction for access to fishing grounds is on average lower than for fishing stocks. The non-weighted index over all OR and all factors is 1.3 compared to 2.3 for fishing stocks. This figure has to be interpreted cautiously as there is more variability for this index. Some factors of interaction may be a strong source of perturbation for the small-scale fleets and others may have negligible or null impacts.

As indicated in the next figure, fishing activity with the small-scale segment as well as recreational and illegal fishing, are at the origin of significant competition for access the grounds. Competition for access to the grounds is often related to competition to the stocks as the available space of and range of operation of small-scale vessels is limited. Spatial competition with large fleet is limited as large-scale vessels, except some specific cases (intermediate vessels) do not operate in the same areas as small-scale vessels. Competition with other gears is also frequent (Index=1.5) with the small-scale segment. Aquaculture farms have been developed in some ORs but the level interaction is considered as low or null. There is no significant marine energy project in the ORs that may create spatial interaction with the fisheries. Aggregated removal (exploitation of sand, etc.), temporary dredging of channels and harbors may lead to localized interaction with coastal fisheries. Marine traffic mainly commercial is source of interaction with fixed gears and MFADs in some ORs (Index=1.5). Even not spatial, the impact coastal development and agriculture with consequences in terms de habitat degradation and food chain pollution are significant even not at the same level between ORs. Martinique, Guadeloupe and to a less extent La Réunion coastal fisheries are threaten by ecosystem degradation to which they may also contribute by fishing exploitation. Since 2011 Massive Sargassum algae inflows in the Caribbean over the past years have also impacted the small-scale fisheries. The development of MPAs in most of the ORs to conserve biodiversity or to manage activities has in some case reduced the fishing areas (the average index over all ORs=2) but the extent of these areas is sometimes limited.

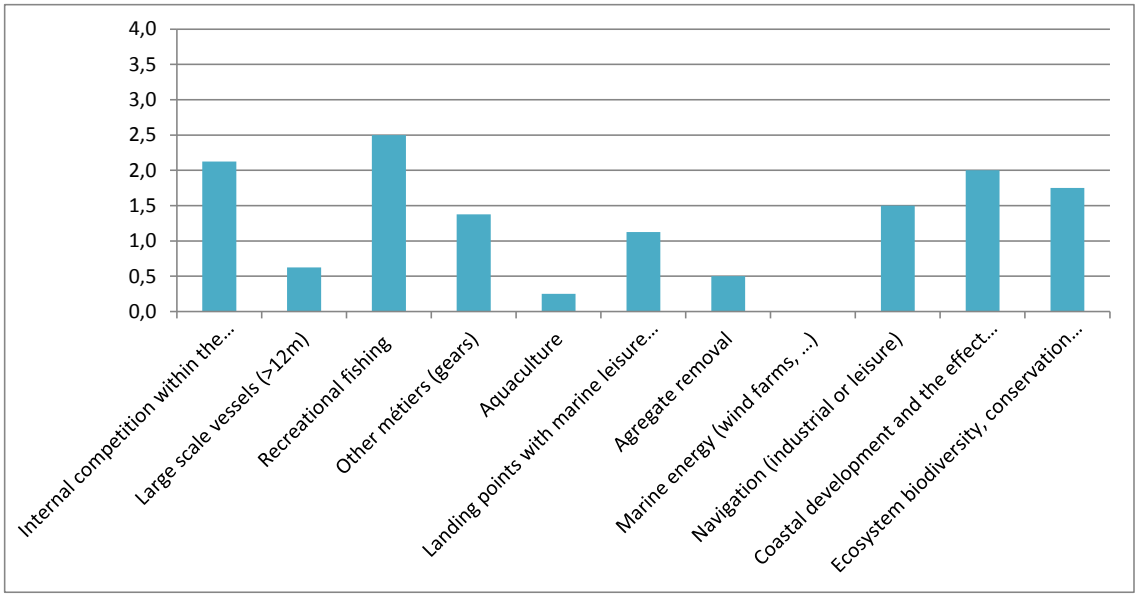


Figure 4 Level of interaction for access to fishing grounds over all the ORs

Synthesis figures per type of interaction and per OR is provided hereafter to provide a more detailed overview of the factors of interaction per OR. When we look at the average figures per OR (figure 5), the interactions are medium (Index=2) in Guadeloupe and Martinique (the type interaction is also similar), It is 1. 5 for La Réunion and between 1.25 and 0.6 for the other ORs.

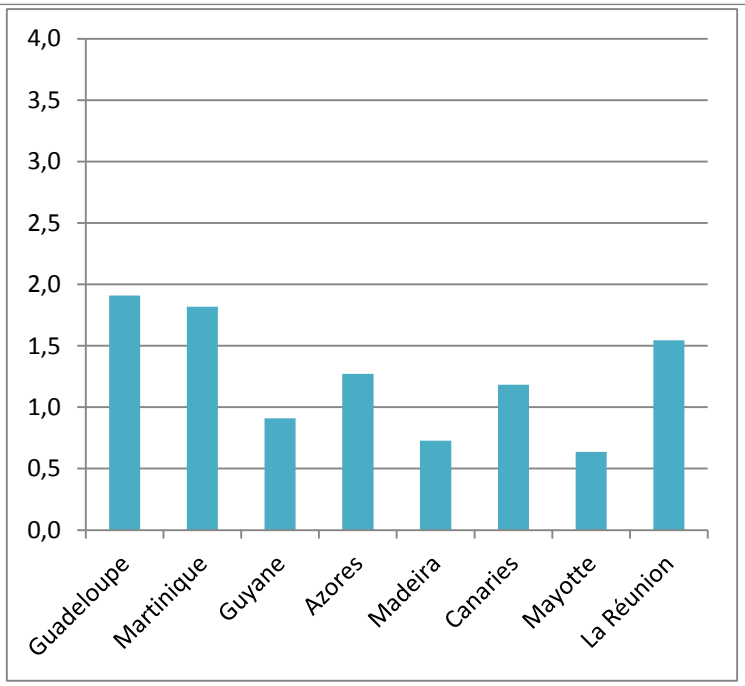


Figure 5 Global index of interaction for access to fishing grounds in each OR

The detailed results per OR and per type of interaction is provided hereafter (figure 6). As explained before, Competition for access to the grounds is often related to competition to the stocks as the available space of and range of operation of small-scale vessels is limited. In Martinique and Guadeloupe, the level of competition for fishing areas is high (Index=3) either for coastal fishing areas or offshore fishing MFADs area. As mentioned before, conflicts between static gears (pots, nets) exist for the harvesting of benthic and demersal species. In Guadeloupe, the MFADs regulation is poorly enforced and since 1994, the number of MFADs is not known by the Maritime authorities and also the regional fisheries committee. Competition for access to fishing areas fosters conflicts between fishers. The spatial competition for access to the fishing grounds can be considered as globally low in French Guiana (Index=1). However, in the mouth of the two main estuaries, spatial occupation by the small-scale vessels is often very dense. In Azores, the use of gill nets and traps causes a medium competition with the art of trolling. In Madeira, spatial competition manly occurs for those vessels targeting limpets and demersal species. **This work has to be continued in Canaries.**

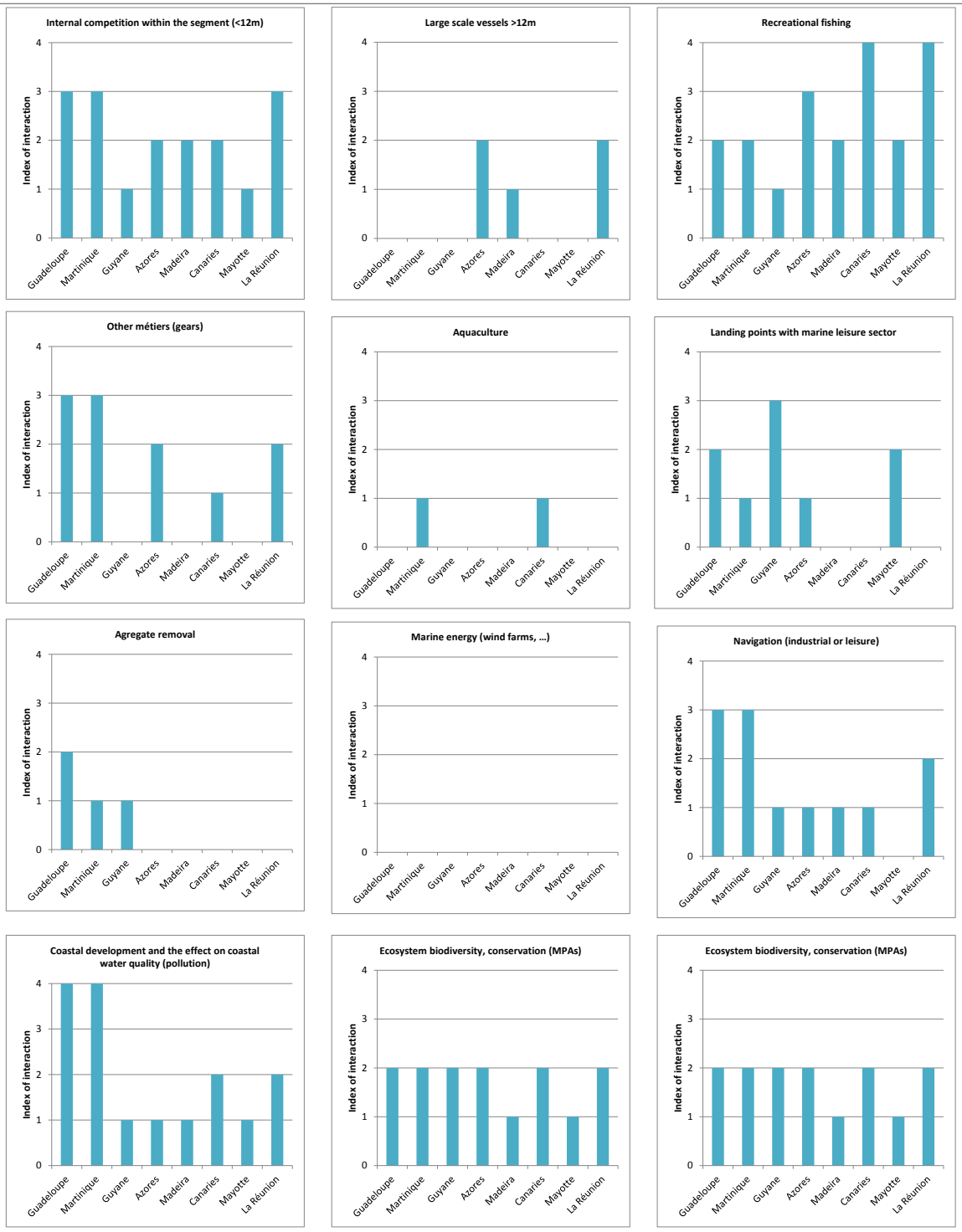


Figure 6 Summary of the interaction levels in all the ORs

IV. Results in each OR

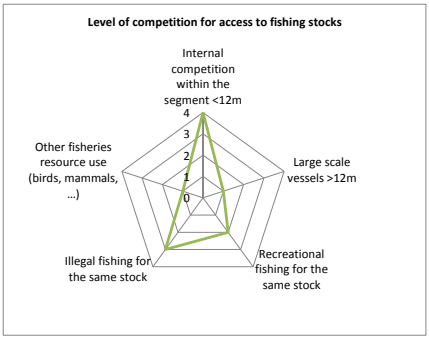
4.1 Situation in Guadeloupe

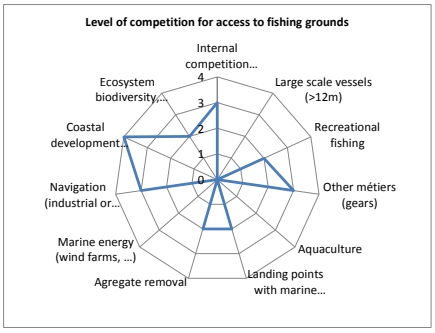
The aim of this assessment is the artisanal or small-scale commercial fishing vessels from Guadeloupe under 12 meters. This segment is composed mainly composed of non-decked vessels with outboard engines operating on a one-day trip basis. The segment also includes decked vessels (see the description of the fleet in task 2.1). The evaluation aims to identify the level of competition of the segment for the access to fishing stocks and grounds with other fleet segments or marine uses and infrastructures.

An experts' panel made of the two fishery researchers taking part in ORFISH project from Ifremer has made a literature review and used its expert knowledge to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others.

Table 2 Interactions matrix of Guadeloupe

Level of competition for access to fishing stocks	Index
Internal competition within the segment <12m	4
Large scale vessels >12m	1
Recreational fishing for the same stock	2
Illegal fishing for the same stock	3
Other fisheries resource use (birds, mammals, …)	1
Total	11
Average index per region	2,2
S.D.	1,3
C.V.	59%
Level of competition for access to fishing grounds	**Index**
Internal competition within the segment (<12m)	3
Large scale vessels (>12m)	0
Recreational fishing	2
Other métiers (gears)	3
Aquaculture	0
Landing points with marine leisure sector	2
Agregate removal	2
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	3
Coastal development and the effect on coastal water quality (pollution)	4
Ecosystem biodiversity, conservation (MPAs)	2
Total	21
Average index per region	1,9
S.D.	1,4
C.V.	72%





4.1.1 Level of competition for access to fishing stocks

Internal competition within the segment (<12m): (Index=4)

In the case of the level of the competition for access to fishing stocks, the panel has found a very high level of competition within the small-scale fleet. This is mainly explained by the facts that, except the fishing permit to enter the sector (i.e. operating license) there is no access right regulating the effort to the different fisheries and most island fisheries can be considered to "open-access" (Guyader et al. 2013[13]). This is the case for both coastal fisheries and the so-called offshore fisheries targeting large pelagic species. Fisheries regulation is included in the

[13] Guyader, O., Bellanger, M., Reynal, L., Demaneche, S., Berthou, P., 2013. Fishing strategies, economic performance and management of moored fishing aggregating devices in Guadeloupe. Aquat. Living Resour. 26, 97–105.

Prefectural Order of 2002[14] regulating the coastal marine fisheries in the waters of Guadeloupe.

Other small-scale vessels not in the segment: not concerned

Large scale vessels (>12m): (Index=1)

Competition for stocks with large scale vessels does not exist within the Guadeloupe EEZ, however a significant part of the fleet harvests migratory large pelagic species such as dolphinfish (*Coryphaena hippurus*) (61%), yellowfin tuna (*Thunnus albacares*) (18%), blue marlin (*Makaira nigricans*) (8%) and other miscellaneous species like wahoo (*Acanthocybium solandri*) also exploited by other fleets in the Atlantic area (Guyader et al., 2017[15]). In the case of yellowfin tuna, most of the landings are made by large scale purse seiner fleets operating on drifting FADs. Considering the limited dependency of the fleet to this species, the level of competition is considered as low-medium.

Recreational fishing for the same stock: (Index=2)

The level of competition with recreational fishing for the same stock is considered as medium. Local Recreational fishers also operate on MFADs but competition is mainly due to recreational foreign fishers targeting billfish (FAO 2016)[16]. For coastal resources, competition in mainly explained by spearfishing activities and spiny lobster harvesting. Recreational fishing is a significant activity in Guadeloupe. A phone survey carried out in 2005 estimated at 11% the level of participation in the population (43 000 fishers) (Ifremer-bva 2008[17]). The main fishing activities are fishing from the shore, hand fishing (44% of the respondents) or line fishing (42% of respondents), then boat fishing (22%) and spearfishing (22%).

Illegal fishing for the same stock: (Index=3)

Illegal fishing for the same stocks is considered as high by commercial fishers but difficult to characterize (Diaz et al. 2009). This element has to be completed. In 2007, an identification test of informal fishing vessels was conducted (Guyader 2006[18]). This work was carried out through direct contacts and field observations.

A socio-economic survey was carried out with a sample of fishers (N=110) in 2008 to assess the economic situation of the segment but also to identify the interactions/conflicts within the sector and with other users (Guyader et al. 2012). The main results are presented hereafter (figures 7 and 8).

[14] Arrêté N° 2002/1249 du 19 août 2012 portant réglementation de l'exercice de la pêche maritime côtière dans les eaux du Département de la Guadeloupe. Préfecture de la Région Guadeloupe

[15] Guyader, O., R. Bauer, and L. Reynal. 2017. Assessing the number of moored fishing aggregating devices through aerial surveys: A case study from Guadeloupe. Fisheries Research 185:73–82. doi:10.1016/j.fishres.2016.10.003.

[16] FAO. 2015. SECOND REGIONAL WORKSHOP ON CARIBBEAN BILLFISH MANAGEMENT AND CONSERVATION OF THE WECAFC /OSPESCA /CRFM/CFMC WORKING GROUP ON RECREATIONAL FISHERIES Panama City, Panama, 9-11 November 2015, 61 p. http://www.fao.org/3/a-i5436b.pdf

[17] Ifremer-bva. 2008. Enquête relative à la pêche de loisir (récréative et sportive) en mer en France et les DOM, 33 p.

[18] Guyader O., Berthou P., Reynal L., Demanèche S., Bruneau M., Bellanger M., Merrien C., Guegan F., Lespagnol P., Pitel-Roudaut M., Jézéquel M., Leblond E., Daurès F., 2011, Situation de la pêche en Guadeloupe en 2008. Rapport du projet pilote Système d'Informations Halieutiques Guadeloupe, 2007/2009, http://archimer.ifremer.fr/doc/00086/19689

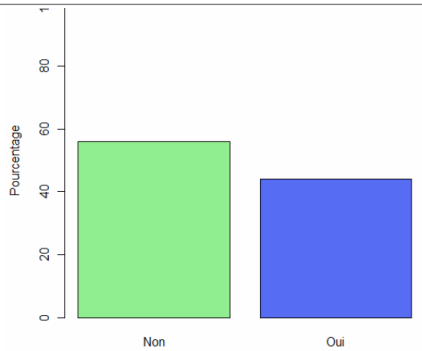


Figure 7 Percentage of fishers in conflict with other users

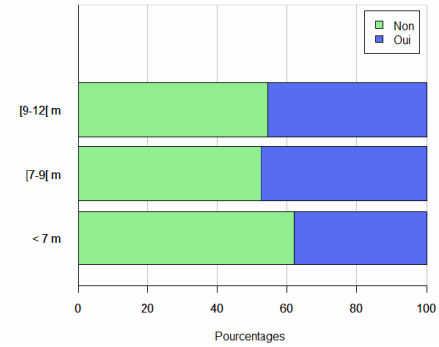


Figure 8 Percentage of fishers per vessel size category in conflict with other users

In 2008, more than 40% of the interviewed fishers faced conflicts and there were few differences between vessels size categories. The two most cited categories of users are professional fishermen (30% of respondents) and illegal fishers (25%). Spearfishing, navigation (industrial or leisure) are cited by 8% of fishermen. According to the respondents, there is no conflicts with aquaculture. The destruction or theft of fishing gear, the crowding of fishing grounds and the marketing of products are the main sources of conflict.

Table 3 Conflicts per category og users (in%)

	% de conflit
Pêcheurs professionnels	30.2
Pêcheurs à pied professionnels	3.4
Pêcheurs plaisanciers embarqués ou non / apnée	23.3
Aquaculteur	0.0
Plongée sous-marine	6.9
Navigation de plaisance	8.6
Navigation de commerce	8.6
Autres	0.9

Table 4 Type of conflicts (in%)

	% de conflit
Destruction engins pêche	27.6
Encombrement zones pêche	17.2
Commercialisation	8.6
Droits de pêche	5.2
Rejets pêche	0.0
Autres	8.6

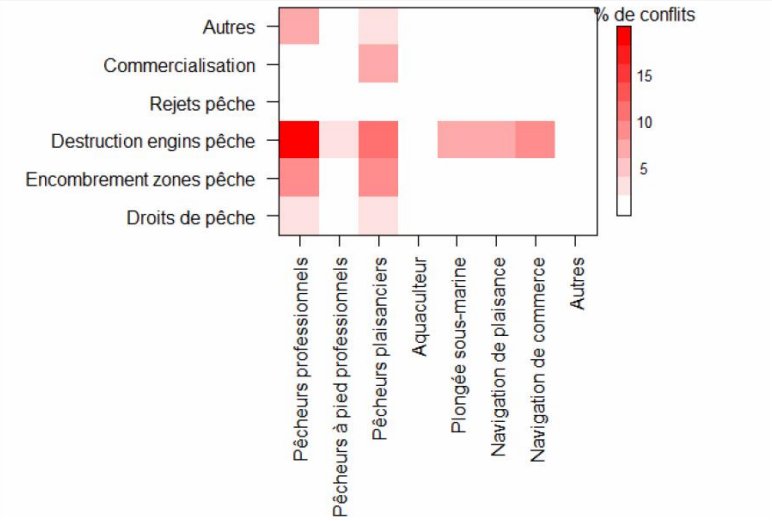


Figure 9 Category of users versus type de conflicts (in %)

Other fisheries resource use (birds, mammals, …): (Index=1)

Recent research on the interaction between fisheries and whales, suggest that baleen whales are not a threat to fisheries in Caribbean waters, while toothed cetaceans seem to be more impacted by fisheries than they actually impacting them. Whales target different types of food resources and consume significantly less than what is taken by fisheries[19]. In terms of spatial interaction, Marine mammals are a nuisance for fishermen on some coastal MFADs. The presence of these mammals is however very irregular.

4.1.2 Level of competition for access to fishing grounds

Internal competition within the segment (<12m): (Index=3)

The level of competition for fishing areas is very high either for coastal fishing areas or offshore fishing MFADs area. As mentioned before, conflicts between static gears (pots, nets) exist for the harvesting of benthic and demersal species. The MFADs regulation is poorly enforced and since 1994, the number of MFADs is not known by the Maritime authorities and also the regional fisheries committee (Guyader et al. 2017)[20]. Competition for access to fishing areas fosters conflicts between fishers (Guyader et al. 2018)[21].

[19] Morissette, L., 2010. Whales eat fish? Demystifying the myth in the Caribbean marine ecosystem, Fish & Fisheries, 11, 388-401

[20] Guyader, O., R. Bauer, and L. Reynal. 2017. Assessing the number of moored fishing aggregating devices through aerial surveys: A case study from Guadeloupe. Fisheries Research 185:73–82. doi:10.1016/j.fishres.2016.10.003.

[21] Guyader, O., Frangoudes, K., Kleiber D. 2018. Existing territories and territorial use rights opportunities for management of moored fish aggregating devices:The case of the La Désirade Island small-scale fisheries, Society & Natural Resources. DOI: 10.1080/08941920.2018.1443235

Large scale vessels (>12m): (Index=0)

There are no known vessels above 12 m operating in the Guadeloupe EEZ.

Recreational fishing: (Index=2)

As mentioned before, recreational fishing is a significant activity in Guadeloupe. Spatial interactions occur mainly in the spearfishing activity and also on the MFADs with recreational vessels.

Other métiers (gears) (Index=3)

Spatial competition within the small-scale sector but between gears is high, especially between traps and nets (gillnets and trammel nets) because these gears often operate in the same areas.

Aquaculture: (Index=0)

There is only one production farm in Guadeloupe located in the western of Basse-Terre. Complying with the provisions of the Rural Code and the transfer of skills that took place in 2011, the Guadeloupe Region has drawn up a Regional Marine Aquaculture Development Plan (SRDAM) [22], with all stakeholders involved. The SRDAM recommends artisanal and sustainable aquaculture. It focuses on the preferential and non-exclusive development of marine fish farming, this production sector being the most structured of activities that can be considered for short-term development in Guadeloupe. It has a marine hatchery and a production farm that can serve as training centers for new operators. Within the framework of this SRDAM, all the existing sites, but also the areas favorable to the development of marine aquaculture, have been listed. In total, Guadeloupe has 18 favorable sites, offering 500 hectares of developable surface for the establishment of fish farms.

Landing points with marine leisure sector: (Index=2)

In Guadeloupe, 10 official fishing harbors are registered under the management of the department authorities but other harbors (with mixed activities) or landing sites are used by fishers. The infrastructures have been improved over the last ten years even if there are always some issues for fishing activity.

Aggregate removal: (Index=2)

Concerning marine aggregates, the number of projects has been limited to one project with non-exploitation in 2014 (see the following map). Such exploitation exists off Le Gosier (Petit Havre) area. The extraction at sea of these materials is regulated under the mining code by a mining license and an order to open mining works.

[22] http://www.regionguadeloupe.fr/actualites-et-agendas/toute-lactualite/detail/actualites/le-schema-regional-de-developpement-de-laquaculture-marine/categorie/economie-emploi-entreprises/#_

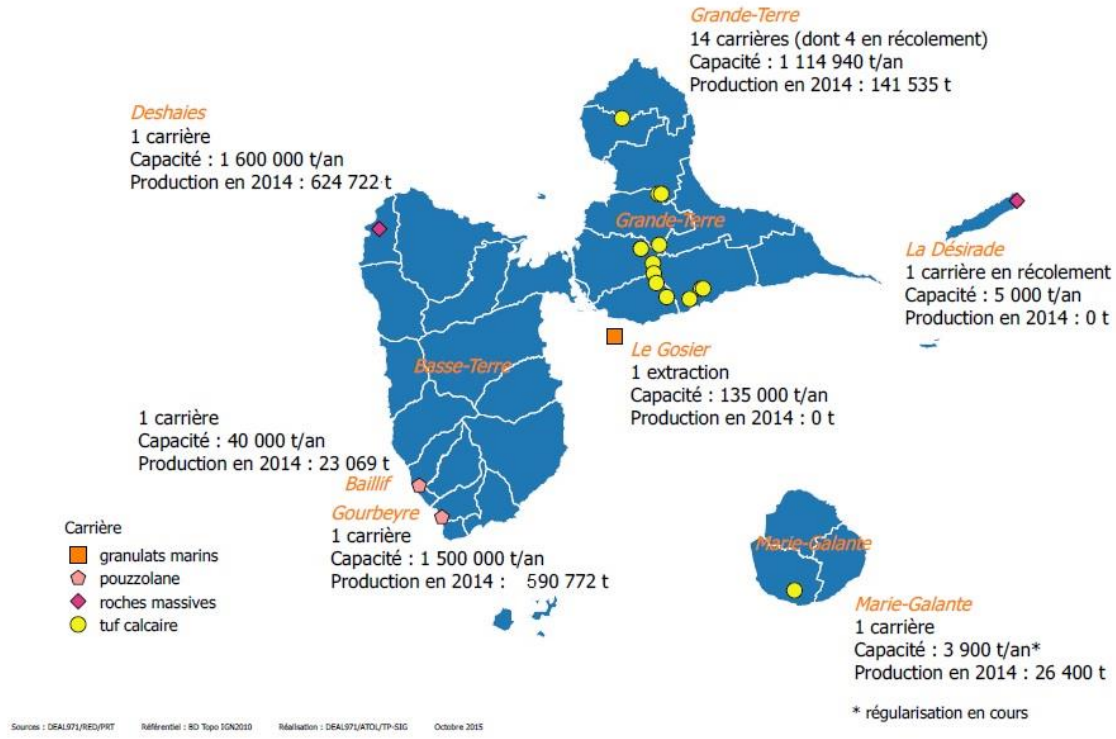


Figure 10 Map of aggregate extraction licenses including marine areas

More recently, the port of Guadeloupe has decided to expand its port and facilitate access to larger vessels[23]. Significant dredging work has been done with the releasing of sediments at sea with potential impacts on coastal fisheries in part of the island.

Marine energy (wind farms, …): (Index=0)

There is no marine energy installation in Guadeloupe.

Navigation (industrial or leisure): (Index=3)

The interaction with navigation (industrial or leisure) is considered as medium/high. As can be seen on the following map, the marine traffic is quite high in some areas and vessels may cross fishing areas where fishers set their gears, either static gears like pots and nets, but also moored fishing aggregating devices (MFADs) to target large pelagic fish. Fishers regularly complain about the loss of gears or devices due to marine traffic. Conversely, marine traffic especially sailing vessels, complain about fisher's gears or devices.

[23] Prefectoral Order No. 2014-193 / SG / DICTAJ / BRA of 16 July 2014 relating to the work of the GPMG Grand Port Project Unit 1, and the monitoring on the disposal sites.

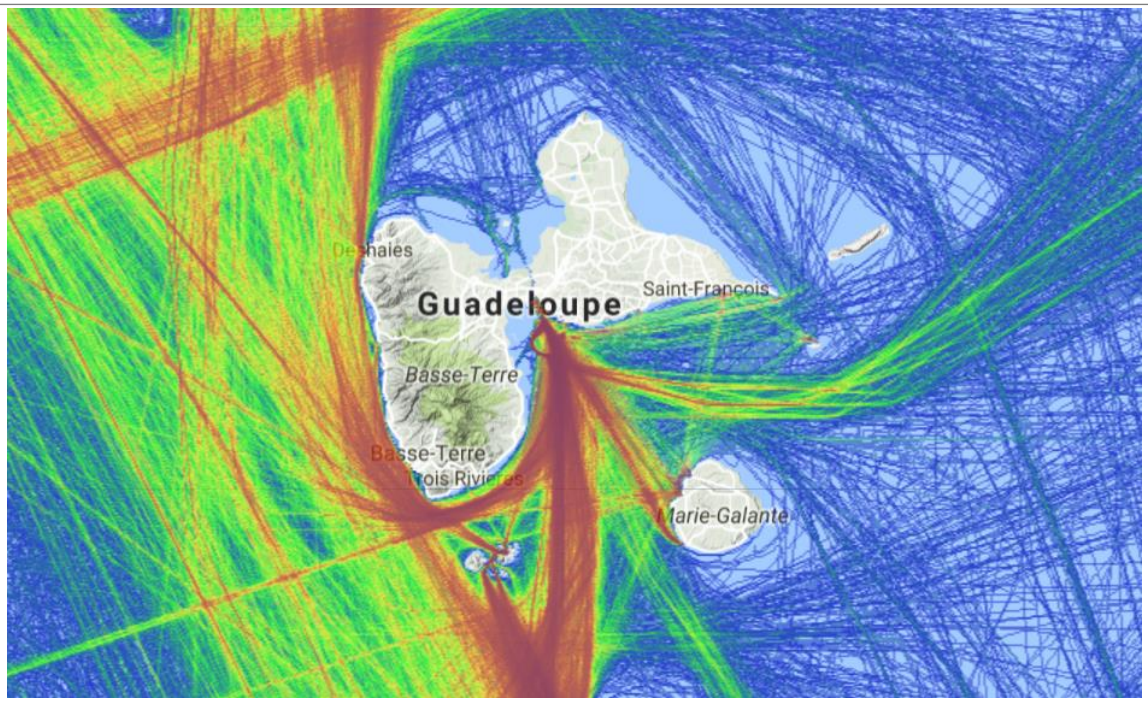


Figure 11 Cumulated vessel traffic around Guadeloupe in 2016
Source: https://www.marinetraffic.com

Coastal development and the effect on coastal water quality (pollution): (Index=4)

The impact of coastal development and the effect on coastal water quality (pollution) on fisheries can be considered as high in Guadeloupe. Beyond turbidity due to quarry and soil erosion, the transfer of Chlordecone (kepone) from treated grounds towards the marine environment has been proved since the beginning of 2000s (Bertrand et al. 2016)[24]. In 2008, a maximal residue limit (MRL) was set at 20 µg / kg wet weight in fish and seafood, and therefore intensified the concern about the risks of high human exposure to the pesticide due to the consumption of contaminated marine products. To answer this concern, several sampling cruises were carried by public authorities and by Ifremer, in order to analyse the contamination of the fish fauna around the Guadeloupe Island (Bertrand et al. 2013)[25].
Further, this study was completed by an assessment of the fishery activity in areas which are the more exposed to the chlordecone contamination, taking into account data from a fishery observatory which has been set up in the archipelago since 2007. Concerning the marine fauna, two species groups are particularly exposed: the very coastal ones, particularly those living at or close to the mouth of rivers, and crustaceans wherever they live. Among fishes, the most contaminated species belong to many various groups which are present in the very coastal belt, more or less regularly.
Lastly, this study provided orders of magnitude on the relative part of the fishery activity around the archipelagos for which the contamination is of great concern. A prefectural decree regulating the new fishing ban zones in Guadeloupe was established in 2013 covering a total ban area of 37 km^2.

[24] Bertrand, J., Abarnou, A., Bodiguel, X, Guyader, O., Reynal, L., Robert, S. 2016. Assessment of Chlordecone Content in the Marine Fish Fauna around the French West Indies Related to Fishery Management Concerns. In Crisis management of chronic pollution: contaminated soil and human health. Lesueur Jannoyer Magalie, Cattan Philippe, Woignier Thierry, Clostre Florence (Eds). 2016. Boca Raton : CRC Press, 290 p. (Urbanization, industrialization and the environment series, 2) ISBN 978-1-4987-3783-8. Chap.8, pp.105-118 (CRC Press Taylor and Francis Group)
[25] Bertrand, J., Guyader, O., Reynal, L. 2013. Caractérisation de la contamination de la faune halieutique par la chlordécone autour de la Guadeloupe. Résultats des campagnes de 2008 à 2011 (projet CarGual). DAAF Guadeloupe, Ref. Référence Ifremer n° 13/5210052/F , 47p. ttp://archimer.ifremer.fr/doc/00136/24762/

In addition, three partial exclusion zones have been defined. The first two frame the total no-go zone. The third is located in the Grand Cul-de-Sac Marin. In the latter, only king lobsters (*Palinurus argus*) larger than 25 cm are allowed for fishing and marketing. Six other crustaceans, three molluscs and 28 fish species are also banned from commercialization.

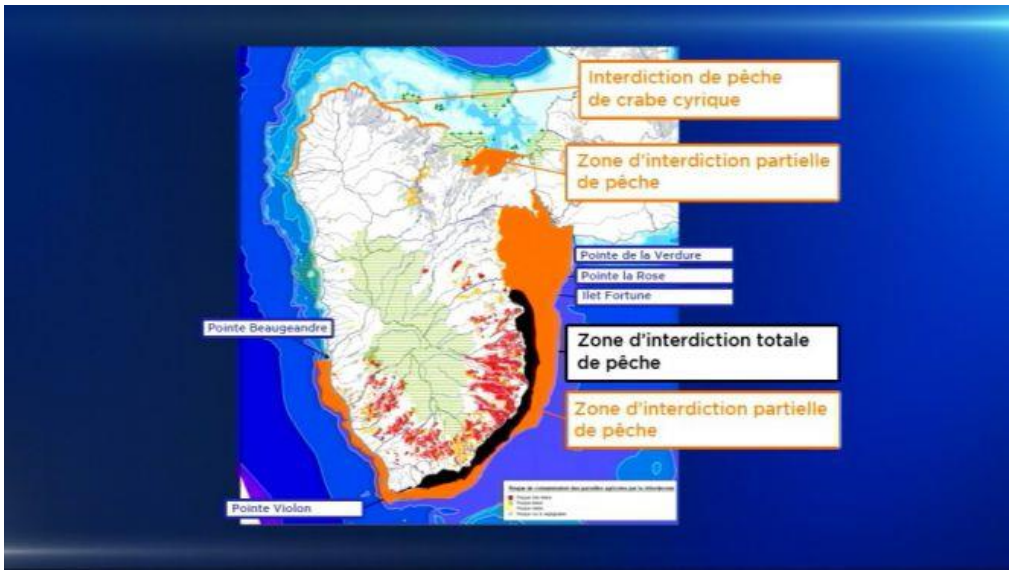


Figure 12 Banned and regulated areas for fishing Guadeloupe in relation to Chlordecone pesticide

Ecosystem biodiversity, conservation (MPAs): (Index=2)

Ecosystem biodiversity is considered as high in the French Lesser Antilles. Five species of marine turtles are observed in the waters of the French West Indies; the Hawksbill Turtle, Green Turtle, Leatherback Turtle, Loggerhead Sea Turtle and Olive Ridley Turtle. Sea turtles can interact with fishing activities in different stages of their life cycle both on the high seas and in coastal areas. The probability of interaction with fishing activities in the coastal region is potentially near the nesting beaches, when adults are approaching the coast for breed or near feeding areas (seagrass beds, coral reefs) and turtle growth (Claro et al. 2010)[26]. In general, gillnets and trammel nets are the most impacting gear in terms of catch frequency and mortality (Delcroix 2003[27], Louis-Jean 2006[28], Louis Jean 2015[29]). The species mainly concerned by these incidental catches are turtles nested (53%) and green turtles (20%); catches concern both juveniles and adults. The sea turtle restoration plan in the French West Indies has been validated by the National Council for the Conservation of Nature in 2006.

In terms of measures established for ecosystem biodiversity and conservation with potential impact on fisheries, several MPAs have been established in Guadeloupe (see below) within the area of the Guadeloupe national park[30]. Another no take zone area around the island of "petite

[26] Claro, F., Bedel, S., et Forin-Wiart M.A., 2010. Interactions entre pêcheries et tortues marines en France métropolitaine et d'Outre-mer. Rapport SPN 2010/13. MNHN-SPN, Paris, 123 p.
[27] Delcroix, E., 2003. Etude des captures accidentelles de tortues marines par la pêche maritime dans les eaux de l'archipel guadeloupéen. Rapport de MST. 84p.
[28] Louis-Jean, L., 2006. La conservation de la tortue marine face au secteur clé de la pêche maritime de la Martinique. Mémoire de Master 2 EMTS, MNHN, 83p.
[29] Louis-Jean, L. 2015. Étude de la pêche artisanale côtière aux filets de fond aux Antilles françaises afin de réduire les captures accidentelles de tortues marines et obtenir une activité plus durable, Thèse de doctorat EPHE, 174 p. http://www.theses.fr/2015EPHE3028
[30] http://www.guadeloupe-parcnational.fr/fr

terre" in the eastern part of Guadeloupe was also established but with limited interaction with fishing[31]. The level of competition for fishing at the scale of the region is low.

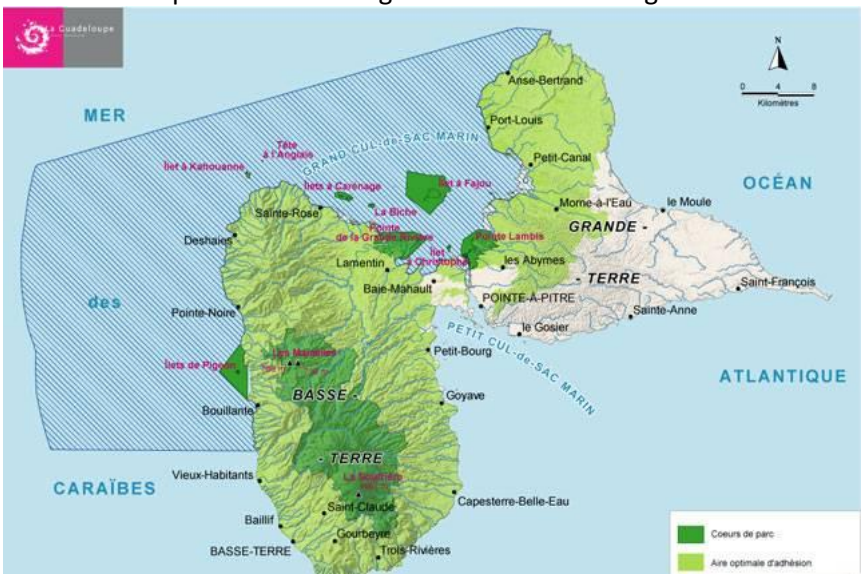


Figure 13 Protected areas of Guadeloupe
Source: Parc National Guadeloupe

4.1.3 Global summary

1) Which actors/sectors of activity generate the most competitions?

Internal competition within the SSF sector is a key issue in Guadeloupe. The main reason is the lack of regulation for access to the fishing stocks and fishing grounds. Illegal fishing and recreational are also serious competitors. The sustainability of the sector is also threatened by the quality of habitats environment and the main competitors are coastal development and agriculture. Massive Sargassum algae inflows in the Caribbean over the past years have also impacted the small-scale fisheries.

2) What are the main themes of conflict and their characteristics?

The main themes of conflict relate to the previously-mentioned actors (conflicts for access to the fishing areas, illegal selling of catches). Pollution of coastal habitats by pesticide used by agriculture led to the ban of fishing areas for commercial fishers.

3) Are there any new projects and solutions considered to deal with some conflicts of uses?

Currently, no solution is within sight to resolve these conflicts except fisher's financial compensation for the prohibited fishing areas due to pesticides.

4.2 Situation in Martinique

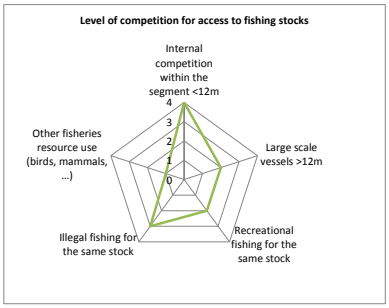
The aim of this assessment is the artisanal or small-scale commercial fishing vessels from La Martinique. This segment is also called the yole fleet which are vessels under 12 meters. The

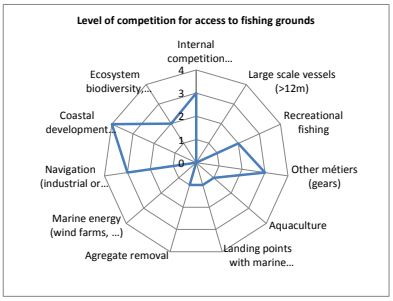
[31] http://reservesdesiradepetiteterre.com/ilets-de-petite-terre-reglementation/

evaluation aims to identify the level of competition of the segment for the access to fishing stocks and grounds with other fleet segments or marine uses and infrastructures.
An experts' panel made of the two fishery researchers taking part in ORFISH project from Ifremer has made a literature review and used its expert knowledge to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others.

Table 5 Matrix interactions of Martinique

Internal competition within the segment <12m	4
Large scale vessels >12m	2
Recreational fishing for the same stock	2
Illegal fishing for the same stock	3
Other fisheries resource use (birds, mammals, …)	1
Total	12
Average index per region	2,4
S.D.	1,1
C.V.	48%
Level of competition for access to fishing grounds	Index
Internal competition within the segment (<12m)	3
Large scale vessels (>12m)	0
Recreational fishing	2
Other métiers (gears)	3
Aquaculture	1
Landing points with marine leisure sector	1
Agregate removal	1
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	3
Coastal development and the effect on coastal water quality (pollution)	4
Ecosystem biodiversity, conservation (MPAs)	2
Total	20
Average index per region	1,8
S.D.	1,3
C.V.	73%





4.2.1 Level of competition for access to fishing stocks

Internal competition within the segment (<12m): (Index=4)

In the case of the level of the competition for access to fishing stocks, the panel has found a very high level of competition within the small-scale fleet. This is mainly explained by the facts that, except the fishing permit to enter the sector (i.e. operating license), there is no access right regulating the effort to the different fisheries and most island fisheries can be considered "open-access" excepted in the so-called "cantonments" (Areas not Catching Fish) around the Islands (Valdivia 2014)[32]

Other small-scale vessels not in the segment: Not concerned.

Large scale vessels (>12m): (Index=2)

Competition for stocks with large scale vessels does not exist within the Martinique EEZ, however a significant part of the fleet harvests migratory large pelagic species such as dolphinfish, yellowfintuna (*Thunnus albacares*), blue marlin (*Makaira nigricans*), Atlantic tuna and other miscellaneous species like wahoo (*Acanthocybium solandri*) also exploited by other fleets in the Atlantic area (Reynal et al, 2015)[33]. In the case of yellowfin tuna, most of the

[32] Valdivia F., « Les cantonnements de pêche à la Martinique : bilan et perspectives », Études caribéennes [En ligne], 27-28 | Avril-Août 2014, mis en ligne le 14 août 2014, consulté le 07 juin 2018. URL : http://journals.openedition.org/etudescaribeennes/6800 ; DOI : 10.4000/etudescaribeennes.6800

[33] Reynal Lionel, Pau Cedric, Dromer Clement, Mathieu Heloise, Guyader Olivier (2015). Pêche et biologie des espèces agrégées autour des DCP ancrés. Rapport final du projet Interreg Caraïbes Magdelesa / Fishing and biology of the species aggregated around moored FADs. Final report of the Interreg Caraïbes MAGDELESA project. R.INT.RBE/BIODIVENV 2015-3.

landings are made by large scale purse seiner fleets operating on drifting FADs. Considering the limited dependency of the fleet to this species, the level of competition is considered as low-medium. Market Interaction with the snappers fishing in Guyana exported to Martinique is the most important source competition.

Recreational fishing for the same stock: (Index=2)

The level of competition with recreational fishing for the same stock is considered as medium. Local Recreational fishers also operate on MFADs but competition is mainly due to recreational foreign fishers targeting billfish (FAO 2016)[34]. For coastal resources, competition in mainly explained by spearfishing activities and spiny lobster harvesting. Recreational fishing is a significant activity in Martinique. A phone survey carried out by Ifremer in 2005 estimated at 13% the level of participation in the Martinican population (44 000 fishers) (Ifremer-bva 2005[35]). The main fishing activities are fishing from the shore, hand fishing (49% of the respondents) or line fishing (43% of respondents), then boat fishing (17%) and spearfishing (18%).

Illegal fishing for the same stock: (Index=3)

Illegal fishing for the same stocks is considered as very high by commercial fishers but difficult to characterize. Competition for sea urchins and queen conch are considered as the most sensitive fisheries for illegal activities.

A socio-economic survey was carried out with a sample of fishers (N=138) in 2008 to assess the economic situation of the segment but also to identify the interactions/conflicts within the sector and with other users (Reynal et al. 2012). The main results are presented hereafter.

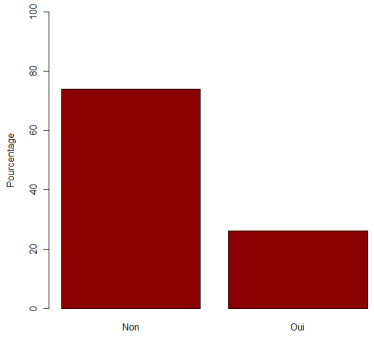


Figure 14 Percentage of fishers in conflict with other users

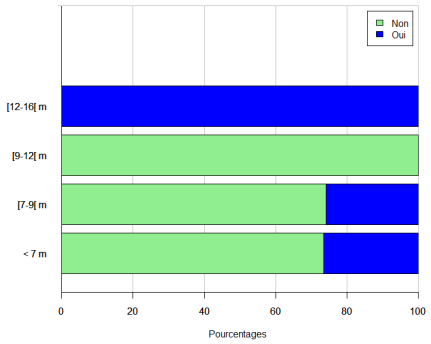


Figure 15 Percentage of fishers per vessel size category in conflict with other users

[34] Ibid.
[35] Ifremer-bva. 2008. Enquête relative à la pêche de loisir (récréative et sportive) en mer en France et les DOM, 33 p.

In 2008, around 30% of the interviewed fishers faced conflicts mainly within the <7m, 7-9m 12-16m length. The two most cited categories of users were illegal fishers (14%) professional fishermen (10% of respondents) and diving/snorkelling (7.2%). Navigation (industrial and leisure) are cited by around 10% of fishermen. According to the respondents, there was no conflict with aquaculture. The destruction or theft of fishing gear, the crowding of fishing grounds were the main sources of conflict.

Table 6 Conflicts per category of users (in %)

	% de conflit
Pêcheurs professionnels	10.1
Pêcheurs à pied professionnels	0.7
Pêcheurs plaisanciers embarqués ou non / apnée	13.8
Aquaculteur	0.0
Plongée sous-marine	7.2
Navigation de plaisance	6.5
Navigation de commerce	3.6
Autres	3.6

Table 7 Type de conflicts (in %)

	% de conflit
Droits de pêche	2.9
Encombrement zones pêche	13.8
Destruction engins pêche	17.4
Rejets pêche	0.0
Commercialisation	1.4
Autres	5.1

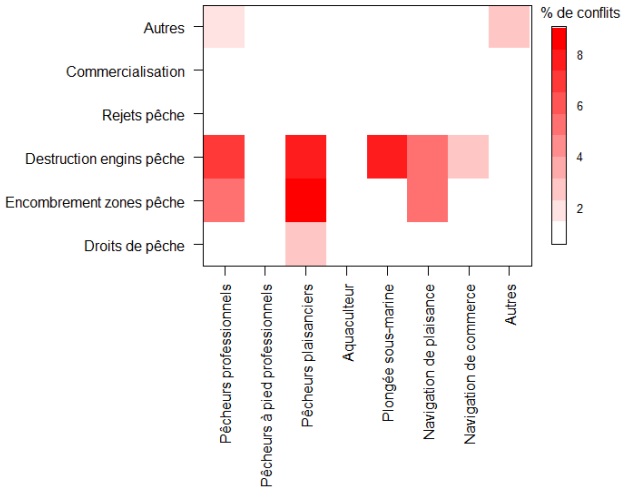


Figure 16 Category of users versus type de conflicts (in %)

Other fisheries resource use (birds, mammals, …): (Index=1)

Recent research on the interaction between fisheries and whales, suggest that baleen whales are not a threat to fisheries in Caribbean waters, while toothed cetaceans seem to be more impacted by fisheries than they actually impacting them. Whales target different types of food resources and consume significantly less than what is taken by fisheries (Morissette et al. 2010)[36]. In terms of spatial interaction, Marine mammals are a nuisance for fishermen on some coastal MFADs. The presence of these mammals is however very irregular.

4.2.2 Level of competition for access to fishing grounds

Internal competition within the segment (<12m): (Index=3)

[36] Morissette, L., et al. 2010. Whales eat fish? Demystifying the myth in the Caribbean marine ecosystem, Fish & Fisheries, 11, 388-401

The level of competition for fishing areas is high either for coastal fishing areas or offshore fishing MFADs area. As mentioned before, conflicts between static gears (pots, nets) exist for the harvesting of benthic and demersal species.

Large scale vessels (>12m): (Index=0)

There are no known vessels above 12 m operating in the Martinican EEZ.

Recreational fishing: (Index=2)

The level of spatial competition with recreational fishing for the same stock is considered as medium. For coastal resources, competition in mainly explained by spearfishing activities and spiny lobster harvesting.

Other métiers (gears): (Index=3)

Competition is mainly between traps and beach seines.

Aquaculture: (Index=1).

The interaction with coastal fisheries is low. Marine aquaculture in Martinique exploits two species: the Caribbean Wolf (*Sciaenops occelata*) and secondarily Cobia (*Rachycentron canadum*). 12 offshore farms and 2 hatcheries are currently in operation (see figure). All the Martinican companies in these sectors are of type artisanal and the production is distributed locally (AAMP 2010)[37].

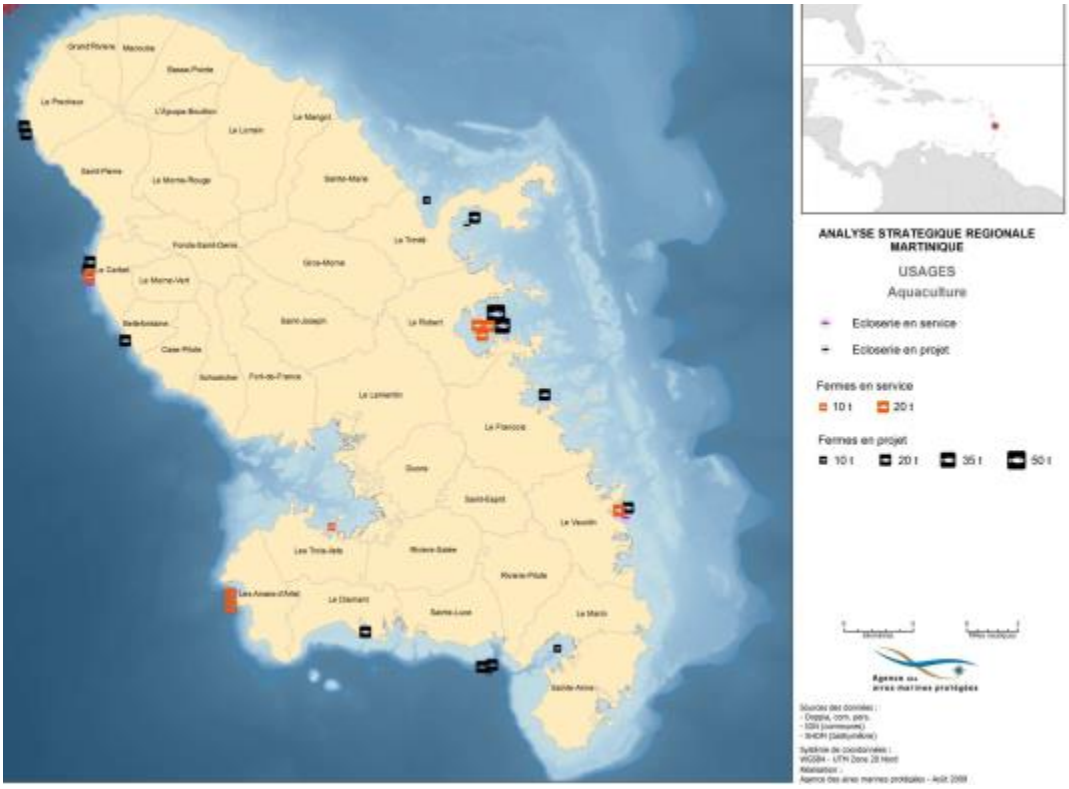


Figure 17 Aquaculture farms in Martinique
Source: AAMP 2010.

[37] AAMP 2010. État des connaissances sur le milieu marin de la Martinique : Écosystèmes Patrimoine naturel et biodiversité Usages et pressions. 155 p. http://www.aires-marines.fr/L-Agence/Organisation/Parcs-naturels-marins/Parc-naturel-marin-de-Martinique/Documentation/ASR-Martinique

Landing points with marine leisure sector: (Index=1)

In Martinique, fishing harbors are registered under the management of the department authorities but other harbors (with mixed activities) or landing sites are used by fishers. The infrastructures have been improved over the last ten years even if there are always some issues for fishing activity

Aggregate removal: (Index=1)

The extraction at sea of these materials is regulated under the mining code by a mining license and an order to open mining works. There is no marine extraction licenses for marine aggregates in Martinique but land extraction potentially impacts the coastal shoreline and marine habitats (Legrand 2010)[38].

Marine energy (wind farms, …): (Index=0)

There is no marine energy installation in Martinique.

Navigation (industrial or leisure): (Index=3)

The interaction with navigation (industrial or leisure) is considered as medium/high. As can be seen on the following map, the marine traffic is quite high in some area and vessels may cross fishing areas where fishers set their gears, either static gears like pots and nets, but also moored fishing aggregating devices (MFADs) to target large pelagic fish. Fishers regularly complain about the loss of gears or devices due to marine traffic.

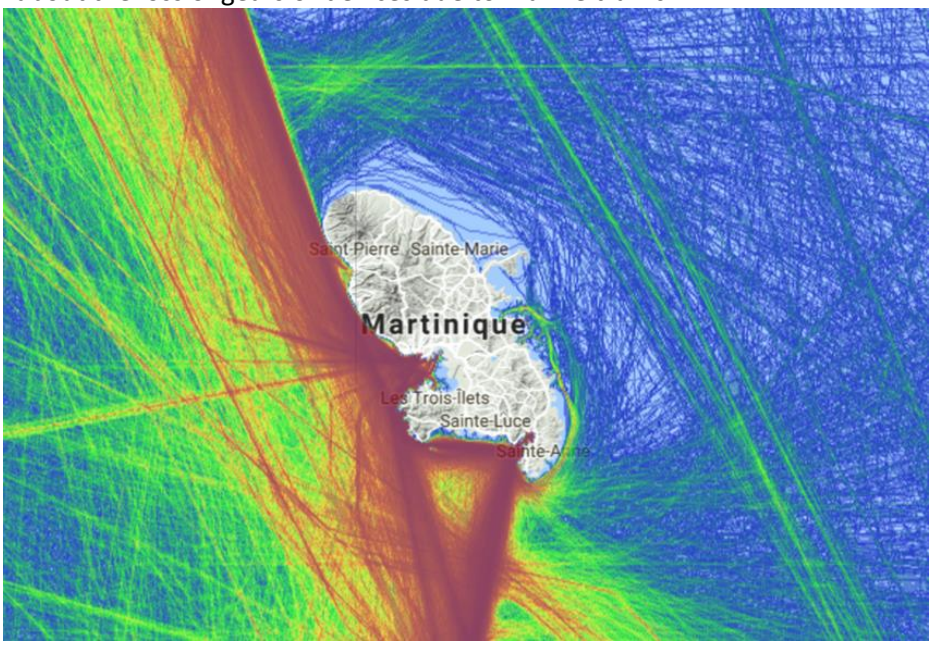


Figure 18 Cumulated vessel traffic around Martinique in 2016
Source: https://www.marinetraffic.com

Coastal development and the effect on coastal water quality (pollution): (Index=4)

The impact of coastal development and the effect on coastal water quality (pollution) on fisheries can be considered as very high in Martinique. Legrand (2010) assessed their state of health of the benthic biocenosis of Martinique coastline between 0 and 50 m in relation to anthropic pressures.

[38] Legrand, H. 2010. Cartographie des biocénoses benthiques du littoral martiniquais et eutrophisation en zone récifale en relation avec les sources de pression d'origine anthropique, Thèse de doctorat, École Pratique des Hautes Études, 291 p.

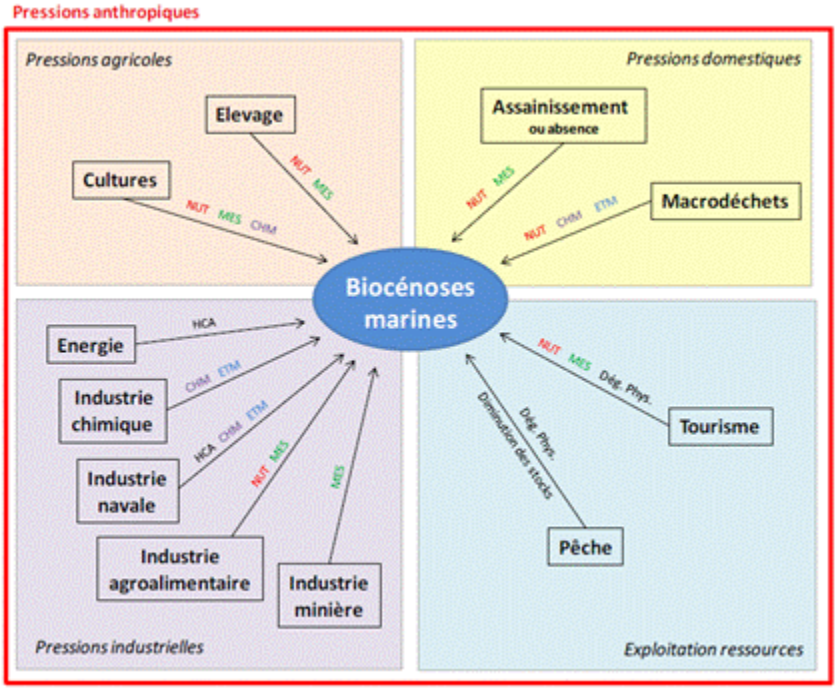


Figure 19 .Synthetic diagram of the anthropic pressures having a potential impact on marine biocenoses of Martinique Source: Legrand 2010

Coral reefs and the phanerogamous seagrass beds, with total surface areas of about 50 km² each, are mainly present in the southern Caribbean and in the central-Atlantic region characterized by a double barrier system. According to Legrand (2010), the state of health of coral communities is very alarming since 80% of them are degraded, mainly due to macroalgae development and / or hyper-sedimentation. Among the large number of anthropic pressures identified on the Martinican territory, the sources of pollution in nutrients and suspended matter appear predominant. The development of a risk map for these two types of releases highlighted areas of high risk, including bays and semi-enclosed systems, which appear to be consistent with the advanced degradation status of coral communities.

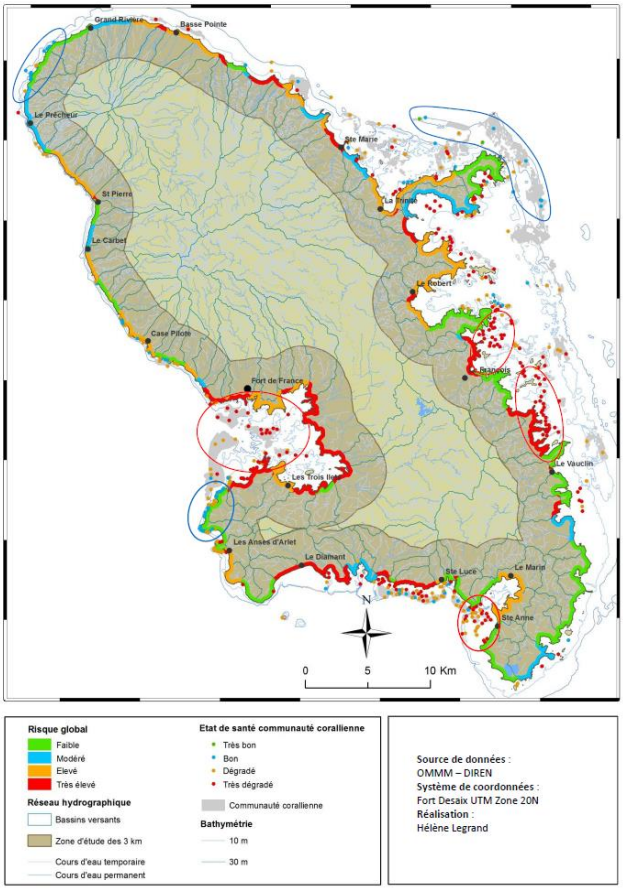


Figure III.35. Répartition des états de santé des communautés coralliennes et des risques de pollution par bassin versant autour du littoral martiniquais.

Figure 20 Health conditions of coral communities and risks of pollution by catchment around Martinique coastline

Source: Legrand 2010

Beyond turbidity due to quarry and soil erosion, the transfer of chlordecone (kepone) from treated grounds towards the marine environment has been proved since the beginning of 2000s (Bertrand et al. 2016). In 2008, a maximal residue limit (MRL) was set at 20 µg / kg wet weight in fish and seafood, and therefore intensified the concern about the risks of high human exposure to the pesticide due to the consumption of contaminated marine products. To answer this concern, several sampling cruises were carried by public authorities and by Ifremer, in order to analyse the contamination of the fish fauna around the Guadeloupe Island (Bertrand et al. 2010)[39].

Further, this study was completed by an assessment of the fishery activity in areas which are the more exposed to the chlordecone contamination, taking into account data from a fishery observatory which has been set up in the archipelago since 2007. Concerning the marine fauna, two species groups are particularly exposed: the very coastal ones, particularly those living at or close to the mouth of rivers, and crustaceans wherever they live. Among fishes, the most contaminated species belong to many various groups which are present in the very coastal belt, more or less regularly.

[39] Bertrand J., Bodiguel, X., Abarnou, A., Reynal, L., Bocquene, G. 2010. Chlordecone in the marine environment around the French West Indies: from measurement to pollution management decisions. Communication, ICES Conference and Meeting (CM), 2010, Nantes. http://archimer.ifremer.fr/doc/00014/12511/

Lastly, this study provided orders of magnitude on the relative part of the fishery activity around the archipelagos for which the contamination is of great concern. Due to chlordecone contamination, Prefectural decree established the first fishing ban areas in 2010 (see below).

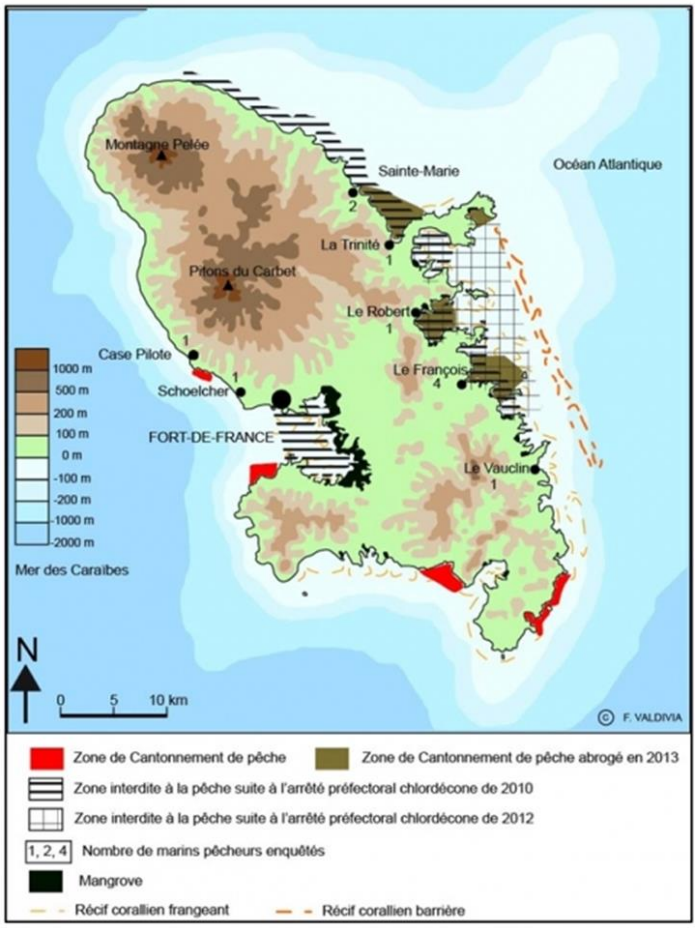


Figure 21 fishing ban areas due to Chloredécone pollution
Source: Valdivia F. 2014

Ecosystem biodiversity, conservation (MPAs): (Index=2)

Ecosystem biodiversity is considered as high in the French Lesser Antilles. Five species of marine turtles are observed in the waters of the French West Indies; the Hawksbill Turtle, Green Turtle, Leatherback Turtle, Loggerhead Sea Turtle and Olive Ridley Turtle. Sea turtles can interact with fishing activities in different stages of their life cycle both on the high seas and in coastal areas. The probability of interaction with fishing activities in the coastal region is potentially near the nesting beaches, when adults are approaching the coast for breed or near feeding areas (seagrass beds, coral reefs) and turtle growth (Claro et al. 2010)[40]. In general, gillnets and trammel nets are the most impacting gear in terms of catch frequency and mortality (Delcroix 2003[41], Louis-Jean 2006[42], Louis-Jean 2015[43]). The species mainly concerned

[40] CLARO F., BEDEL S. et FORIN-WIART M.A., 2010. Interactions entre pêcheries et tortues marines en France métropolitaine et d'Outre-mer. Rapport SPN 2010/13. MNHN-SPN, Paris, 123 p.
[41] Delcroix, E., 2003. Etude des captures accidentelles de tortues marines par la pêche maritime dans les eaux de l'archipel guadeloupéen. Rapport de MST. 84p.
[42] Louis-Jean, L., 2006. La conservation de la tortue marine face au secteur clé de la pêche maritime de la Martinique. Mémoire de Master 2 EMTS, MNHN, 83p.
[43] Louis-Jean, L. 2015. Étude de la pêche artisanale côtière aux filets de fond aux Antilles françaises afin de réduire les captures accidentelles de tortues marines et obtenir une activité plus durable, Thèse de doctorat EPHE, 174 p. http://www.theses.fr/2015EPHE3028

by these incidental catches are turtlesnested (53%) and green turtles (20%); catches concern both juveniles and adults. The sea turtle restoration plan in the French West Indies has been validated by the National Council for the Conservation of Nature in 2006.

The Martinique Marine Natural Park was created on May 5, 2017 after three years of consultation[44]. It is the ninth in France, the third in Overseas and the second largest in area after that of Mayotte, in the Indian Ocean. The Marine Natural Park extends from the Martinican coast to the outer limit of its exclusive economic zone and covers an area of 48 900 km². It integrates all of Martinique's marine habitats (mangroves, beaches, islets, seagrasses, coral reefs communities, deep and offshore habitats ...) that bring together remarkable biodiversity at the junction between the Atlantic Ocean and the Caribbean Sea. The sea and the coast also host many activities essential to the economy of Martinique and the quality of life of its inhabitants. The Marine Nature Park aims to know and protect the marine environment, while supporting the sustainable development of the marine activities that depend on it.

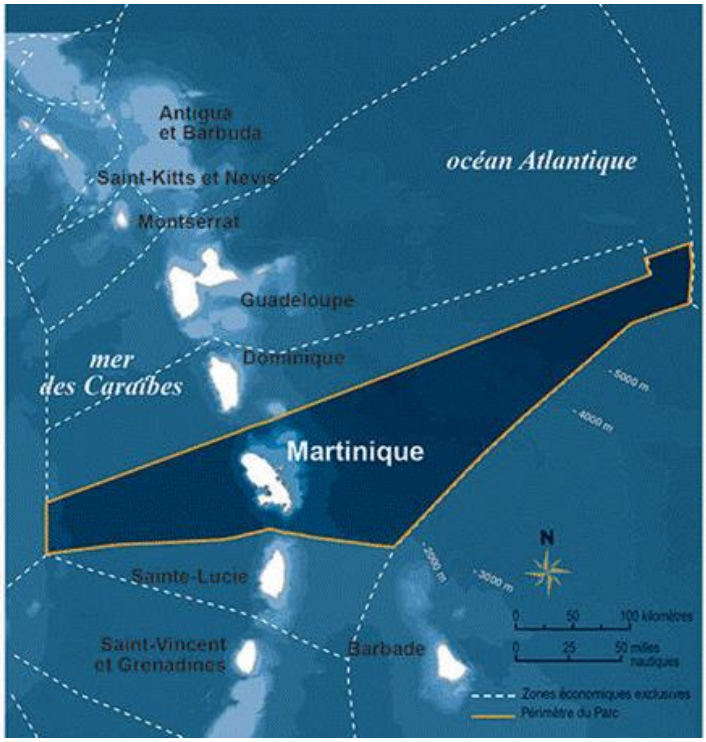


Figure 22 Area covered by the Martinique Marine Natural Park

1.1.1 Global summary

1) Which actors/sectors of activity generate the most competitions?

Internal competition within the SSF sector is a key issue in Martinique. The main reason is the lack of regulation for access to the fishing stocks and fishing grounds. Illegal fishing and recreational are also serious competitors. The sustainability of the sector is threatened by the quality of habitats environment and the main competitors are coastal development and agriculture.

2) What are the main themes of conflict and their characteristics?

[44] https://www.legifrance.gouv.fr/eli/decret/2017/5/5/DEVL1701003D/jo#JORFSCTA000034600785

The main themes of conflict relate to the previously-mentioned actors (conflicts for access to the fishing areas, illegal selling of catches). Pollution of coastal habitats by pesticide used by agriculture led to the ban of fishing areas for commercial fishers. Massive Sargassum algae inflows in the Caribbean over the past years have also impacted the small-scale fisheries.

3) **Are there any new projects and solutions considered to deal with some conflicts of uses?**

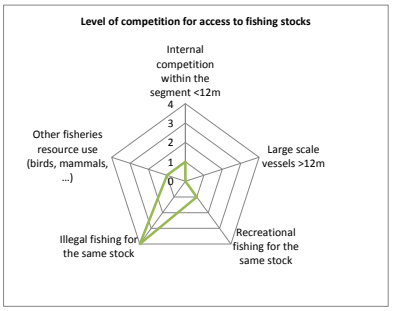
Currently, no solution is within sight to resolve these conflicts except fisher's financial compensation for the prohibited fishing areas due to pesticides.

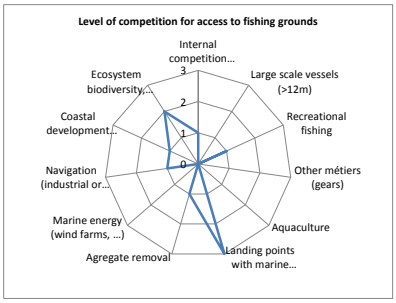
4.3 Situation in French Guiana

The aim of this assessment is the artisanal or small-scale commercial fishing vessels from French Guiana under 12 meters. This segment is composed mainly composed of non-decked vessels with outboard engines called "pirogue", "canots créole" and "canots creoles améliorés". There are also some decked vessels with inboard engine called "tapouille" (see the description of the fleet in task 2.1). The whole fleet operates mainly with drifting nets. The evaluation aims to identify the level of competition of the segment for the access to fishing stocks and grounds with other fleet segments or marine uses and infrastructures.
An experts' panel made of the two fishery researchers taking part in ORFISH project from Ifremer has made a literature review and used its expert knowledge to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others.

Table 8 Interactions Matrix of French Guiana

Internal competition within the segment <12m	1
Large scale vessels >12m	0
Recreational fishing for the same stock	1
Illegal fishing for the same stock	4
Other fisheries resource use (birds, mammals, …)	1
Total	7
Average index per region	1,4
S.D.	1,5
C.V.	108%
Level of competition for access to fishing grounds	Index
Internal competition within the segment (<12m)	1
Large scale vessels (>12m)	0
Recreational fishing	1
Other métiers (gears)	0
Aquaculture	0
Landing points with marine leisure sector	3
Agregate removal	1
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	1
Coastal development and the effect on coastal water quality (pollution)	1
Ecosystem biodiversity, conservation (MPAs)	2
Total	10
Average index per region	0,9
S.D.	0,9
C.V.	104%





4.3.1 Level of competition for access to fishing stocks

Internal competition within the segment (<12m): (Index=1)

Around 120 boats spread on 350 km of coastline, fishing between 1 and 15 m depth. As the continental shelf is large, competition exist but at low level. Fishing capacity is limited threw fishing licenses delivered by the local fishermen committee. There are no other regulations concerning access to the concerned fish stocks.

Other small-scale vessels not in the segment: not concerned

Large scale vessels (>12m): (Index=0)

The large-scale fleet, including shrimps' trawlers exploit completely different species and do not interact with the small scale fleet (figure 24)

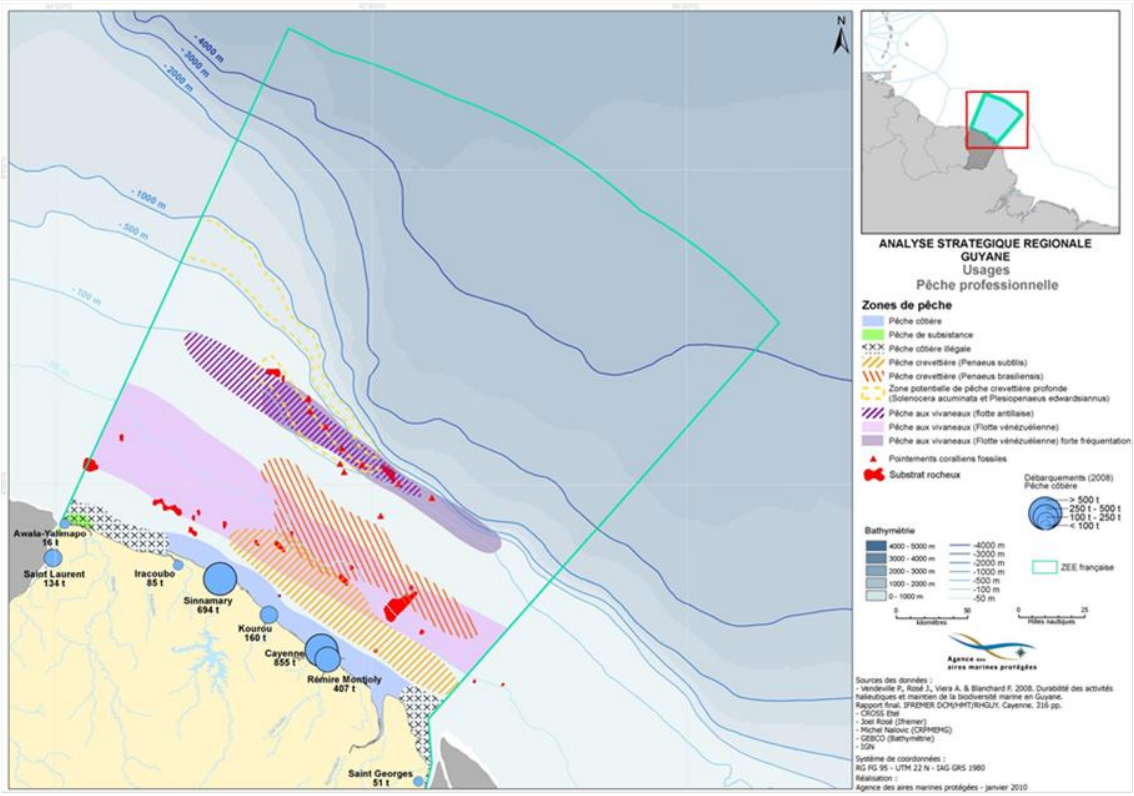


Figure 23 Area covered by the Martinique Marine Natural Park

Recreational fishing for the same stock: (Index=1)

The main species in the professional landings and in the recreational activities (essentially fishing rods operated on the beaches and on boats)[45] are the same (*Cynoscion acoupa*). Two recreational associations exist in F. Guiana but the activity is moderate, mainly during the week-ends and the holidays of the dry season (from August to November).

Illegal fishing for the same stock: (Index=4)

National illegal fishing is observed on the west side of the coastal shelf, and moreover, a very significant foreign illegal fishing has been quantified with as much boats as national legal ones (Levrel, 2012)[46]. (See figure 1).

Other fisheries resource use (birds, mammals, …): (Index=1)

Coastal dolphin schools (*Sotalia guianensis*) are observed (cf. next figure). Their diet is not known but dolphins are predators eating fish and potentially species among those that are fished.

[45] Ifremer-bva. 2008. Enquête relative à la pêche de loisir (récréative et sportive) en mer en France et les DOM, 33 p.
[46] Levrel A., 2012. Estimation de la pêche illégale étrangère en Guyane française. RBE/BIODIVHAL 2012-05.

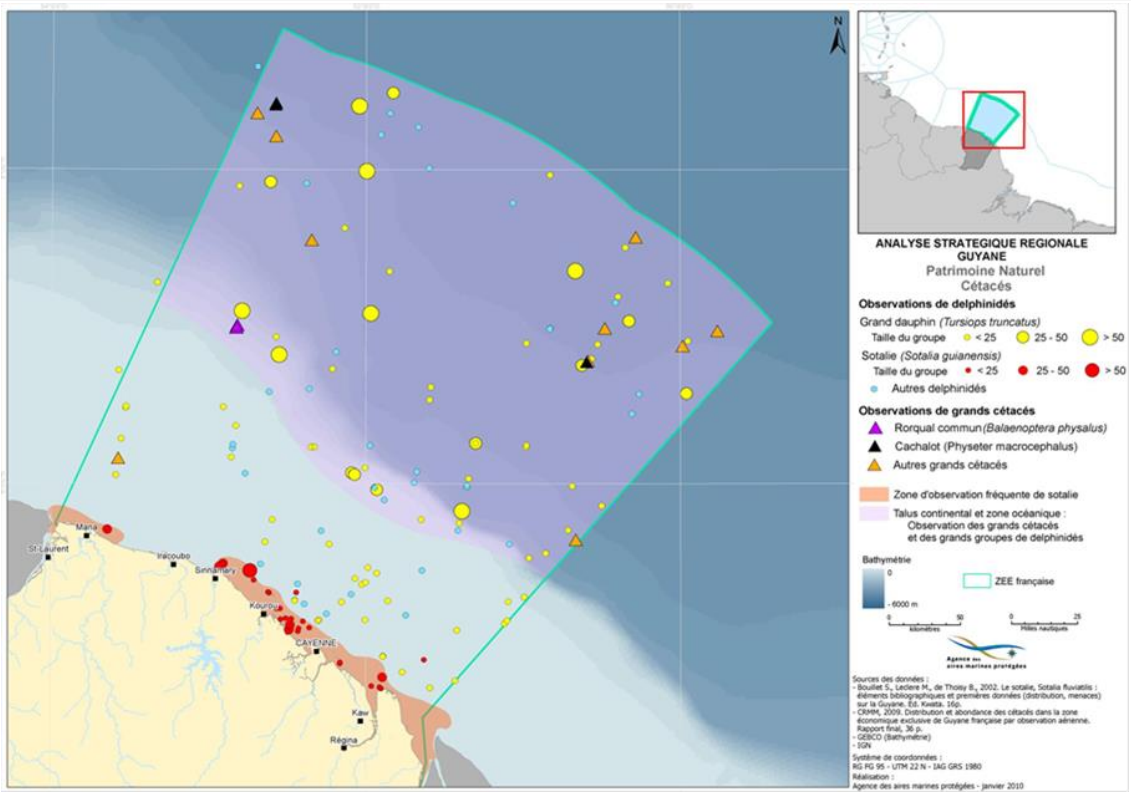


Figure 24 Marine mammals observations. « Analyse stratégique régionale de Guyane », 2009, AAMP.

4.3.2 Level of competition for access to fishing grounds

Internal competition within the segment (<12m): (Index=1)

The spatial competition for access to the fishing grounds can be considered as globally low. However, in the mouth of the two main estuaries of the eastern part of F. Guiana, "Approuage" and "Oiapoque" spatial occupation by the small-scale vessels is often very dense.

Large scale vessels (>12m): (Index=0)

As illustrated in figure 1, large scale vessels (handliners and trawlers) operate deeper than small scale ones, between 20 and 100m depth while small-scale vessels operate between 0 and 10 or 15m depth. As a consequence, there is no spatial competition between small scale and large-scale fleets.

Recreational fishing: (Index=1)

The rare rocky grounds around the "Iles du Salut" and "Grand Connétable" are the main places were recreational fishermen operate as well as some commercial fishermen. See figure 3.

Other métiers (gears): (Index=0)

No other métiers.

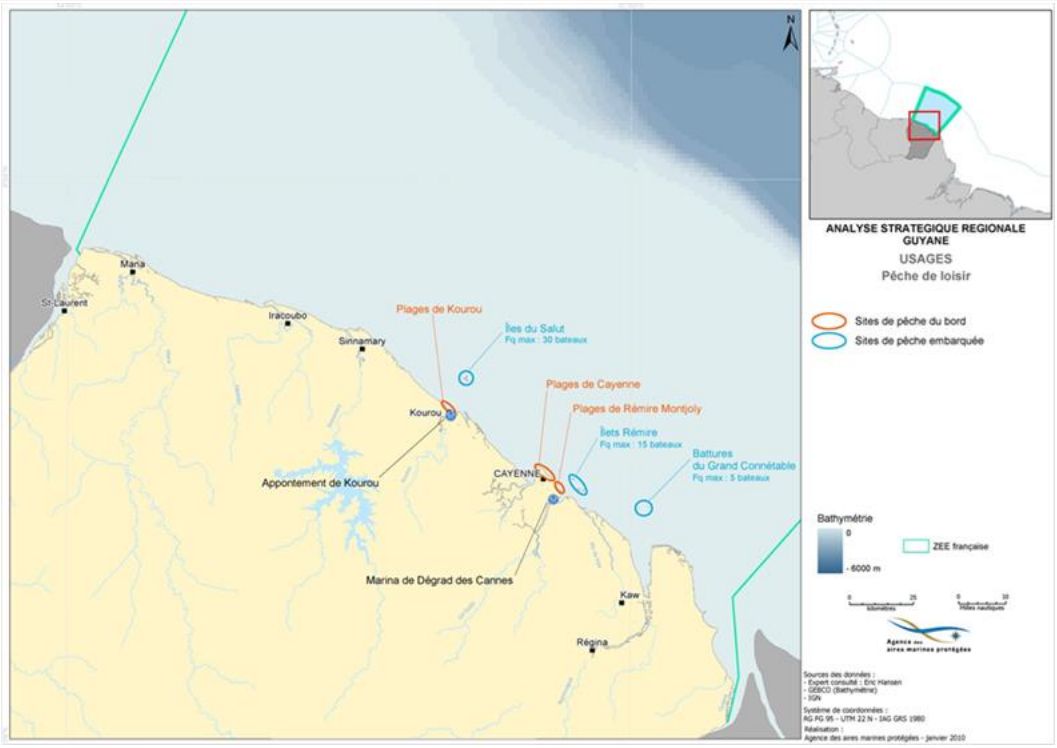


Figure 25 Recreational fishing. « Analyse stratégique régionale de Guyane », 2009, AAMP

Aquaculture: (Index=0)

There is no marine aquaculture in F. Guiana.

Landing points with marine leisure sector: (Index=3)

The harbor infrastructures are scarce in F. Guiana. Landings in some places depend on the high tide time. There are less than 10 landing points for all the small-scale coastal fleet that are sometimes also used by recreational fishermen, so that it is not always easy for landings. The level of interaction can be considered as high.

Aggregate removal: (Index=1)

Permanent dredging in the three estuaries where the industrial harbors are located may punctually be unfavorable for fish on these sites. When the dredge is acting on an area, fishermen can't operate there. The level of interaction is considered as low.

Marine energy (wind farms, …): (Index=0)

No marine energy projects have been launched in F. Guyana so there is no interaction with the small-scale fisheries sector.

Navigation (industrial or leisure): (Index=1)

There are three industrial harbors located in the mouth of estuaries. If interaction may occur in these areas, most of the marine traffic is outside the small-scale fishing area. The interaction can be considered as low.

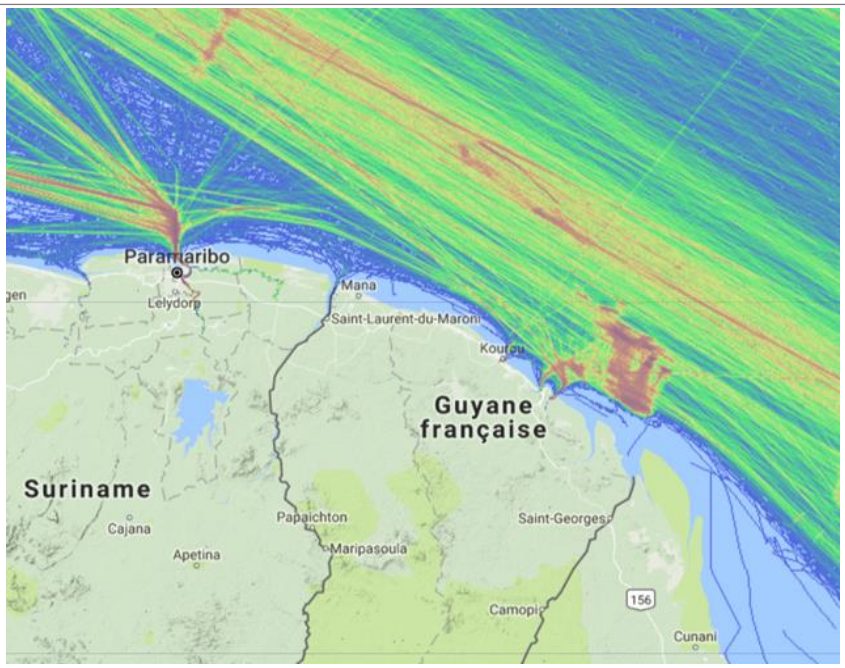


Figure 26 Cumulated vessel traffic around F. Guiana in 2016.
Source: https://www.marinetraffic.com

Coastal development and the effect on coastal water quality (pollution): (Index=1)

Mercury contamination levels stay below the threshold for human consumption and health. Urban areas are growing, as well as agriculture while the water treatments are becoming under calibrated. Hence more often bathing bans on the main urban beaches are observed.

Ecosystem biodiversity, conservation (MPAs): (Index=2)

There is a fishing ban within the perimeter of the "Réserve Naturelle du Grand Connétable" (MPA) that is one of the rare rocky places where high valued commercial species (Giant grouper/*Epinephelus itajara*) are observed. Moreover, during the turtle breeding season, between April and august, large spawning sites are observed, especially in the western part of French Guiana, but not only, and by-catches of turtles are observed with negative impacts for turtles as well as economic one for the fishermen (torn fishing nets). See figures 27 and 28.

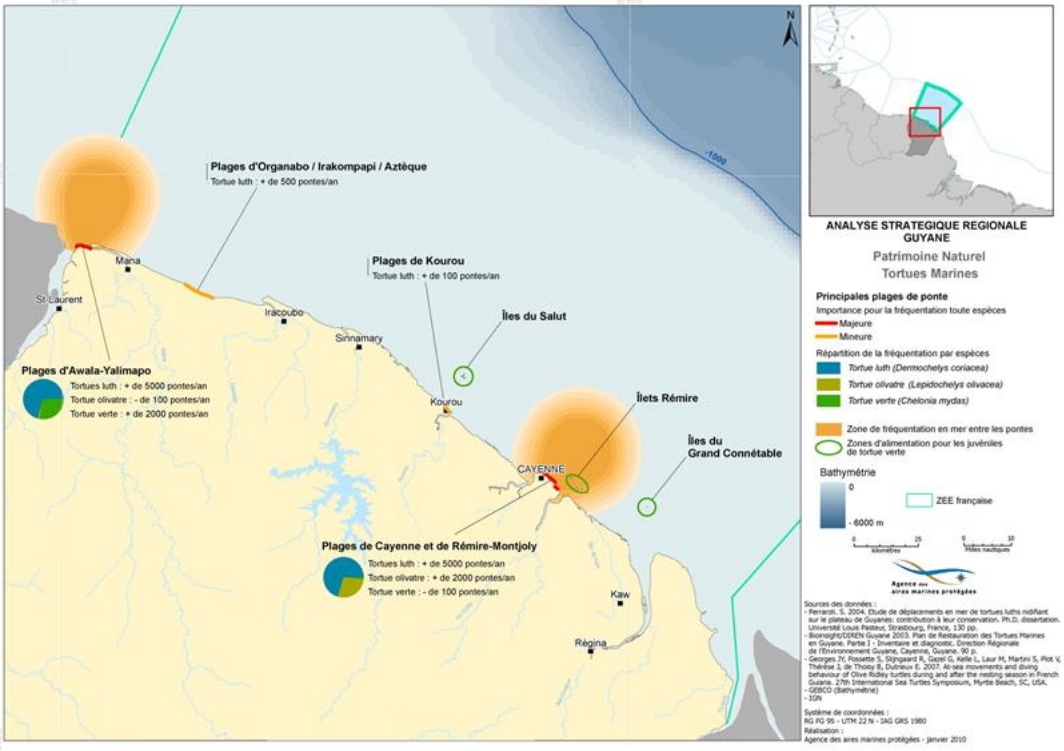


Figure 27 Turtle nesting sites. « Analyse stratégique régionale de Guyane », 2009, AAMP.

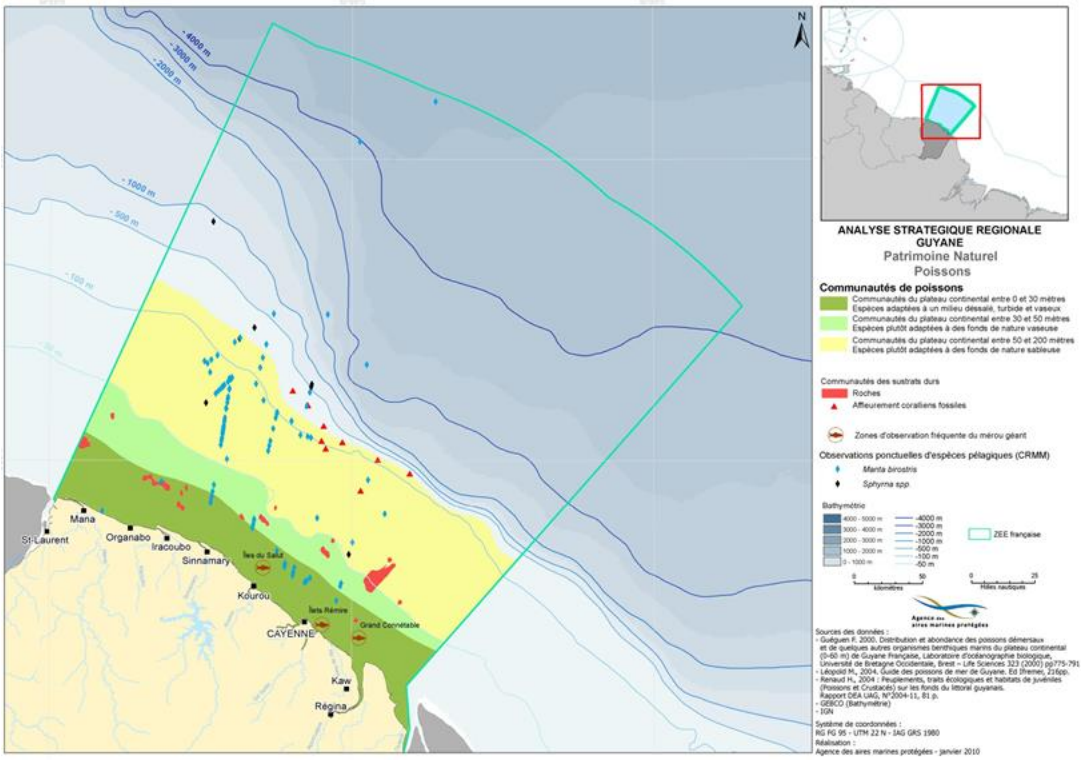


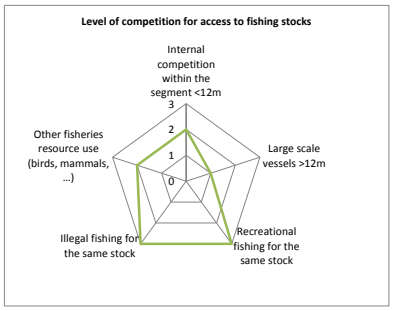
Figure 28 Fish species distribution. « Analyse stratégique régionale de Guyane », 2009, AAMP

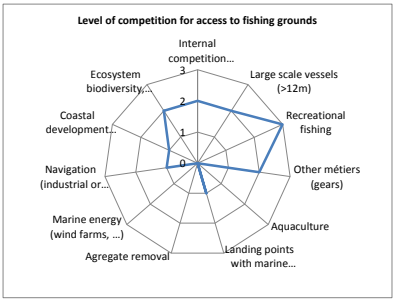
1.2 Situation in Azores

The aim of this activity is to evaluate the competition that affects the small-scale professional fishing boats of Azores Outermost Region. This evaluation aims to identify the level of competition of the segment for the access to fishing stocks and grounds with other fleet segments or marine uses and infrastructures.
A panel made out of three experts, taking part in ORFISH project from the Federation of Fisheries of the Azores and the Regional Directorate of Fisheries has used their personal knowledge to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others. The matrix of interactions is detailed hereafter.

Table 9 Interactions Matrix of the Azores

Level of competition for access to fishing stocks	Index
Internal competition within the segment <12m	2
Large scale vessels >12m	1
Recreational fishing for the same stock	3
Illegal fishing for the same stock	3
Other fisheries resource use (birds, mammals, …)	2
Total	11
Average index per region	2,2
S.D.	0,8
C.V.	38%
Level of competition for access to fishing grounds	**Index**
Internal competition within the segment (<12m)	2
Large scale vessels (>12m)	2
Recreational fishing	3
Other métiers (gears)	2
Aquaculture	0
Landing points with marine leisure sector	1
Agregate removal	0
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	1
Coastal development and the effect on coastal water quality (pollution)	1
Ecosystem biodiversity, conservation (MPAs)	2
Total	14
Average index per region	1,3
S.D.	1,0





4.3.3 Level of competition for access to fishing stocks

In the case of the level of the competition for access to fishing stocks, the panel believes that there is a very high level of competition with the recreational and illegal fishing for the same stock. That might be due to Increase of the parallel economy (illegal) and the will to evade taxes. The Internal competition within the segment (<12m), is medium probably due to the legislation that regulates the fishing areas of the various segments of the fleet. In Azores, the fishing area for tuna fishing is common among the fleet segment <12 and > 12, because it is a pelagic species, so the level of competition with other small-scale vessels is medium. The competition for access to the same stock between the fleet and other fisheries resource use (squid, sea bream, mackerel, ...) is also medium. The Level of competition for access to fishing stocks for large scale vessels (>12m) is low due to the small quota allocated to the Autonomous Region of the Azores for this segment and of the reduced fishing areas.

4.3.4 Level of competition for access to fishing grounds

About the level of competition for access to fishing grounds, there is a medium level of competition within the segment (<12m) and within the large-scale vessels (>12m), because

since we have reduced fishing areas, they are not enough fishing grounds for all the vessels in fleet. This kind of competition is due to the many protected marine areas and UNESCO biosphere reserves (see next figures) established for the Azores, which leads to smaller areas for professional fishing. The use of gill nets and traps causes a medium competition with the art of trolling. The landing points with marine leisure sector are just considered as a competitor with professional fishing in some Azorean ports with reduced berthing, which causes some difficulties in the discharge of the fish.

The navigation of large vessels (leisure and industrial) in the fishing areas, does not have a great impact on the access to the fishing grounds for the professional fishing, nevertheless its passage distances the fish. There is no competition for the access to the fishing grounds for aggregate removal and marine energy. The aquaculture, doesn't compete with the professional fishing because the areas defined for aquaculture don't interfere with this activity (Resolução do Conselho do Governo n.º 2/2018 de 24 de janeiro de 2018).

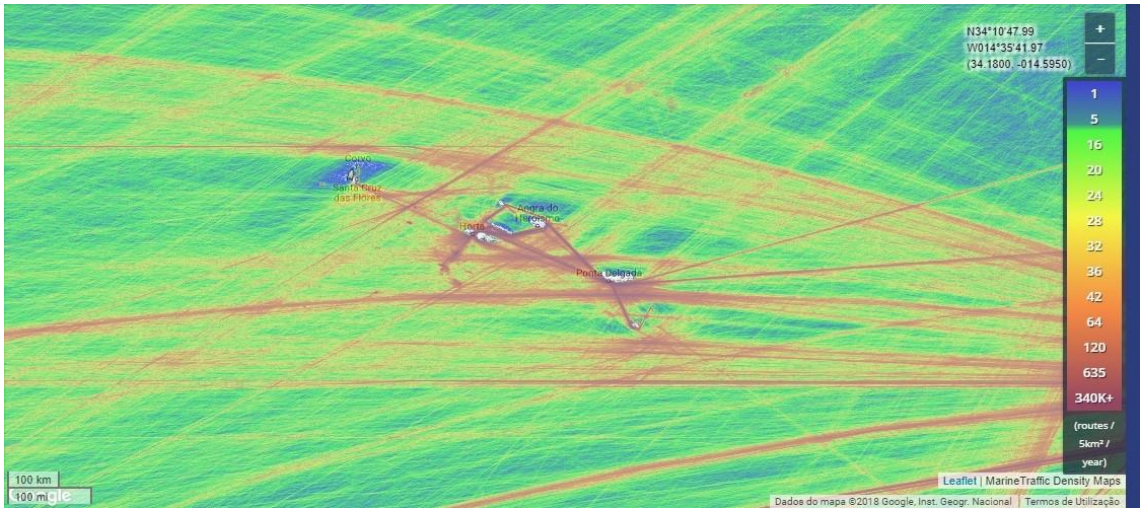


Figure 29 Cumulated vessel traffic around Azores in 2016 (Vessel size (GT<500); Vessel type: passenger vessel)
Source: https://www.marinetraffic.com

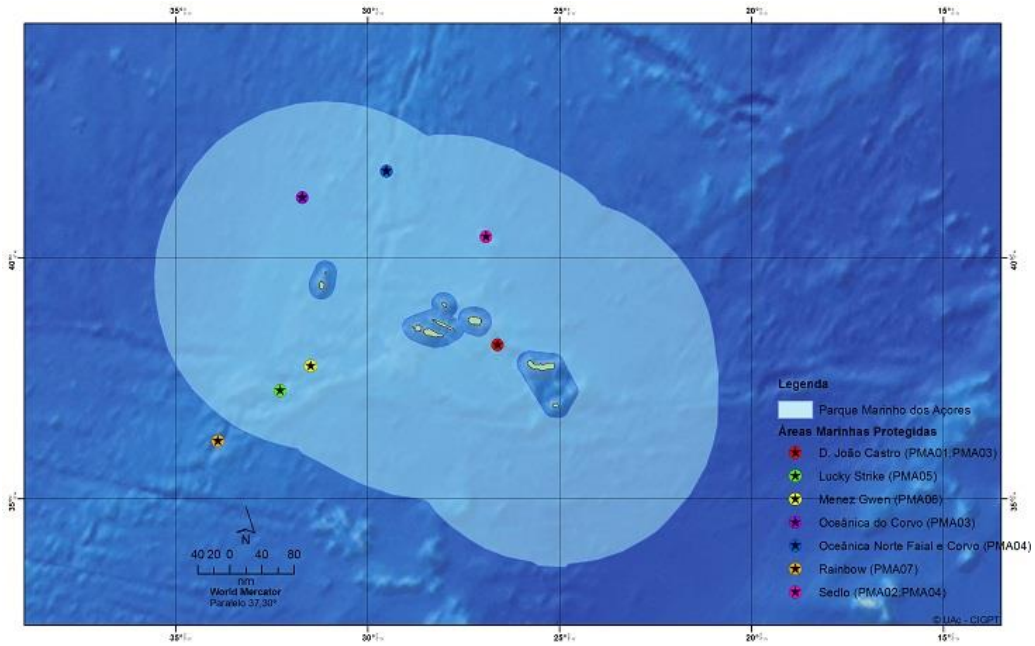


Figure 30 Marine Park of the Azores and Marine Protected Areas
Source: Azores Government Website

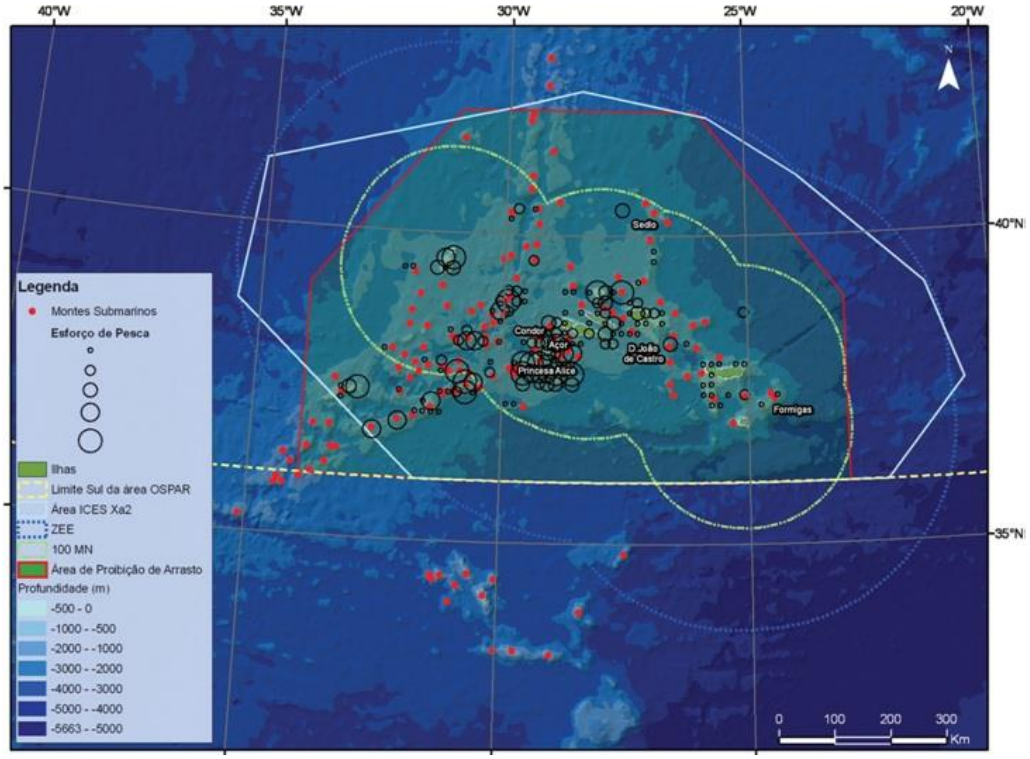


Figure 31 The Azores Ecosystem
Source: ImagDop

In the figure above, are presented in color contrast bathymetry, distribution of seamounts and the key areas for the management (100 miles, EEZ, statistic area ICES Xa2, forbidden area for trawling and the south limits for international committees). Additionally, is also represented the fishing effort directed at demersal species during 2007.

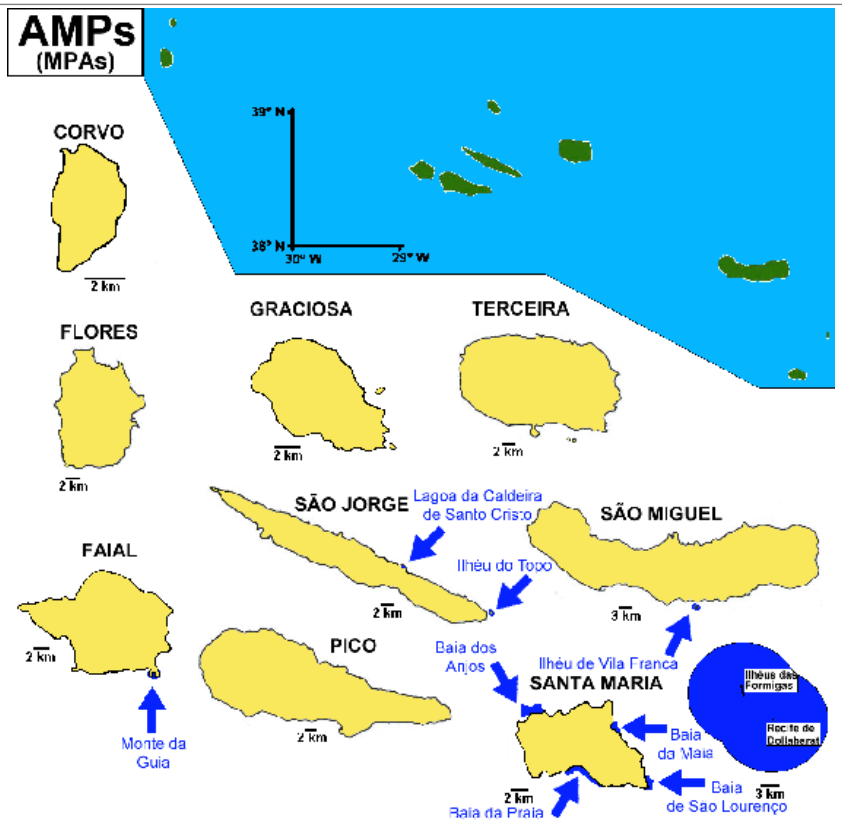


Figure 32 Location of Marine Protected Areas established in the Azores
Source: MARE website

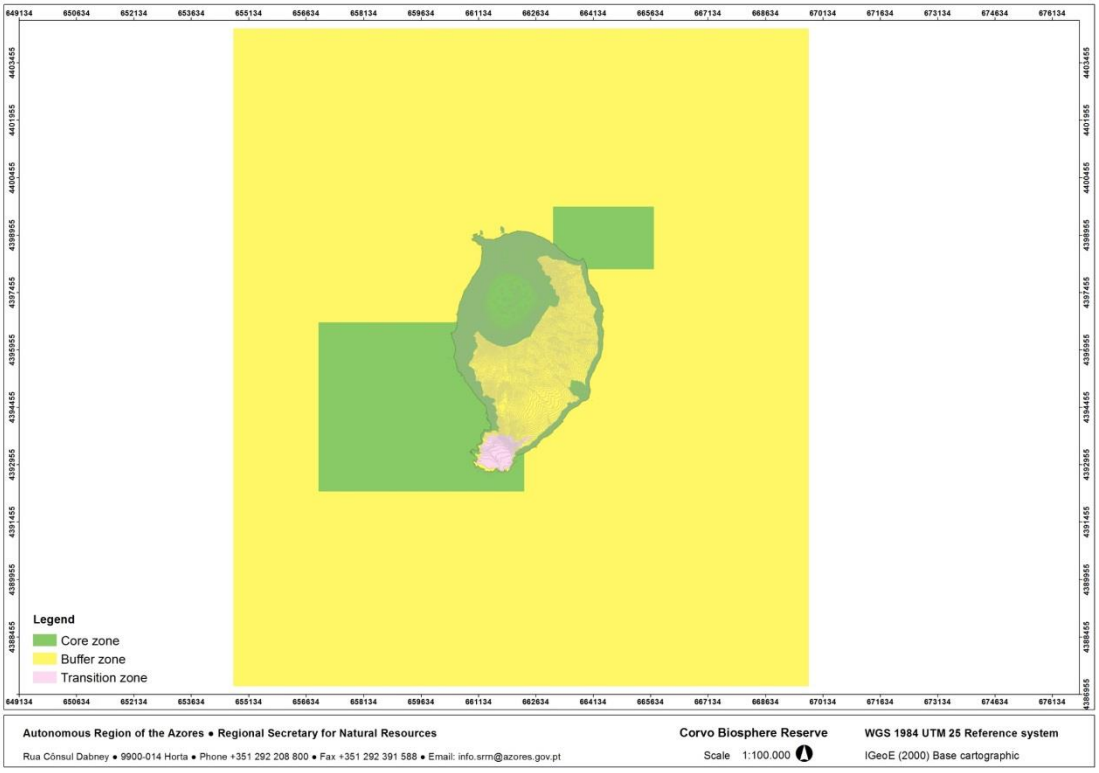


Figure 33 Corvo Biosphere Reserve
Source: Azores Government

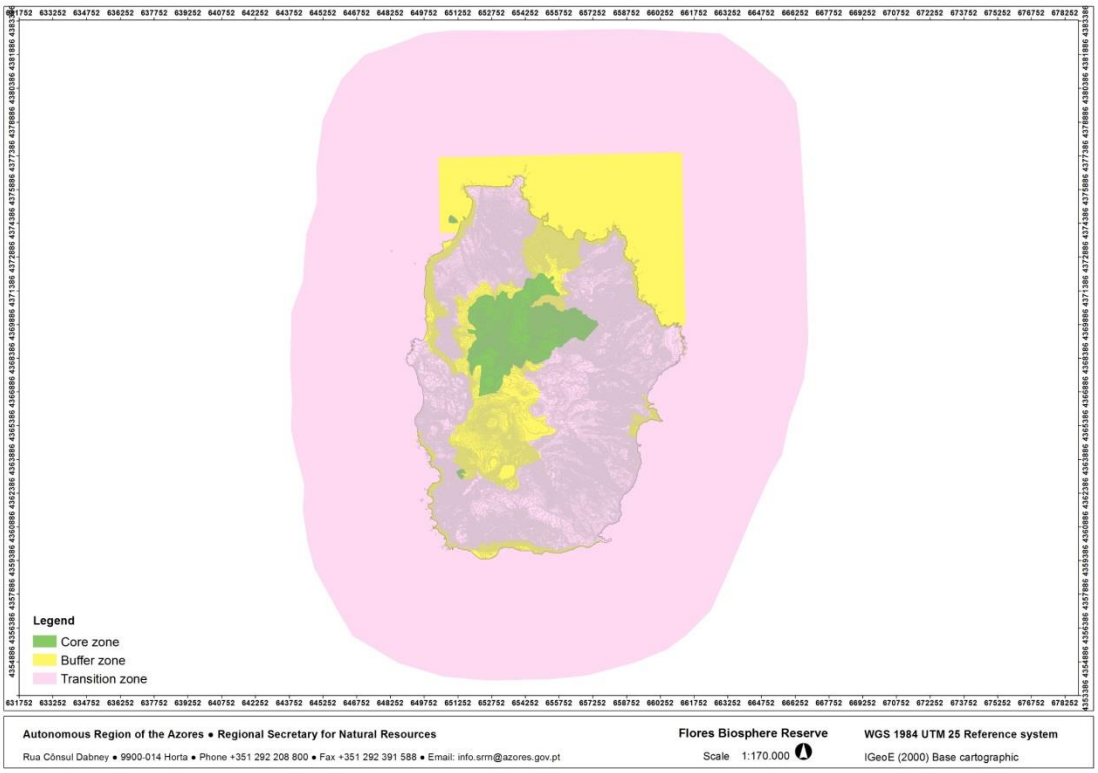


Figure 34 Flores Biosphere Reserve
Source: Azores Government

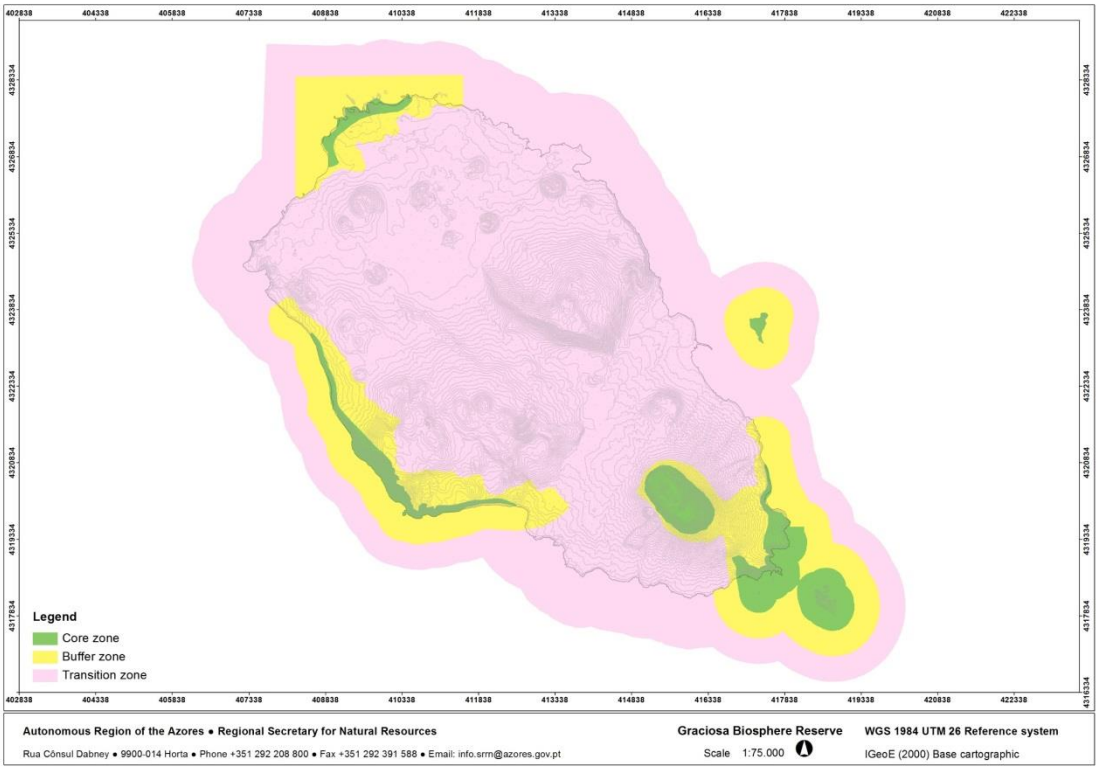


Figure 35 Graciosa Biosphere Reserve
Source: Azores Government

The coastal development and the effect on coastal water quality (pollution) is not very significative in the Azores, but still, the products fertilizers used in agriculture and others (eg. poor sanitation) eventually drain into the sea, polluting the waters. The plastics used on land that fly to the sea are ingested by animals (killing them) and damage the equipment of vessel (which may cause expensive repairs in the vessels).

4.3.5 Global summary

1) Which actors/sectors of activity generate the most competitions?

In the case of the level of the competition for access to fishing stocks, we think there is a very high level of competition with recreational and illegal fishing. Moving to competition for access to fishing grounds, the medium level occurs due to the large protected marine areas and biosphere reserves, so the professional fisherman have a smaller area for their work.

2) What are the main themes of conflict and their characteristics?

Professional fishermen complain about recreational and illegal fishers. It is identified by professionals as one of the main sources of competition. This activity competes with the artisanal fisheries, not only impacting the same resources, but also illegally commercializing their catches.

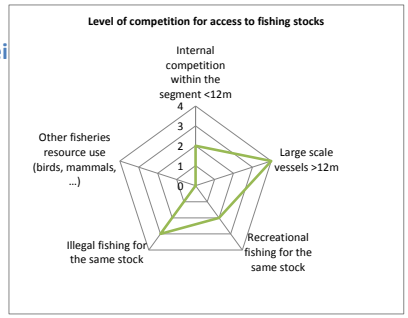
3) Are there any new projects and solutions considered to deal with some conflicts of uses?

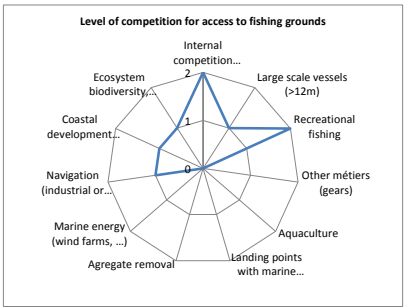
Surveillance resources are considered insufficient.

4.4 Situation in Madeira

The aim of this activity is to evaluate the competition that affects the small-scale commercial fishing vessels of Madeira. This evaluation aims to identify the level of competition of the segment for the access to fishing stocks and grounds with other fleet segments or marine uses and infrastructures.
A panel made out of experts, has used their personal knowledge to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others. The matrix of interactions is detailed hereafter.

Table 10 Interactions matrix of Madei





Level of competition for access to fishing stocks	Index
Internal competition within the segment <12m	2
Large scale vessels >12m	4
Recreational fishing for the same stock	2
Illegal fishing for the same stock	3
Other fisheries resource use (birds, mammals, …)	-
Total	11
Average index per region	2,2
S.D.	1,0
C.V.	44%
Level of competition for access to fishing grounds	Index
Internal competition within the segment (<12m)	2
Large scale vessels (>12m)	1
Recreational fishing	2
Other métiers (gears)	0
Aquaculture	0
Landing points with marine leisure sector	0
Agregate removal	0
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	1
Coastal development and the effect on coastal water quality (pollution)	1
Ecosystem biodiversity, conservation (MPAs)	1
Total	8
Average index per region	0,7
S.D.	0,8
C.V.	108%

4.4.1 Level of competition for access to fishing stocks

Internal competition within the segment (<12m): (Index=2)

Since Madeira is characterized by its narrow insular platform and oligotrophic waters[47][48], the fishing activity focus on specific fish resources, such as tuna, scabbardfish, small pelagic species and demersal species. The fishing sector within this segment mainly targets demersal species such as the common seabream (*P. pagrus*), the parrotfish (*S. cretense*), and others. Small vessels target tuna species and scabbardfish, although most of the fleet targeting these resources have LOA* > 12m. Also, competition may be significant regarding the limpet fishery, targeting both *P. candei* and *P. aspera* species, with reduced number of vessels targeting this resource, but mostly concentrated on the Northwestern coast and Desertas island. Thus, competition within this segment is considered as moderate.
Competition for access to fishing stocks is considerable, especially between April and September, where tuna species, namely bigeye tuna (*Thunnus obesus*), longfin tuna (*Thunnus alalunga*) and skipjack tuna (*K. pelamis*)[49], migrate, passing around the archipelago. Small-scale vessels compete with the large vessels although the biggest rivalry exists between large vessels. Due to their small-sized nature, small-scale vessels do not venture further from the coast, since their size limits the ability to catch and store properly their catches, so direct competition with large vessels is reduced.

Other small-scale vessels not in the segment: not concerned

Large scale vessels (>12m): (Index=4)

The fiercest competition exists within large vessels, especially because the Portuguese tuna fleet capturing it mostly by means of pole and line, locally known as "salto e vara", comprises vessels from Madeira and Azores. Since Azorean vessels venture south to Madeiran waters,

[47] SRA (2014). Estratégia Marinha para a subdivisão da Madeira. Diretiva Quadro Estratégia Marinha. Secretaria Regional do Ambiente e dos Recursos Naturais. 463p.
[48] Caldeira, R. M. A., Groom, S., Miller, P., Pilgrim, D., Nezlin, N. P. (2002). Sea-surface signatures of the island mass effect phenomena around Madeira Island, Northeast Atlantic. Remote Sensing of Environment, (80): 336-360.
[49] SRA (2014). Estratégia Marinha para a subdivisão da Madeira. Diretiva Quadro Estratégia Marinha. Secretaria Regional do Ambiente e dos Recursos Naturais. 463p.

competition is fiercest, with the existence of over 30 ships (>12 m) in the area. Capturing tuna by means of lingering over a large school, vessels compete for such position, being the reason where competition arises. This method, called locally as "segurar a mancha", based on capturing tuna by patiently allowing tuna to aggregate beneath the vessel, which creates a shadow, capturing them after reaching a considerable shoal size[50]. Although partnerships exist between vessels to hold the shoal, competition arises often for the same shoal, especially when more than 1 vessel appears in the same area. Apart from the tuna fleet, the long-standing scabbard fishery is also the target of tough competition. This segment targets the deep-water species black scabbardfish (*A. carbo*) and, as more recent findings indicate, also the sympatric species intermedius scabbardfish (*A. intermedius*). Most of the fleet is comprised of vessels >12 m, which tend to operate in known fishing grounds off Madeira, also venturing south to the Canary Islands and north to the Azores[51]. This resource is captured through horizontal drifting longlines with several thousand hooks spaced by 1-2m, placed at 1000m deep. Since this resource has a high commercial value, a stiff competition exists for fishing area and landing time due to availability of that resource. Considering that this fleet operates far from land and fish for over 2 weeks, the occasion a vessel arrives at port is important in terms of economic return, since if more vessels return at the same time, less valuable the catch will be. On the contrary, if one arrives with none or very few vessels arriving at the same time, more valuable the catch will be. In addition, the small pelagic fishery, locally known as "ruama", targeting blue jack mackerel (*T. picturatus*) and the Atlantic chub mackerel (*S. colias*), although small in numbers, exhibit a certain degree of competition. Thus, a fierce competition is present in this segment, spanning different fisheries.

Recreational fishing for the same stock: (Index=2)

Recreational fishing was an unregulated practice until recent years. In Madeira, an effort was done to control this activity by means of implementing regulation in 2016. Currently, recreational fishermen are obliged to purchase a fishing license, which varies according to the amount of fish one intends to catch in a given period, being possible to acquire monthly or annual licenses.

Illegal fishing for the same stock: (Index=3)

Illegal fishing is one of the main causes regarding stock overexploitation. In Madeira, such episodes occur, being the most frequent ones the scabbardfish fishery bycatch, usual with the deep-water sharks, and catches outside the legal fishing period and minimum size of individuals, very common with the limpet catches.

Other fisheries resource use (birds, mammals, …): not relevant

We can consider this evaluation as non-existent since no other fishing resources are exploited.

4.4.2 Level of competition for access to fishing grounds

Internal competition within the segment (<12m): (Index=2)

[50] Shon, S., Delgado, J. M., Morato, T., Pham, C. K., Zylich, K., Zeller, D., Pauly, D. (2015). Reconstruction of marine fisheries catches for Madeira Island, Portugal from 1950-2010. Fisheries Centre, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada. Working Paper Series, nº52. 13p.

[51] Farias, I., Morales-Nin, B., Lorance, P., Figueiredo, I. (2013). Black scabbardfish, Aphanopus carbo, in the Northeast Atlantic: distribution and hypothetical migratory cycle. Aquatic Living Resources, 26(4): 333-342.

Considering internal competition within the segment (<12m), there is a certain degree of competition (index=2) for vessels to access fishing grounds, especially for those vessels targeting limpets and demersal species.

Large scale vessels (>12m): (Index=1)

There exists competition with the large-scale vessels (>12m) but it is limited (Index=1). It is mainly observed in the scabbardfish fleet, since several areas are known to possess more fish than others. Apart from this segment, the tuna fleet does not compete for a specific area as much as the stock itself and caught volume.

Recreational fishing: (Index=2):

Other métiers (gears): *(Index=2)*

Regarding competition with other métiers, these do not differ significantly within the same fleet segment, especially within the small pelagic and scabbardfish fishery since the methods are the same no matter the vessel size, although a note worth mentioning is that occasionally, regarding tuna, small vessels chose to catch fish with horizontal longlines instead of the pole and line method. This probably is related to the inability that a small vessel has to hold a large shoal of tunas, since it requires days over the shoal and small vessels do not have the capacity to sustain the crew that long and also due to limited fuel consumption, although may occur but only in association with other vessel.

Aquaculture: *(Index=0)*

The fishing industry has never complained about aquaculture companies, nor does it compete directly with commercial fisheries (index=0). Aquaculture in Madeira is present through 2 companies, both producing gilthead seabream (*S. aurata*) in offshore sea cages, which does not compete with any wild population in terms of market share. Marine aquaculture in the Autonomous Region of Madeira is characterized by the use of open-sea culture cages for intensive fish production. This system is best suited to local physical and environmental conditions, considering the lack of adequate space in the terrestrial zone and the characteristics of marine waters, low productivity (oligotrophic) and average winter temperatures significantly higher than continental Europe. With a production of around 450 tonnes per year, about half of the national production, aquaculture in Madeira is undergoing a period of expansion. Currently there are two companies in business, dedicated to the production of Guilthead seabream (Sparus aurata), but four more are finalizing the licensing processes. The Madeiran government has been investing in aquaculture research, supporting the Calheta Mariculture Center (CMC) projects. The CMC is a research centre focused on the production of local species and providing technical support to fish farms. This has been done through the extension of its technical teams, training at various levels and the production of juveniles provided to private fish farmers.[52]

Table 11 Evolution of the aquaculture production in Madeira

	2010	2011	2012	2013	2014	2015
Quantity (t)	437	168	316	527	621	429
Value (1 000 €)	1 900	834	1 556	2 555	2 529	1 718

Source: European Parliament

Landing points with marine leisure sector: (Index=0)

[52] http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/601978/IPOL_IDA(2017)601978_EN.pdf

When we look at competition for landing points with marine leisure sector, marinas and other leisure areas do not interfere with any commercial activity since many, if not all, are located separately from the ports where commercial fish is landed (Index=0)

Aggregate removal and marine energy (wind farms, …): (Index=0)

Aggregate removal is not reported in Madeira (Index=0) and thus far, no marine energy structures are in place (Index=0).

Navigation (industrial or leisure): (Index=1)

For navigation (industrial or leisure), competition is spatially restricted to harbour entrances and regular passenger ferry navigation (Index=1).

Coastal development and the effect on coastal water quality (pollution): (Index=1)

Regarding coastal development and the effect on coastal water quality (pollution), land-originated pollution and marine and coastal deterioration were identified as counterproductive factors to fishing[53]. The government is responsible for maintaining all port structures, although some renovations are required to continue to provide modern facilities to the fishing sector. In this regard, although some investment is being poured onto port facilities, such as the renovation of Porto Moniz harbour in 2017 and the Caniçal harbour this year (largest port in terms of landed commodities), the largest port in terms of fish landed, Funchal harbour, is lacking that much-needed renovation, since those facilities data back to the 70's and 80's. Apart from that, as public investments were being made to modernize infrastructures and Madeira's economy during the 90's and 2000's, in parallel, the government made huge investments in sewage treatment plants across the island, following the previously-mentioned trend. Finally, other issues regarding pollution of coastal waters are considered residual, with sporadic events of accumulation of man-made debris in some areas. The index of competition is considered as low (Index=1)

Ecosystem biodiversity, conservation (MPAs): *(Index=1)*

Although low, the level of competition with ecosystem biodiversity, conservation (MPAs will increase in the future with the increase of MPA's. Madeira contributes to the marine protection of the Macaronesia with six relevant nature reserves. None of them belong to the OSPAR network of marine protected areas. Up to now the only. Macaronesia archipelago part of OSPAR is the Azores

4.4.3 Global summary

1) Which actors/sectors of activity generate the most competitions?

Currently, the tuna fishing sector generates more internal competition due to fleet size and commercial value of the target species. In addition, the seasonal nature of the fishery, which only occurs between April and September, especially for large vessels (>12m), since small vessels can continue fishing due to their smaller operating costs, is an added competition factor which fuels further rivalry.

2) What are the main themes of conflict and their characteristics?

[53] A reference will be quoted soon

The main themes of conflict relate to the previously-mentioned segment. Since within the tuna fishery high sums of money are involved, the conflicts arise due to selling prices and presence on top a shoal of tuna. Regarding selling prices, these are quite common but occur in a normal negotiation fashion, varying according the buyer and/or some buying clauses on the contract. Considering confrontations at sea over shoals of tuna, many have been observed between vessels, even occurring several collisions at sea, although no vessel has been sunk as a result of these confrontations.

3) **Are there any new projects and solutions considered to deal with some conflicts of uses?**

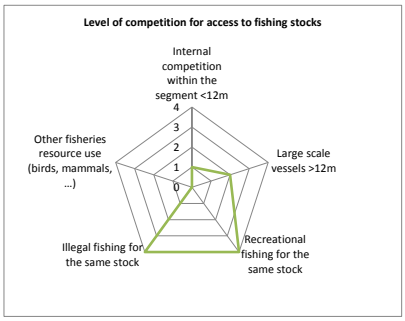
Currently, no solution is within sight to resolve these conflicts. "Trade wars" will always occur since it is within the nature of a free market. Considering collisions at sea, none has been found to happen on purpose, so only increased precaution in sea maneuvers can mitigate this issue, although each situation requires specific solutions.

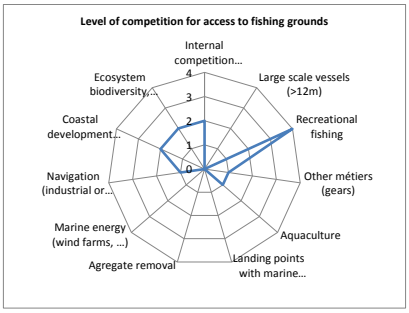
4.5 Situation in Canaries

The aim of this evaluation is the artisanal or small-scale professional fishing boats at Canary Islands (from now on, 'the segment'). The evaluation aims to identify the level of competition of the segment for the access to fishing stocks and grounds with other fleet segments or marine uses and infrastructures. An expert's panel made of the four fishery researchers taking part in ORFISH project from the Canary Islands Lab at Tenerife of the Spanish Institute of Oceanography has made a literature review and used its expert knowledge to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others. The matrix of interactions is detailed hereafter.

Table 12 Interactions matrix of Canaries

Level of competition for access to fishing stocks	Index
Internal competition within the segment <12m	1
Large scale vessels >12m	2
Recreational fishing for the same stock	4
Illegal fishing for the same stock	4
Other fisheries resource use (birds, mammals, …)	-
Total	11
Average index per region	2,2
S.D.	1,5
C.V.	68%
Level of competition for access to fishing grounds	**Index**
Internal competition within the segment (<12m)	2
Large scale vessels (>12m)	0
Recreational fishing	4
Other métiers (gears)	1
Aquaculture	1
Landing points with marine leisure sector	0
Agregate removal	0
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	1
Coastal development and the effect on coastal water quality (pollution)	2
Ecosystem biodiversity, conservation (MPAs)	2
Total	13
Average index per region	1,2
S.D.	1,3
C.V.	106%





4.5.1 Level of competition for access to fishing stocks

Explanations:

In the case of the level of the competition for access to fishing stocks, the panel has found a very high level of competition with large scale vessels (larger than 12 m), recreational and illegal fishing, while internal competition within the segment is low. Competition with other small-scale vessels not in the segment was not evaluated since there are none, the same happening with other fisheries resource's uses, which don't exist.

Tunafishing large-scale vessels have a very high degree of competition with small-scale vessels for the access to tunafish stocks, with a seasonal pattern depending on stock availability. *Thunnus thynnus* and *Thunnus alalunga* catches are restricted by EU TACs, meaning a worsening of competition at seasonal scale. This TAC, in the case of *T. thynnus*, is disproportionally low compared to tunafish purse seine fishing at mainland Spain[54]. Furthermore, large scale vessels have a certain degree of competition (medium level) among them for tunafish, not as intensive as that one showed between large-scale and small-scale vessels, because they associate among them achieving certain degree of organization. The vessels take turns at fishing maintaining the "mancha"(big tunafish shoal) well spotted[55 56 57 58].

About competition with recreational and illegal fishing, artisanal professional fishers identify these factors as ones of the main sources of impact on stocks overexploitation, often using the same kind of boats and gears, but technically better equipped, worsen by an insufficient surveillance and inadequate regulation (Santamaría *et al.* 2001[59], GEPETO 2014[60], Jiménez Navarro *et al.* 2014[61]). Figure 1 shows the proportion between professional and recreational fishing vessels by harbor at Tenerife Island (Jiménez Navarro *et al.* 2014[62], Jiménez *et al.* 2017[63]). It's also one of the main problems identified at found by Corral *et al.* at their study about participatory artisanal fisheries management in islands (Corral and Manrique de Lara 2017)[64].

[54] Brito A., A. Rodríguez, O. Monterroso, M. Rodríguez, R. Riera, O. Pérez, E. Ramos y O. Álvarez. "Evaluación preliminar del impacto ambiental de la pesca de atún rojo (Thunnus thynnus) por parte de la flota pesquera con base en puertos de la Comunidad Autónoma de Canarias, en comparación con el resto de flotas nacionales". Julio 2017. Estudio técnico 2017-16: 51 pp.

[55] Corral, S. and D.R. Manrique de Lara. 2017. "Participatory artisanal fisheries management in islands: Application to the Canary Islands (Spain)". Marine Policy, 81: 45-52.

[56] Ibid.

[57] Ibid.

[58] Delgado de Molina, A., E. Rodríguez Marín, R. Delgado de Molina and J.C. Santana. 2014. "Atlantic bluefin tuna (*Thunnus thynnus*) fishery in the Canary Islands (Linnaeus, 1758)". SCRS/2013/145, Collect. Vol. Sci. Pap. ICCAT, 70(2): 499-510.

[59] Santamaría, M.T.G., E. Balguerías, J.F. González, P. Pascual, J.A. Díaz, E. González, M. Suárez, A. Fernández and M.A. González. 2001. "Final Report of A pilot study for estimation of data from local fisheries in the Canary Islands". Study Contract UE 00/022: 464 pp.

[60] GEPETO. 2014. "Propuestas Conjuntas de Unidades y Planes de Gestión. Sector Artesanal Tenerife-Administraciones Pesqueras-Investigadores": 4 pp.

[61] Jiménez Navarro, S., Mª Teresa García Santamaría, Noemí Villegas Díaz y José F. González Jiménez. 2014. "II. Encuestas de percepción del estado de las pesquerías artesanales en Tenerife según sector". GEPETO: 34 pp.

[62] Ibid.

[63] Jiménez, S., M.T.G. Santamaría, N. Villegas, J.F. González y J.M. Falcón. 2017. "Descripción y evolución de las infraestructuras portuarias y flota artesanal de Tenerife". Vieraea, 45: 159-180.

[64] Ibid.

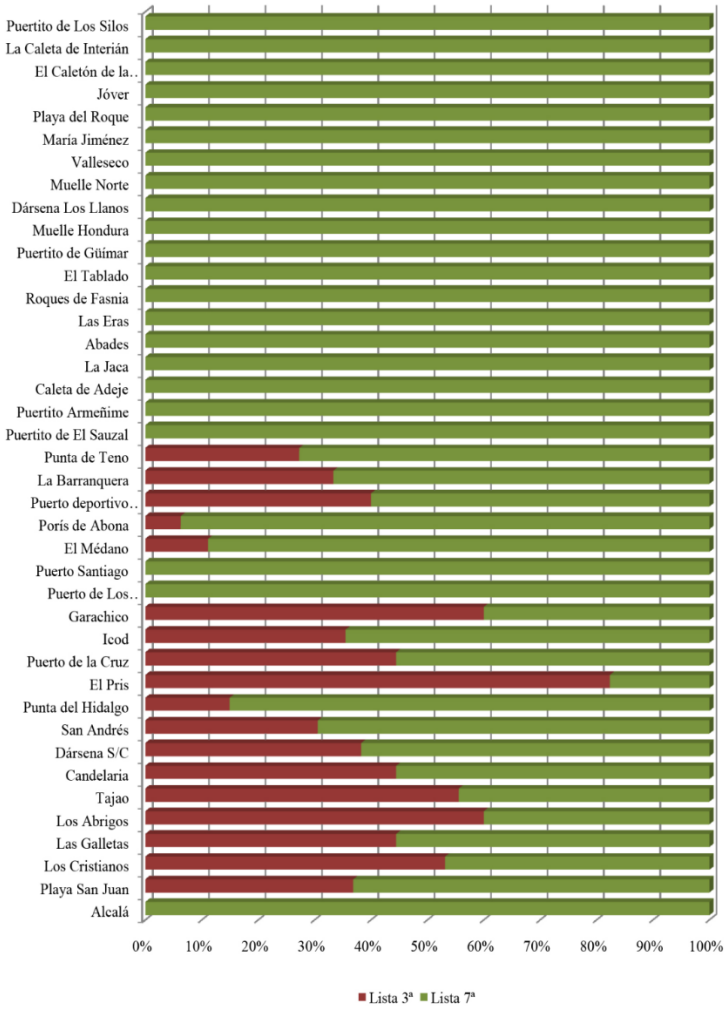


Figure 36 Proportion between professional and recreational fishing vessels by harbor at Tenerife Island
(Jiménez Navarro et al. 2014, Jiménez et al. 2017)

Concerning other fisheries resource use (birds, mammals, …), we can consider this valuation is overruled since there is a lack of other fisheries resource use.

4.5.2 Level of competition for access to fishing grounds

Moving to competition for access to fishing grounds, the higher level occurs with recreational fishery. Professional fishers complain about recreational fishers pursuing them and trying to discover their fishing spots. As it was already mentioned above, it is identified by professionals as one of the main sources of competence.

A medium level of competition is identified with conservation areas, with coastal development and the effect on coastal water quality (pollution), and internally within the segment. Marine Protected Areas in general are preserving part of fishing grounds and this is seen as positive by part of the sector, but also as a direct cause of grounds reduction by other parts of the sector (Martín-Sosa and Jiménez 2016) [65]. Field work in the frame of Marine Reserves of Fishery Interest and of INDEMARES project has verified that MPAs setting up affects to certain extent

[65] Martín-Sosa, P. y S. Jiménez. 2016. "Informe técnico sobre conclusiones de la reunión mantenida en el Centro Oceanográfico de Canarias con el sector pesquero de Lanzarote antes cuestiones de la Orden AAA/2536/2015 de 30 de noviembre que regula las artes y modalidades de pesca marítima en el caladero nacional canario con las que no están de acuerdo". Instituto Español de Oceanografía: 7 pp.

to spatial distribution of fishing effort (Martín-Sosa 2017[66]). Level of competition will increase in the future with the increasing area preserved for protection. In addition, land originated pollution, and marine and coastal deterioration were identified as counterproductive factors at GEPETO project (GEPETO 2014) and at the study about the participatory artisanal fisheries management in islands (Corral and Manrique de Lara 2017) respectively. Coastal infrastructures development was also a fishing sector complaint from the fishing sector at Lanzarote (Martín-Sosa and Jiménez 2016). Although it has not been identified at reviewed literature, the expert knowledge consequence of a vast field experience with fishing sector tells the authors there is certain degree of internal competition within the segment (vessels shorter than 12 m).

The competition with other métiers, aquaculture and navigation is low. In the case of other métiers, the level is low ought to the very reduced number of fishing vessels devoted to other métiers out of the segment. A longliner fishing at Canary Islands seamounts highly competes with vessels within the segment (IEO 2013a[67], IEO 2013b[68]), but although the level of competition is high, the number of vessels out of the segment competing is very low. Aquaculture infrastructure, at local level, brings about complaints of certain parties of fishing sector since it reduces their fishing grounds (Martín-Sosa and Jiménez 2016). Navigation results in a competition spatially restricted to harbor entrances and regular passenger ferry navigation (Martín-Sosa and Jiménez 2016).

No competition for the access to the fishing grounds is found with large-scale vessels, landing points with marine leisure sector, aggregate removal, marine energy infrastructure, as well as a lack of competition is found internally within the segment of vessels larger than 12 m. The competition for the stocks does not extend to the grounds for tunafishing. There is a traditional respect about the turns in fishing the spotted tunafish shoals (Corral and Manrique de Lara 2017, Díaz de La Paz *et al.* 2017, Brito *et al.* 2017, Delgado de Molina *et al.* 2014).

The competition of the segment with larger than 12 m vessels for the stocks does not extend to the grounds for tunafishing. The fact of having different fishing techniques (large vessels maintaining shoals spotted, small vessels freely) geographically splits the two kinds of vessels (larger and smaller than 12 m) (Corral and Manrique de Lara 2017, Díaz de La Paz *et al.* 2017, Brito *et al.* 2017).

Competition dealing with landing points with marine leisure sector was not identified as a problem within the frame of GEPETO project, nor in reviewed literature (Santamaría *et al.* 2001, GEPETO 2014, Jiménez Navarro *et al.* 2014, Corral and Manrique de Lara 2017). Finally, the access of the segment to the fishing grounds is not currently impaired by neither aggregate removal (sand, oil or gas extraction) nor marine energy (wind farms, …) infrastructures, this not being a hurdle for the appearance of decrements in the future for the segment access to the fishing grounds.

4.5.3 Global summary

1) Which actors/sectors of activity generate the most competitions?

[66] Martín-Sosa, P. 2017. "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 Canarias": 71-104. En: Afonso-Carrillo, J. (ed.). 2017. Investigando el mar: Viaje al planeta agua. Actas XII Semana Científica Telesforo Bravo, Instituto de Estudios Hispánicos de Canarias, Puerto de La Cruz, Santa Cruz de Tenerife: 202 pp.

[67] IEO. 2013. "Caracterización del Sur de Fuerteventura". Informe del Instituto Español de Oceanografía-Centro Oceanográfico de Canarias. Proyecto LIFE+ INDEMARES (LIFE07/NAT/E/000732). Coordinación: Fundación Biodiversidad, Madrid: 329 pp. http://www.repositorio.ieo.es/e-ieo/handle/10508/1758.

[68] IEO. 2013. "Caracterización del Banco de La Concepción". Informe del Instituto Español de Oceanografía-Centro Oceanográfico de Canarias. Proyecto LIFE+ INDEMARES (LIFE07/NAT/E/000732). Coordinación: Fundación Biodiversidad, Madrid: 278 pp. http://www.repositorio.ieo.es/e-ieo/handle/10508/1757

In the case of the level of the competition for access to fishing stocks, the panel has found a very high level of competition with large scale vessels (larger than 12 m), recreational and illegal fishing. Moving to competition for access to fishing grounds, the higher level occurs with recreational fishery.

2) **What are the main themes of conflict and their characteristics?**

Professional fishers complain about recreational fishers pursuing them and trying to discover their fishing spots. It is identified by professionals as one of the main sources of competence. The other main theme of conflict is with illegal fishing. This activity competes with the artisanal fisheries, not only impacting the same resources, but also illegally commercializing their catches.
Moreover, tunafishing large-scale vessels have a very high degree of competition with small-scale vessels for the access to tunafish stocks, with a seasonal pattern depending on stock availability. *Thunnus thynnus* and *Thunnus alalunga* catches are restricted by EU TACs, meaning a worsening of competition at seasonal scale.

3) **Are there any new projects and solutions considered to deal with some conflicts of uses?**

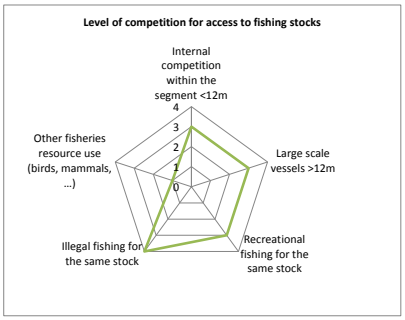
No, there aren't at all. Surveillance resources are always insufficient, and no projects exist to tackling the competence for the tunafishing stocks. The fishing sector tries to deal with this problem internally.

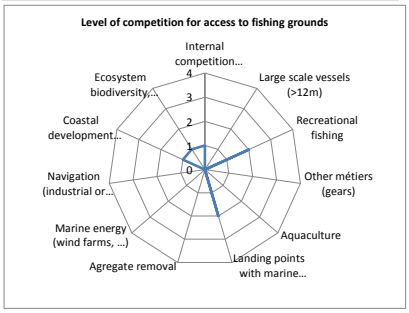
1.3 Situation in Mayotte

The aim of this evaluation is the small-scale commercial fishing vessels fleet from Mayotte. It is composed of 140 undecked boats <10m with outboard engines (from 1x25 to 2x40horsepower), targeting pelagic resources (skipjack, yellowfin tuna…) on free schools or around the ten MFADs anchored around the barrier reef, or targeting demersal resources (snappers, groupers, trevallies…) neer the barrier reef or on the outer shallow reefs in the Mozambique channel. The trips are usually daily but can reach 4-5 days for the fleets operating on the outer reefs. Most of the fishing activities are operated with hand-lines, a few boats use nets to target small pelagic fish. The fleet is also composed of 3 longliners <10m targeting swordfish and tuna (bigeye and yellowfin tuna) within the 20 NM around the barrier reef, above 1800m deep grounds. The trips usually last 2 or 3 nights. Those fleets coexist with a fleet of subsistence, non-commercial fishing boats composed of around 350 similar undecked boats targeting the same resources with hand lines and nets, and around 700 pirogues, exploiting inner lagoon and barrier reef demersal resources. Mayotte EEZ is also exploited by French, Spanish and Seychelles purse-seiners targeting skipjack, yellowfin and bigeye tuna.
This competition assessment has been held by the fish and aquaculture project manager of the Mayotte natural marine park, part of the French agency for biodiversity. The natural marine park is, among other projects, in charge of fisheries data collection in Mayotte, in collaboration with the French research centers (Ifremer and IRD). The matrix of interactions is detailed hereafter.

Table 13 Interactions Matrix of Mayotte

Level of competition for access to fishing stocks	Index
Internal competition within the segment <12m	3
Large scale vessels >12m	3
Recreational fishing for the same stock	3
Illegal fishing for the same stock	4
Other fisheries resource use (birds, mammals, …)	1
Total	14
Average index per region	2,8
S.D.	1,1
C.V.	39%
Level of competition for access to fishing grounds	Index
Internal competition within the segment (<12m)	1
Large scale vessels (>12m)	0
Recreational fishing	2
Other métiers (gears)	0
Aquaculture	0
Landing points with marine leisure sector	2
Agregate removal	0
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	0
Coastal development and the effect on coastal water quality (pollution)	1
Ecosystem biodiversity, conservation (MPAs)	1
Total	7
Average index per region	0,6
S.D.	0,8
C.V.	127%





4.5.4 Level of competition for access to fishing stocks

Internal competition within the segment (<12m): (Index=3)

The level of competition for access to fishing resources within the commercial fleet has been estimated as high. Despite the lack of historical data on fisheries, it appears that demersal resources on coastal reefs and barrier reefs have drastically dropped over the last 20 years according to fishermen. Today, a very limited number of commercial fishermen rely on coastal demersal resources, most of them turned to pelagic resources or demersal stocks of outer reefs, which are also told to be declining. There does not seem to be a high level of competition for pelagic resources within the segment, except for the access to moored FAD which can be considered as a competition for access to fishing grounds (see below). Longline fishermen have however recently reported robbery of their catches and equipment, supposedly from hand-line fishermen. Except for this isolated case of robbery, this high level of competition for resources does not appear to generate real conflicts between fishermen.

Large scale vessels (>12m): (Index=3)

The level of competition for resources with large scale vessels is considered as high. A fleet of 30-40 purse seiners targeting tuna operate within Mayotte EEZ during three months of their Indian Ocean campaign. Those fleets have a very common use of drifting fishing aggregating devices (DFAD) in their whole fishing area. The use of DFAD is told by local fishermen to disrupt tuna school's migration paths and to reduce the attraction power of the island reefs, therefore reducing tuna catchability.

Recreational and subsistence fishing for the same stock: (Index=3)

The level of competition for access to fishing resources with recreational and subsistence fisheries is considered to be significant (Index=3). Coastal resources are thriving because of the high fishing pressure by all fisheries including subsistence / recreational fisheries. As resources seem to be declining, competition is considered as high, but does not seem to be a source of conflicts.

Illegal fishing for the same stock: (Index=3)

Illegal fishing activities in Mayotte territory are pretty scarce. It concerns mainly underwater fishing in the lagoon, fishing in "Passe-en-S" no-take zone, and net fishing above coral reefs which are forbidden by local decree. Those activities do not compete much with commercial fisheries (low to medium level). However, illegal marketing of fishing catches by unregistered fishermen and resellers is very important in Mayotte, and is a source of big competition and conflicts with regular fishermen, due to very low level of enforcement. Level of competition for illegal fishing activities is therefore considered as very high (Index=3).

Other fisheries resource use (birds, mammals, …): (Index=1)

Competition with "natural" competitors for resources is low, marine mammal depredation rarely occur in the longline fishery, shark depredation is a bit more frequent in the demersal handline fishery, especially on outer reefs.

4.5.5 Level of competition for access to fishing grounds

Internal competition within the segment (<12m): (Index=1)

The level of competition for access to fishing grounds is not known to be important. Mayotte fishermen exploit 150Km² of coral reefs plus the outer reefs. The displacement of demersal fishing effort to outer reefs is more due to the decline of resources than to competition for fishing grounds.

Large scale vessels (>12m): (Index=0)

Mayotte fishing boats' fishing grounds are limited to 20NM for longliners and 5NM for handliners around the barrier reef, whereas industrial purse seiners are not allowed to enter within 24NM around it. Therefore, competition for fishing grounds with large scale vessels is null.

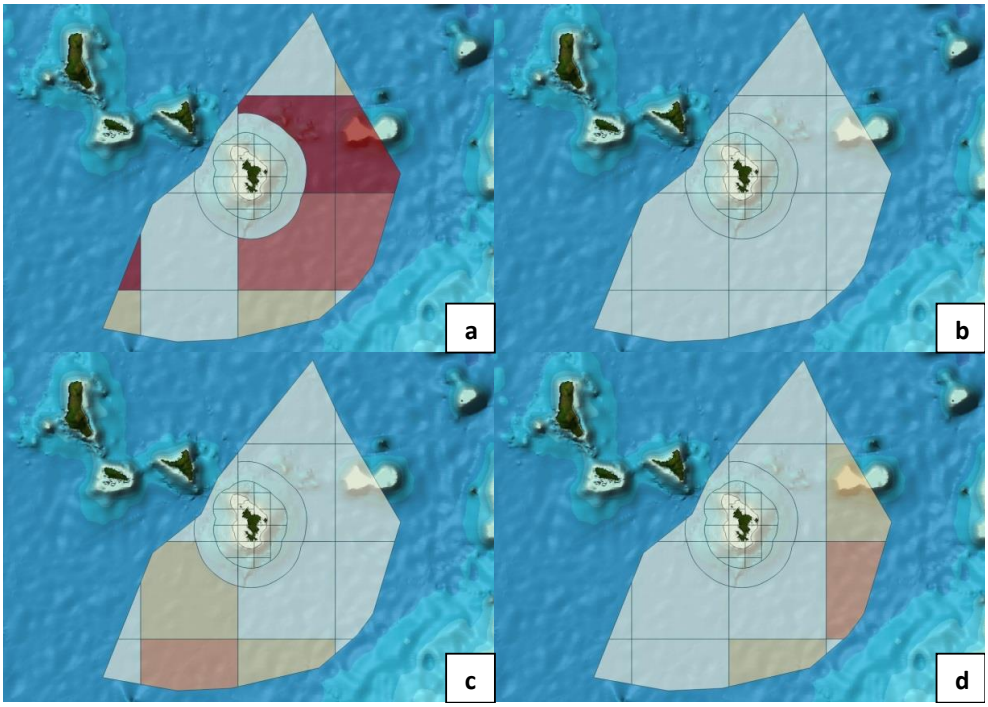


Figure 37 French purse seiners catches repartition in Mayotte EEZ from 2013 (a) to 2016 (d)
Source: Fisheries Information System - Ifremer / IRD / DPMA / AFB

Recreational fishing: (Index=2)

There is a slight competition for fishing grounds with recreational fisheries, specifically for handline boats exploiting MFAD. Fishing over MFAD is only allowed for recreational fishermen on Saturdays and Sundays, and forbidden during the rest of the week. This regulation is not respected due to lack of enforcement and sometimes creates conflicts.

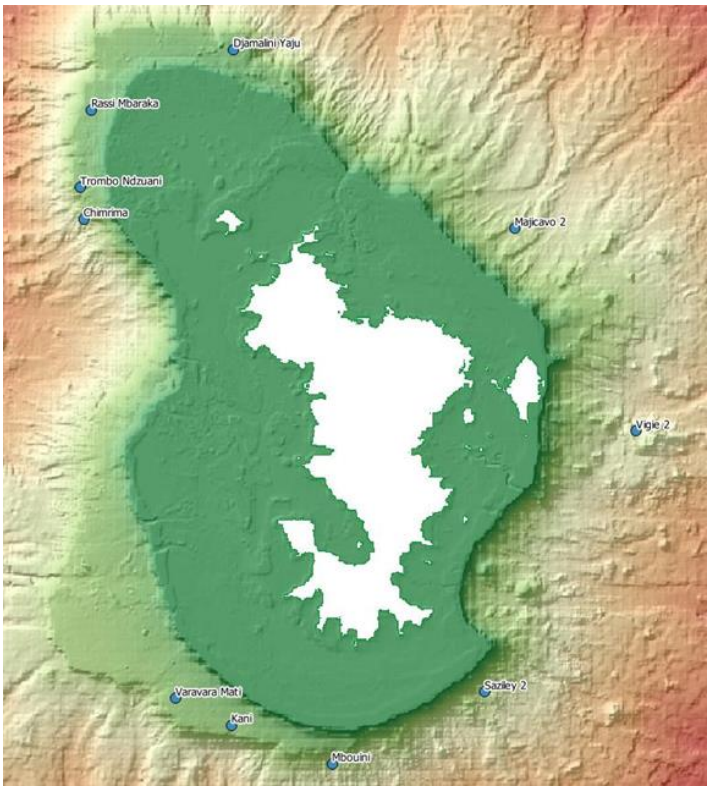


Figure 38 Moored FAD around Mayotte

Landing points with marine leisure sector: (Index=2)

Mayotte's fishing landing points are not yet equipped with infrastructures dedicated to commercial fisheries. Therefore, professional fishermen have to use leisure docks and piers for landing their catches, or directly on the beach. This situation sometimes leads to tensions and conflicts, especially for the longline fishing boats which have no choice but using the main touristic floating pier of Mamoudzou.

Aggregate removal: (Index=0) Marine energy (wind farms, …): (Index=0)

Aggregate removal and marine energy production units do not occur in Mayotte. Fish culture occurred in two places near the shore until 2016 and did not generate competition with fishing activities ever.

Navigation (industrial or leisure): (Index=0)

Navigation activities, neither commercial nor leisure, do not have significant impact on fishing activities in Mayotte.

Coastal development and the effect on coastal water quality (pollution): (Index=1) Explanation coming

Ecosystem biodiversity, conservation (MPAs): *(Index=1)*

Only one MPA in Mayotte has a not-take zone regulation and can interfere with fishing activities ("Passe-en-S" reserve). Poaching still occurs a lot in this area due to lack of control,

especially at night and mainly from subsistence and recreational fleets. Commercial fishermen do not rely on this part of the reef for their activity and understand the purpose of the no-take zone. Competition for access to this specific fishing ground is therefore considered as low. The natural marine park doesn't impose any specific regulation on fishing activities in addition to national and local regulation. New decrees concerning fishing activities may however be proposed by the marine park or are always prepared with the marine park staff by local authorities.

4.5.6 Global summary

1) **Which actors/sectors of activity generate the most competitions?**

The main challenges for Mayotte commercial artisanal fisheries are:

- the competition for skipjack and tuna resources with oceanic purse seiners, especially because of their use of dFAD in the Indian Ocean;
- the competition for markets with illegal resellers and recreational fishermen;
- The competition for demersal resources within the segment and with other fleets.

2) **Are there any new projects and solutions considered to deal with some conflicts of uses?**

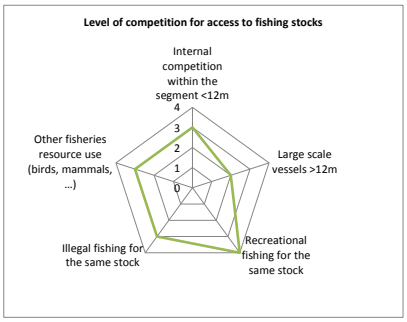
Purse seiners fleet operating in Mayotte's EEZ is composed of French, Spanish and Seychelles vessels, which are allowed to fish in this area thanks to a 8-years fishing agreement with the EU. European's Common Fisheries Policy allows member states to limit the access to their outermost territories' 100NM area to local fishing boats and European boats that can prove historical activity in these areas. This decision has been taken by the French government, but has yet not been notified to European Commission by the French ministry in charge of fisheries. This notification is necessary in order to modify the Seychelles-EU agreement and to respect this 100NM limitation. Lobbying has been and is still made from fishermen representative, local politic representative and marine Natural Park in order to inform the EU Commission of this decision from French government.
In order to try to address the demersal resources decline problem, local authorities and marine Natural Park encourage fishermen to exploit pelagic species, by settling a new park of moored FAD around the island. This project should take place by the end of 2018.

4.6 Situation in La Réunion

The aim of this assessment concerns the costal small-scale fishing vessels from La Reunion. The artisanal fishery is a multi-species and multi-gear professional segment, whose line with hooks is the main gear used. Trawling is prohibited. Fishing activities are carried out from the reef flat to outer slope, near reef barriers when present, and around the islands, at depths less than 500 meters. This segment target coastal demersal resources on insular shelf and large pelagic fish on moored fishing aggregating devices (MFADS) in island territorial water with vessels. The small-scale fleet involves around 148 actives professional vessels in 2016 (length < 12m).
This study aims to identify the level of competition of this segment for the access to fishing areas and stocks with other fleet segments or marine uses and infrastructures. A first description of the situation was made on the basis of factual and expertise knowledges of

Ifremer to evaluate the different levels (from 0, no competition, to 4, very high level) of competition of the segment with others. This knowledge will need to be improved in the future. The matrix of interactions is detailed hereafter.

Level of competition for access to fishing stocks	Index
Internal competition within the segment <12m	3
Large scale vessels >12m	2
Recreational fishing for the same stock	4
Illegal fishing for the same stock	3
Other fisheries resource use (birds, mammals, …)	3
Total	15
Average index per region	3,0
S.D.	0,7
C.V.	24%
Level of competition for access to fishing grounds	**Index**
Internal competition within the segment (<12m)	3
Large scale vessels (>12m)	2
Recreational fishing	4
Other métiers (gears)	2
Aquaculture	0
Landing points with marine leisure sector	0
Agregate removal	0
Marine energy (wind farms, …)	0
Navigation (industrial or leisure)	2
Coastal development and the effect on coastal water quality (pollution)	2
Ecosystem biodiversity, conservation (MPAs)	2
Total	17
Average index per region	1,5
S.D.	1,4
C.V.	



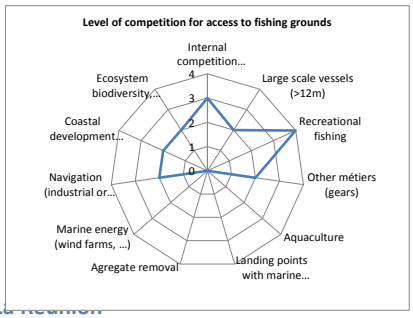


Table 14 Interactions Matrix of La Réunion

4.6.1 Level of competition for access to fishing stocks

Internal competition within the segment (<12m): (Index=3)

The level of competition is obvious in small-scale coastal artisanal fishing, for most of the practices, within the artisanal small-scale coastal fishery segment. This situation is mainly explained by the quasi open access situation of the fisheries.

Other small-scale vessels not in the segment: (Index=2

Competition with other small-scale vessels not in the segment is considered as medium (Index=2). It concerns interactions with mini longliners on demersal and large pelagic fishes.

Large scale vessels (>12m): (Index=2)

With large scale vessels (>12m), the competition is also considered as medium (Index=2), with longliners vessel, when they fish within the 20 NM around MFADs. Competition also exists between the small-scale fleet targeting large pelagic species and the large-scale purse seine vessels or other foreign vessels targeting the same large pelagic species in the Indian Ocean.

Recreational fishing for the same stock: (Index=4)

Current fisheries regulations are governed by prefectural decrees [69]that define and regulate the uses for professional and recreational fishermen. But there is no management plan for demersal resources, with the exception of marine protected areas. A large part of the reef flats

[69] Reference coming

and barrier reef has been managed since 2006 for fisheries at Reunion (National Marine Reserve). Only recreational on-foot reef flats fishing is monitored in marine protected areas.

Competition with recreational fishing is particularly important (Index=4). It encompasses different practices, both fishing by vessel or on-foot. There is no recent study on recreational fishing vessels activities in Reunion but an assessment carried out in 2006 estimated at 320 the number of recreational fishing vessel (Pulcherie, 2007). Recreational spearfishing and all fishing practices on demersal and pelagic fishes (beach seine, fishing rod, octopus on reef flat and shoreline fishermen…)

This competition exists both to access fishing areas and for targeted stocks, such as pelagic fishes on MFADs and the demersal fishes on the insular shelf or on reef flats. This is mainly due to the fact that the control capacities to enforce the current fisheries regulations are considered insufficient. In this context, fishing is often felt as a poor regulated activity by the different users. The "open access" situation is also reflected in the existence of informal commercial activities for the sale of fish by non-professional fishermen, which lead to excesses and non-compliance with regulations. Poaching is high and contributes to increasing uncontrolled fishing pressures that are not in accordance for maintaining stocks at sustainable levels of profitability for professional fishermen, especially on demersal fish[70][71][72][73]. The available indicators on the health status of the main demersal resources, especially deep species, show that they are fully exploited and show clear signs of growth over-exploitation[74][75]. With the exception of fishing on reef flats managed by the MPA, there is no recent study on recreational fishing activities in Reunion, while it represents efforts (nominal and effective) greater than the single professional segment. Under this situation of uncontrolled pressure, both on fishing grounds and on stocks, the competitions generate significant conflicts of interest between artisanal professional fishermen and other fishing activities, on fishing grounds and on stocks, which are restricted to the scale of the island, because the uniqueness of the reliefs and the environmental conditions.

Illegal fishing for the same stock: (Index=3)

Even if sometimes difficult to distinguish recreational and illegal fishing, illegal fishing can be considered as significant (index=3) and concerns such species as spiny lobsters, and more generally all species with high commercial values.

Other fisheries resource use (birds, mammals, …): (Index=3)

If difficult to quantify, the level of competition with other fisheries resource use (Sharks, mammals, birds…) has to be considered with potential interaction with sharks' depredation, mostly on demersal fishery using handline seasonally, exceptionally on moored FAD.

[70] Biais G. et Taquet M. (1987). Etude de la pêche locale réunionnaise. Données statistiques d'octobre 1987 à septembre 1988. Convention Ifremer/Région Réunion. 97p.
[71] Biais G. et Taquet M. (1992). La pêche locale aux abords de La Réunion. Repères Océan n°2. 77p.
[72] Roos D., Tessier E., Guyomard D. (1998). Evolution de l'activité halieutique à La Réunion de 1990 à 1996. DRV/RH/RST/98-14.
[73] Pulchérie M-B. (2007). Homme libre, toujours: la pêche à l'île de La Réunion depuis le XVIIe siècle. Comité régional des pêches maritimes et des élevages marins de La Réunion (Ed.). 111p.
[74] Fleury P-G., Evano H., Le Ru L., Aureche V. (2012). Synthèse de l'étude et des campagnes à la mer 2011 sur l'exploitation aux vire-lignes des espèces démersales profondes autour de La Réunion. RST. Délégation Océan Indien /2012-13. http://doi.org/10.13155/20902
[75] Roos D., Aumond Y., Huet J., Bruchon F. (2015). Projet ANCRE-DMX2 : Indicateurs biologiques et écologiques pour une gestion durable des stocks de poissons DéMersauX profonds (100–700 m) d'intérêt halieutique à La Réunion. RST/RBE-DOI/2015-11. http://doi.org/10.13155/45812

4.6.2 Level of competition for access to fishing grounds

Internal competition within the segment (<12m): (Index=3)

Internal competition within the segment (<12m) for access to fishing grounds, is also significant. This is mainly explained by the limited fishing areas on the coastal insular shelf and around MFADs.

Other métiers (gears): *(Index=2)*

Within the segment, internal spatial interactions with other gears concerns mini longliners operating around MFADs.

Large scale vessels (>12m): (Index=2)

Spatial competition with large scale vessels (>12m) concerns mainly the longliners vessels with risk of MFADs destruction with their pelagic horizontal longlines. The index of interaction is also estimated to medium.

Recreational fishing: (Index=4)

As mentioned before, the level of interaction with recreational fishermen is also high in terms of competition for areas (Index=4). Recreational activities on MFADs, spearfishing and all fishing practices on demersal and pelagic fishes (seine, fishing rod, octopus on reef flat and shoreline fishermen…) could be a source of interaction.

Aquaculture: (Index=0)

Even if aquaculture has been developed around the island, the level of interaction with aquaculture is null. (Index=0).

Landing points with marine leisure sector: (Index=0)

There is no significant interaction.

Aggregate removal: (Index=0) and marine energy (wind farms, …): (Index=0)

if the potential aggregate removal has been studied,[76] there is currently no project around the island (Index=0). Marine energy projects have also been studied and are referenced in the following document[77]

Navigation (industrial or leisure): (Index=2)

Interaction between small scale vessels and navigation is estimated to medium. If the loss of MFADs can be explained by different factors, cargo ships are often blamed for the destruction of MFADs.

Coastal development and the effect on coastal water quality (pollution): (Index=2)

The interaction of coastal development and the effect on coastal water quality (pollution) on fisheries is estimated to medium. This is explained by Turbidity (quarry, soil erosion), nutrients, reef eutrophication, overcrowding of beaches and reef flats…

[76] http://infoterre.brgm.fr/rapports/RP-53684-FR.pdf
[77] Delencre, G. Les projets Energies Marines à La Réunion, Agence Régionale Energie Réunion, 13 p. http://www.arer.org/Les-projets-d-Energies-Marines-a.html

Ecosystem biodiversity, conservation (MPAs): *(Index=2)*

Frequently mentioned by fishers, interaction with ecosystem biodiversity, conservation (MPAs) is not so extensive (Index=2). There is a marine reserve in La reunion[78] Projects to open more reef areas into the MPA exist and may change the situation.

V. Conclusion and perspectives

Within this task, two deliverables were scheduled. The first one, an interactive tool for mapping the evolution of the characteristics of the CFR fleet has been finalized and integrated to the ORFISH web site.

The content of this report on the status and evolution of small-scale fisheries in ORs (deliverable 2) is based on a work in progress. The results are subject to data limitations; they are preliminary and subject to revisions.

These preliminary results of this task have been shared between the contributors and disseminated within the project to get feedback and improvements from the partners, especially in terms of results analysis. Complementary analysis and comparisons between ORs will be carried to provide a more complete overview of the status of fleet and fisheries in the ORs

[78] http://www.reservemarinereunion.fr/

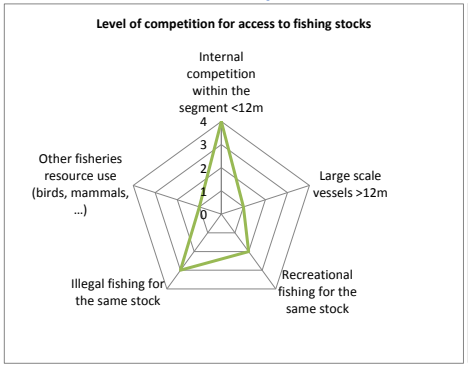
VI. Annexes

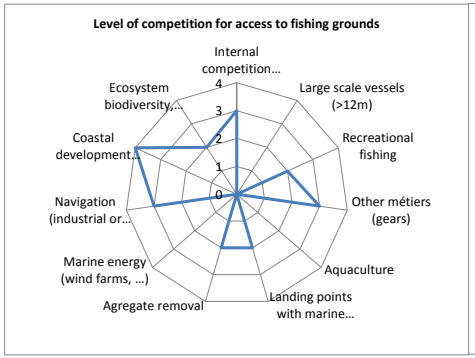
Matrix of interactions per OR

Level of competition for access to fishing stocks	Guadeloupe	Martinique	Guyane	Azores	Madeira	Canaries	Mayotte	La Réunion
Internal competition within the segment <12m	4	4	1	2	2	1	3	3
Large scale vessels >12m	1	2	0	1	4	2	3	2
Recreational fishing for the same stock	2	2	1	3	2	4	3	4
Illegal fishing for the same stock	3	3	4	3	3	4	4	3
Other fisheries resource use (birds, mammals, …)	1	1	1	2	-	-	1	3
Total	**11**	**12**	**7**	**11**	**11**	**11**	**14**	**15**
Index per region	**2,20**	**2,40**	**1,40**	**2,20**	**2,20**	**2,20**	**2,80**	**3,00**
S.D.	1,3	1,1	1,5	0,8	1,0	1,5	1,1	0,7
C.V.	59%	48%	108%	38%	44%	68%	39%	24%
Level of competition for access to fishing grounds	Guadeloupe	Martinique	Guyane	Azores	Madeira	Canaries	Mayotte	La Réunion
Internal competition within the segment (<12m)	3	3	1	2	2	2	1	3
Large scale vessels (>12m)	0	0	0	2	1	0	0	2
Recreational fishing	2	2	1	3	2	4	2	4
Other métiers (gears)	3	3	0	2	0	1	0	2
Aquaculture	0	1	0	0	0	1	0	0
Landing points with marine leisure sector	2	1	3	1	0	0	2	0
Agregate removal	2	1	1	0	0	0	0	0
Marine energy (wind farms, …)	0	0	0	0	0	0	0	0
Navigation (industrial or leisure)	3	3	1	1	1	1	0	2
Coastal development and the effect on coastal water quality (pollution)	4	4	1	1	1	2	1	2
Ecosystem biodiversity, conservation (MPAs)	2	2	2	2	1	2	1	2
Total	**21**	**20**	**10**	**14**	**8**	**13**	**7**	**17**
Index per region	**1,91**	**1,82**	**0,91**	**1,27**	**0,73**	**1,18**	**0,64**	**1,55**
S.D.	**1,4**	**1,3**	**0,9**	**1,0**	**0,8**	**1,3**	**0,8**	**1,4**
C.V.	**72%**	**73%**	**104%**	**79%**	**108%**	**106%**	**127%**	**89%**

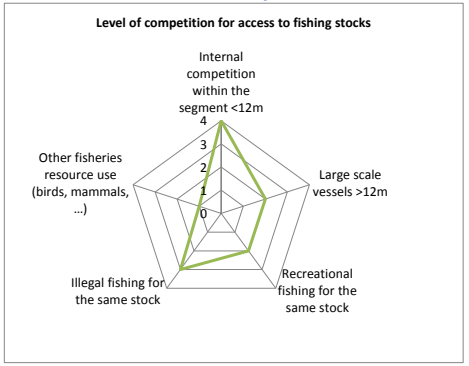
Level of interaction by item for the ORs

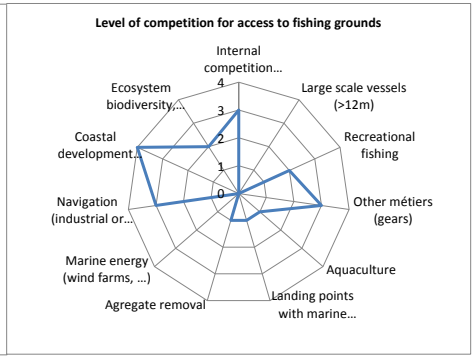
Guadeloupe



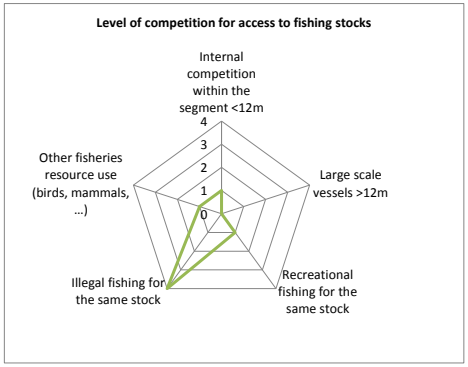


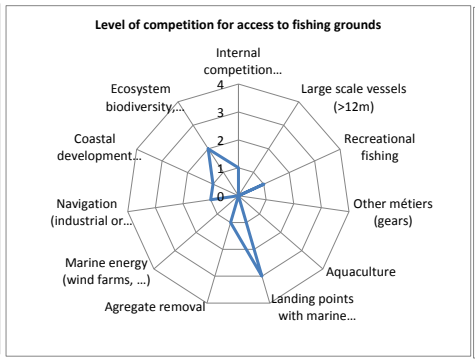
Martinique



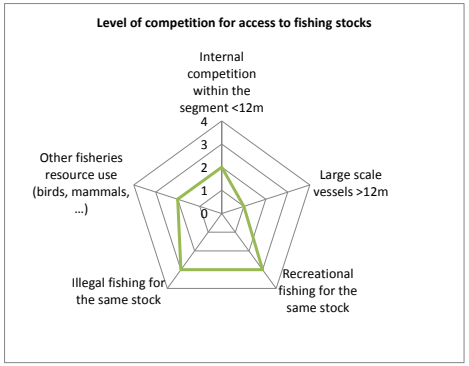


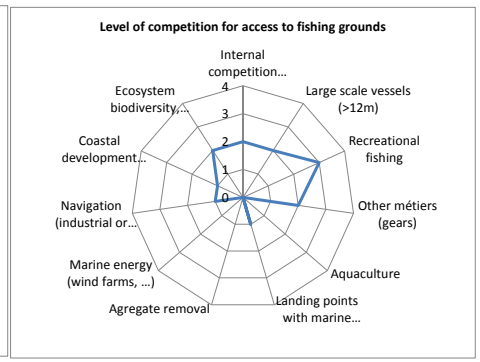
French Guiana





Azores



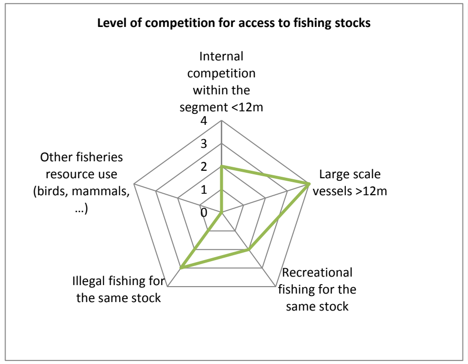


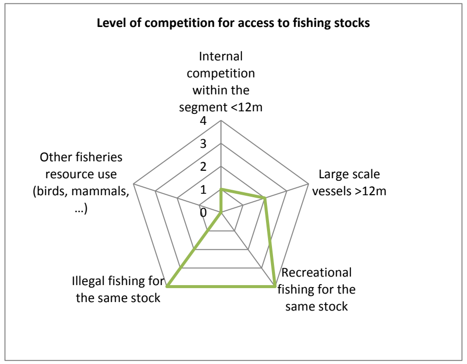
Madeira

Canaries

Mayotte

La Réunion


Level of competition for access to fishing stocks
Internal competition within the segment <12m
Large scale vessels >12m
Recreational fishing for the same stock
Illegal fishing for the same stock
Other fisheries resource use (birds, mammals, ...)
0
1
2
3
4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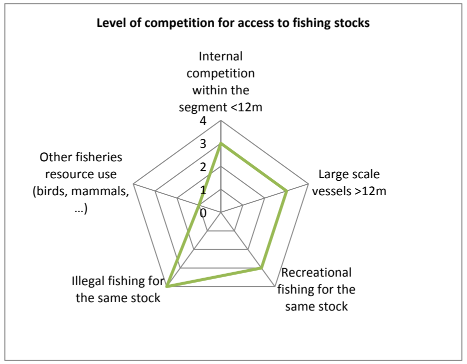
0
1
2
3
4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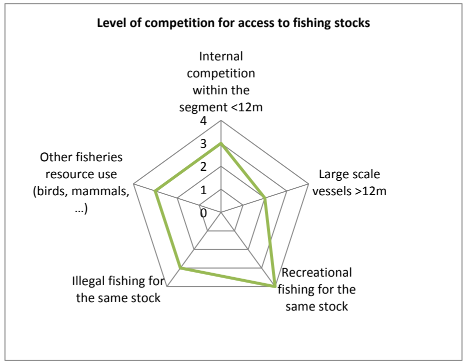
0
1
2
3
4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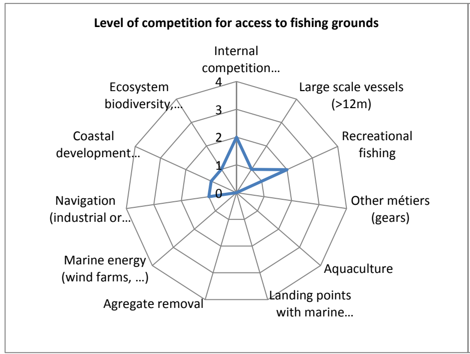
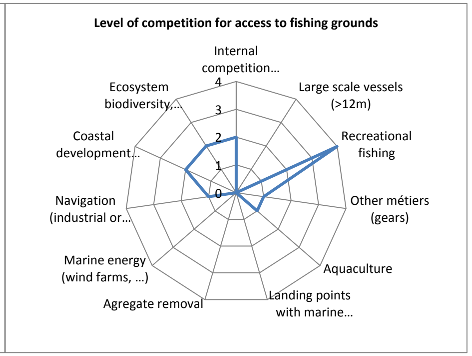
1
2
3
4


Level of competition for access to fishing grounds
Internal competition...
Large scale vessels (>12m)
Recreational fishing
Other métiers (gears)
Aquaculture
Landing points with marine...
Agregate removal
Marine energy (wind farms, ...)
Navigation (industrial or...
Coastal development...
Ecosystem biodiversity,...
0
1
2
3
4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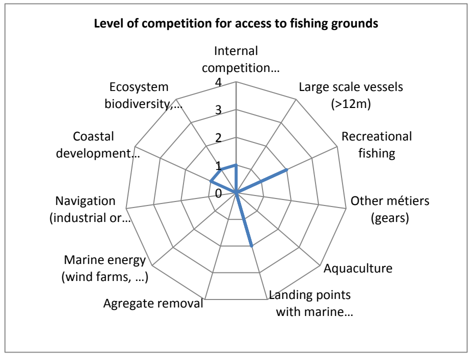
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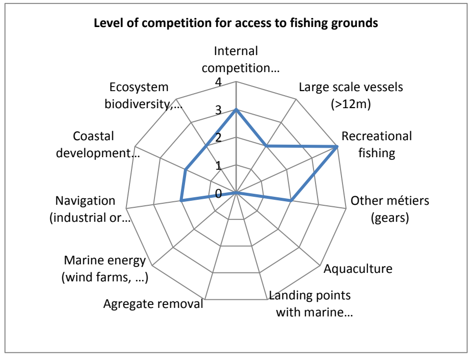
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