Republic of Mauritius

Ministry of Fisheries and Rodrigues

ANNUAL REPORT

2011

Foreword

I am pleased to present the Annual Report of the Fisheries Division for 2011. The report highlights the main activities and achievements of the division including those of the Albion Fisheries Research Centre, the Fisheries Training and Extension Centre, the Seafood Hub One-Stop-Shop and the Fisheries Protection Service. It covers the areas of fisheries research, fisheries planning, development and management, marine conservation, aquaculture, training and fisheries protection.

2011 was marked by several events of major importance to the fisheries sector. My Ministry organised the holding of "Les Assises de la Pêche" in Mauritius and Rodrigues in March and April 2011 respectively as an exchange forum to inform, consult and involve stakeholders in the process for the development of the Fisheries Master Plan.

The Fisheries Master Plan for Mauritius, Rodrigues and the Outer islands was finalised in May 2011 with technical assistance from the ACP FISH II programme aiming at strengthening fisheries management in the ACP countries and was submitted to my ministry for implementation.

The Overseas Fishery Cooperation Foundation of Japan completed its third project entitled "Rehabilitation of Fisheries Facilities for Fisheries Development in Mauritius" in March. The project, which started in October 2010, comprised the training of fishermen and trainers on longline fishing techniques and maintenance of marine diesel engines as well as undertaking the rehabilitation of the fishing boat "MEXA-1" of the Fishermen Investment Trust.

The Directorate General for Maritime Affairs and Fisheries (DG-MARE) of the European Commission carried out an ex-ante evaluation of existing conditions in the Fisheries Sector in Mauritius with the view of concluding a new Fisheries Partnership Agreement and Protocol with Mauritius.

A request for a second phase of the current project under the marine resources management programme being implemented through the Norwegian Agency for Development Cooperation (NORAD) was agreed upon by the Norwegian authorities.

Three fishermen sitting on the board of the Fishermen Investment Trust including one from Rodrigues undertook a mission in Mozambique in July to exchange knowledge, among others, in the setting up and the operation of a system of auto-saving and credit and to learn on the co-management processes for the protection and conservation of the marine resources.

Ten thousand visitors attended the Open Day organized in December by my Ministry at the Albion Fisheries Research Centre and the Fisheries Training and Extension Centre in the context of the Mauritius Export Association Seafood Week. The Open Day was to create awareness among the general public on the various activities carried out in the fisheries sector. Fishermen were also rewarded for their commitment to recover drifting fish aggregating devices and other research equipment and return them to the Fisheries Training and Extension Centre.

Mr. A. Venkatasami, the Director of Fisheries, who headed the fisheries technical services, retired in January 2011 and was replaced by Mr. D. Mauree as Director of Fisheries.

The Annual report includes information which will serve as a valuable reference for all stakeholders, the fishing industry, scientists and the public at large concerned with fisheries research, management, planning, training, marine science, protection and conservation and aquaculture.

I would like to take this opportunity to thank the staff of the Fisheries Division particularly the editing team for their dedicated effort in the preparation of this annual report.

Hon. Louis Joseph Von-Mally
Minister of Fisheries and Rodrigues

Vision

The fisheries sector is an economic pillar with due regard to sustainability of aquatic resources and social development.

Mission

To provide an enabling environment for the promotion of the sustainable development of the fisheries sector and to ensure its continued contribution to economic growth and social development within the framework of good governance and conservation measures.

Objectives

- Establish a conducive environment in which the fishing industry can develop
- Contribute towards the development of Mauritius in a world class seafood hub and derive optimal benefits from marine living resources
- Promote and regulate the optimal long-term sustainable utilisation of living marine resources
- Carry out and promote applied research, development and management of aquatic living resources
- Ensure that all fisheries activities allow for the conservation of vital marine resources
- Foster the interest of Mauritius within the international fisheries community, including encouraging the international trade of fish commodities within the framework of international law and conventions
- Provide professional, responsive and customer friendly services
- Deliver our services efficiently and effectively providing value for money
- Promote the social welfare status of fishermen

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Executive Summary

The fresh fish production estimates from the artisanal fishery showed an increase of 6.8%. 892 tonnes of fish were produced as compared to 831 tonnes in 2010 comprising 556 tonnes from the lagoon and 336 tonnes from the off-lagoon areas with an average catch per fisherman day of 6.9 kg as compared to 6.5 kg in 2010. There were 2 214 active registered fishermen as compared to 2 256 in 2010 and 2 540 boats operating in the artisanal sector as compared to 2 476 boats in 2010.

A total of 1 472 tonnes of frozen fish, was landed as compared to 1 478 tonnes in 2010 and comprised lethrinids (90.7%), snappers/groupers (8.9 %) and tuna/others (0.4%). The slight decrease (<1%) was attributed to less fishing effort as only 6 vessels were active as compared to 7 in 2010. In addition 328 tonnes of chilled fish were landed by 12 semi-industrial boats and 8 carrier boats respectively. The produce from the St. Brandon fishery amounted to 255 tonnes of chilled, salted and frozen fish including frozen octopus and lobster. A total of 148 tonnes of chilled fish and 146 tonnes of frozen fish were landed from the drop-off fishery.

The total import of fish and fish products amounted to 163 000 tonnes while total export was 89 000 tonnes. The per capita consumption of fish was 22.2 kg.

The Laboratory Division created in August comprises the Marine Chemistry, Marine Bacteriology and Fish Toxicity Laboratories and a Documentation Unit/Marine Information Centre. The three laboratories have embarked on the process of accreditation to ISO/IEC 17025:2005 to be in line with Government policy and to operate according to international norms.

The long term monitoring of the coral reef ecosystem and seawater quality was continued at the established sites around the island. The results of the water quality were generally within the *CWQG* limits except at a few stations which are influenced by influx of fresh water from the nearby rivers

Monitoring of potential harmful marine microalgae was continued at the four established sites on a quarterly basis to determine the presence and density of harmful microalgae. Results showed the absence of *Gambierdiscus toxicus* and *Coolia sp* which are associated with ciguatera fish poisoning. Moreover, fish samples received from other organizations and the ministry were tested for ciguatoxin through the mongoose bioassay.

Seed production of “berri rouge”, the freshwater giant tiger prawn and the ornamental freshwater fish were pursued. Technical advice was provided to 102 persons on aquaculture and associated activities.

The “Post Larval Capture and Culture” (PCC) of marine ornamental fish was undertaken by a private promoter with the collaboration of the Aquaculture Division. 1 289 damsel fish collected at the fore reef of Albion using eco-friendly devices were reared in ponds on land and then exported and 574 were released in the lagoon of Albion.

Total marine aquaculture production amounted to 460 tonnes whilst production from the freshwater fish farm was 74 tonnes.

The long term monitoring of the two marine parks was continued. 422 permits were issued for permissible activities in the Blue Bay Marine Park and Rs. 1 022 900 were collected as fees. Twenty five (25) EIA applications were assessed and recommendations were made to the Ministry of Environment and Sustainable Development.

The co-funded UNDP/GEF/GOM project "Partnerships for Marine Protected Areas in Mauritius and Rodrigues" was in its final year of implementation. A management plan was developed for the South East Marine Protected Area (SEMPA) for Rodrigues while the draft management plans for the Blue Bay and Balaclava Marine Parks were finalized.

The long term monitoring of the coral reef ecosystem was carried out at only 3 established sites. Under the "African Adaption Programme – supporting integrated and comprehensive approaches to climate change adaption in Africa" three sites in Mauritius and two in Rodrigues were chosen for the coral farming project.

Nineteen fishermen followed the training course in small scale tuna longline fishing organised with the collaboration of the Overseas Fishery Cooperation Foundation of Japan. 151 fishmongers followed training in fish handling, preservation and marketing. A total of 728 fishermen have benefitted from the training course.

21 Fishing Aggregating Devices (FADs) were active during the year. The total catch recorded around FADs amounted to 258 tonnes and the catch per fisherman day was 16 kg. 236 licences were issued to foreign fishing vessels. The licence fees obtained from fishing vessels amounted to USD 1 370 910. A total of 613 foreign fishing vessels called at Port Louis for transshipment, bunkering, dry docking, supply of provisions and changing of crew. 232 fishing vessels comprising 40 local and 192 foreign vessels reported to the Fisheries Monitoring Centre.

A total of 40 013 tonnes of tuna and tuna-like species were transshipped at Port Louis by tuna fishing vessels and carriers which effected 558 and 55 calls to the port respectively. The amount of toothfish transshipped was 2 108 tonnes.

Acronyms

AFRC	Albion Fisheries Research Centre
CDCF	Centre for Development Cooperation in Fisheries
COD	Chemical Oxygen Demand
COI	Commission de l'Ocean Indien
CPFD	Catch Per Fisherman-Day
CPU	Consumer Protection Unit
CWQG	Coastal Water Quality Guidelines
EIA	Environment Impact Assessment
ELORV	Electronic Operational Risk Valuation
EPA	Economic Partnership Agreement
FAD	Fishing Aggregating Device
FAO	Food and Agricultural Organisation
FC	Faecal Coliform
FiTEC	Fisheries Training and Extension Centre
FMC	Fisheries Monitoring Centre
FMML	Ferme Marine de Mahebourg Ltd.
FPS	Fisheries Protection Service
GRT	Gross registered tonnage
IRS	Integrated Resort Schemes
ISO	International Standard Organisation
LOA	Length overall
IEAWP	Independent Environment Audit on Wastewater Projects
MCS	Monitoring, Control and Surveillance
MID	Maurice Ile Durable
MoESD	Ministry of Environment and Sustainable Development
MSB	Mauritius Standard Bureau
NCG	National Coast Guard
NORAD	Norwegian Agency for Research and Development
PER	Preliminary Environmental Reports
PCC	Post Larval Capture and Culture
ppt	part per thousand
TAC	Total Allowable Catch
VMS	Vessel Monitoring System

1. FISHERIES MANAGEMENT

1.1 Coastal (artisanal) fishery

Fisheries data were collected monthly by a team of enumerators from 25 fish landing stations selected randomly out of the 60 around the island in order to estimate the catch and effort by fish species and gear. 3 141 landings were recorded during the year.

1.1.1 Catch, effort and catch per fisherman day

The production of fresh fish was estimated at 892 tonnes comprising 556 tonnes from the lagoon and 336 tonnes from off-lagoon. The average catch per fisherman-day (CPFD) was 6.9 kg. Table 1.1 and figures 1.1 and 1.2 show the catch, number of fisherman-days and CPFD.

Table 1.1: Catch, fisherman-days and CPFD

Year	Catch (t)			Fisherman-days			CPFD (kg)		
	L	OL	Total	L	OL	Total	L	OL	M
2007	354	286	640	93 261	51 622	144 883	3.8	5.5	4.4
2008	367	315	682	77 719	44 248	121 967	4.7	7.1	5.6
2009	496	324	820	83 880	43 463	127 343	5.9	7.5	6.4
2010	515	316	831	88 167	40 587	128 754	5.8	7.8	6.5
2011	556	336	892	87 632	40 981	128 613	6.3	8.2	6.9

L=lagoon, OL= off-lagoon, M= mean, CPFD= catch per fisherman-day

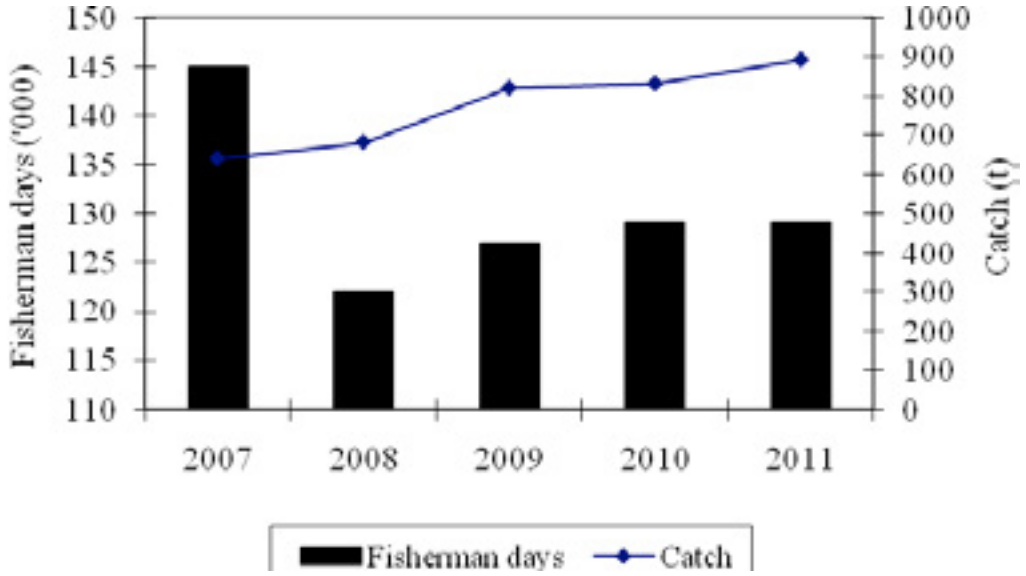

Figure 1.1: Fisherman-days and total catch

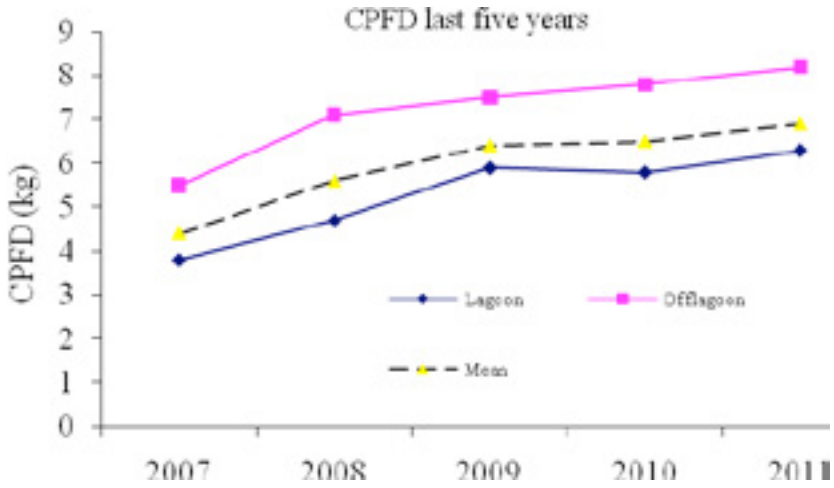

Figure 1.2: Catch per fisherman-day

1.1.2 Monthly landings

The monthly production of fresh fish from the lagoon and off-lagoon, value of catch, effort and CPFD are presented in table 1.2. Peak landing was recorded in March with a catch of 197 tonnes.

Table 1.2: Monthly catch with value, effort and CPFD

Month	Catch (t)			Value (M. Rs)	Fisherman days	CPFD (kg)		
	L	OL	Total			L	OL	Mean
January	16	26	42	7.5	7 025	4.4	7.8	6.0
February	18	23	41	7.6	7 327	4.1	7.7	5.6
March	159	38	197	34.9	17 271	11.6	10.7	11.4
April	72	28	100	16.1	13 694	7.4	7.1	7.3
May	78	27	105	19.2	13 400	7.8	8.2	7.9
June	43	44	87	15.8	13 865	5.0	8.6	6.3
July	26	3	29	4.5	6 744	4.3	4.0	4.3
August	23	8	31	4.9	6 223	4.9	5.1	4.9
September	37	11	48	8.2	8 952	5.2	5.9	5.4
October	33	24	57	9.7	12 314	4.0	6.1	4.7
November	29	74	103	17.6	13 197	4.6	10.6	7.8
December	22	30	52	8.5	8 601	4.2	8.6	6.0
Total	**556**	**336**	**892**	**154.5**	**128 613**	**6.3**	**8.2**	**6.9**

M.Rs = million rupees; L=lagoon; OL= off-lagoon

1.1.3 Catch by gear

Sixteen large nets and five gill nets were operational during the year. The catch by gear was recorded according to the following: hooks and lines, basket traps, basket traps/lines, large net, gill net, harpoons and on foot. The catch by fishing gear is presented in table 1.3.

Table 1.3: Annual catch (kg) by gear

Year	Line	BT	BT/L	LN	GN	H/OF	Total
2007	169 963	251 233	16 227	132 656	7 565	62 426	640 070
2008	178 656	270 923	13 920	143 644	6 669	68 171	681 983
2009	227 186	257 849	18 342	222 870	11 303	82 824	820 374
2010	226 675	266 504	27 990	213 502	7 602	89 093	831 366
2011	185 265	302 895	24 862	280 994	23 882	74 327	892 225

BT = basket trap; BT/L = basket trap and line; LN = large net; GN = gill net; H = harpoon, OF= on foot

The total catch amounted to 892 tonnes compared to 831 tonnes in 2010. The increase in the catch was attributed to the increase in the catch by nets and basket traps.

1.1.4 Fishermen

The number of active fishermen involved in fishing activities increased from 1 770 in 2010 to 2 030 in 2011. The increase is mostly noted among the basket trap and line fishermen. The number of active fishermen by gear type for the past five years is presented in table 1.4.

Table 1.4: Number of active fishermen by gear type

Year	BT	L/H/OF	BT/L	LN	GN	Total
2007	283	770	876	137	12	**2 078**
2008	275	795	807	138	13	**2 028**
2009	279	733	862	133	13	**2 303**
2010	246	594	790	127	13	**1 770**
2011	290	766	830	130	14	**2 030**

BT = basket trap; L/H/OF= line, harpoon, on foot; BT/L = basket trap and line; LN = large net; GN = gill net

1.1.5 Price of fish

Retail prices of fish by stratum forwarded by the enumerators are input in the MAUCAS software and the average price by species estimated. The enumerators obtained the retail prices by conducting surveys at the fish selling points. Table 1.5 shows the yearly average price of fresh fish.

Table 1.5: Yearly average retail price of fresh fish (Rs/kg)

Fish	2007	2008	2009	2010	2011
Homard	600	680	690	750	825
Crabe & crevette	320	320	355	365	435
Vieille rouge	255	275	290	300	320
Vacoas, sacréchien	175	210	245	260	270
Capitaine	180	200	220	235	245
Dame berri	170	190	210	230	245
Octopus	135	150	160	170	175
Carangue	130	150	155	165	170
Cordonnier	120	140	145	155	155
Rouget	115	135	150	160	165
Tuna	115	135	150	160	165
Mullet voilé	105	130	140	145	155
Bordemar	110	135	140	150	150
Licorne	125	150	160	165	170
Cateau	90	105	110	120	120
Shark	50	50	60	65	65
Other fish	75	80	90	90	95

1.2 Banks fishery

Six vessels were engaged in fishing activities on the shallow water banks of Saya de Malha and Nazareth and carried out twelve trips (average of 58 days per trip). Fishing vessel "Hoi Siong 8" cancelled its campaign due to an engine problem. Particulars of the fleet are given in table 1.6.

Table 1.6: Particulars of the fishing fleet

Mother Vessel	LOA (m)	GRT (t)	Hold (t)	No. of Dories	Crew	Fishermen	Joined in	Flag
Shandrani	55	398	200	16	13	82	1994	Mauritius
Shandrani 2	49	289	150	14	13	68	2002	Mauritius
Shandrani 3	49	652	300	16	12	83	2009	Mauritius
Silver Star 2	51	300	200	18	18	66	1992	Mauritius
Diego Star	54	388	190	19	16	50	2005	Madagascar
Glory No. 1	51	300	154	20	16	58	2009	Mauritius
Hoi Siong 8	35	315	145	10	17	24	2009	Mauritius

LOA: Length overall; GRT: Gross registered tonnage

1.2.1 Production of frozen fish

A total of 1 472 tonnes of frozen fish was landed and comprised lethrinids (90.7 %), snappers/groupers (8.9 %) and tuna/others (0.4 %). The total catch decreased by 6 tonnes compared to 2010. No fishing trip was carried out on the Chagos Archipelago and Albatross Bank during the year. Table 1.7 and figure 1.3 illustrate the annual catch from the different fishing areas.

Table 1.7: Annual catch (t) of frozen fish by fishing banks

Year	No. of vessels	Catch (t)				Total catch
		Saya de Malha	Nazareth	Chagos	Albatross	
2007	7	1 481	506	130	10	**2 127**
2008	7	966	722	0	6	**1 694**
2009	10	1 835	237	161	0	**2 233**
2010	7	737	741	0	0	**1 478**
2011	6	757	715	0	0	**1 472**

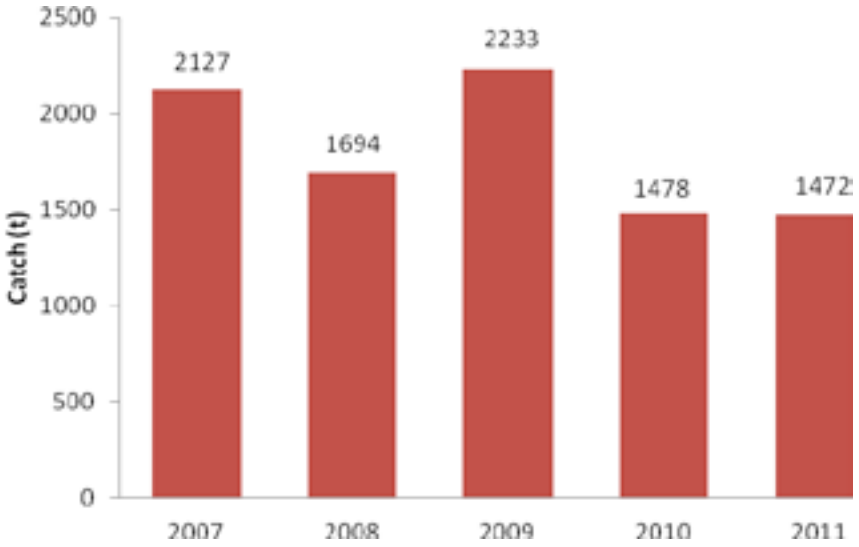

Figure 1.3: Trend in catch for the banks fishery

Details of the fishing effort, catch and CPFD from the different fishing areas are shown in table 1.8.

Table 1.8: Fishing effort, catch (t) and catch per fisherman day (kg) by fishing areas

Fishing areas	Fishing Days	Bad weather days	Fisherman days	Catch (t)	CPFD (kg)	Total catch %
Saya de Malha bank	210	99	9 786	757	77.3	51.4
Nazareth bank	209	70	9 179	715	77.9	48.6
Total	**419**	**169**	**18 965**	**1 472**	**-**	**100.0**

1.2.2 Comparative analysis of data from Nazareth and Saya de Malha banks

The effort, catch and CPFD for the Nazareth and Saya de Malha banks from 2007 to 2011 are given in table 1.9.

Table 1.9: Catch (t), effort (fdays) and CPFD (kg) for the Nazareth and Saya de Malha banks

Year	Nazareth bank			Saya de Malha bank		
	Effort	Catch	CPFD	Effort	Catch	CPFD
2007	5 262	506	96.2	19 473	1 481	76.1
2008	8 405	722	85.9	12 759	966	75.7
2009	3 367	237	70.4	22 625	1 835	81.1
2010	8 092	741	91.5	8 553	737	86.2
2011	9 786	757	77.3	9 179	715	77.9

Both the Nazareth and Saya de Malha banks showed an increase in effort and a decrease in CPFD in 2011 as compared to 2010. The trends in CPFD from the two banks are shown in figure 1.4.

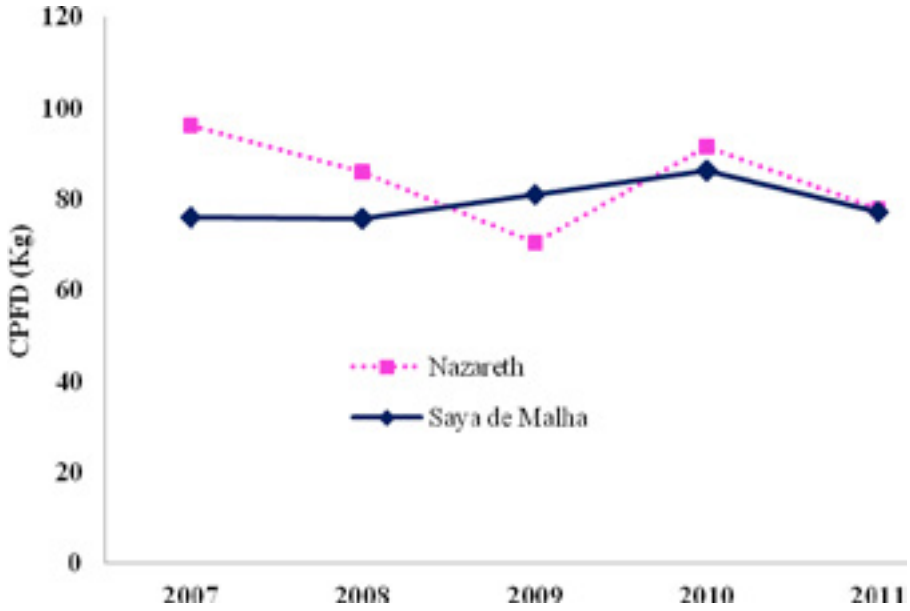

Figure 1.4: Trends in CPFD for the Nazareth and the Saya de Malha banks (2007-2011)

1.2.3 Length frequency distribution of *Lethrinus mahsena*

Length frequency data on samples of *Lethrinus mahsena* were collected during unloading of fishing vessels. The number of fishes sampled from the Saya de Malha bank was 762 and the length ranged from 270 to 510 mm. 96 % of the fish sampled had a length greater or equal to 300 mm. The length frequency

distributions are shown in figure 1.5.

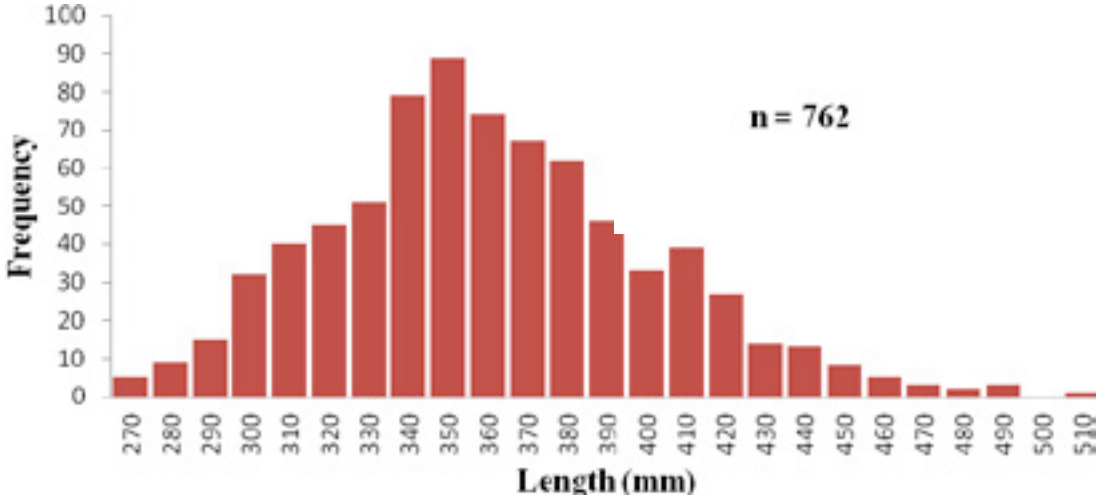

Figure 1.5 Length frequency distribution of *Lethrinus mahsena* from the Saya de Malha bank

1.2.4 Fishing in the waters of the Chagos Archipelago

There were no fishing activities in the waters of Chagos Archipelagos. Details of the catch and effort during the past five years are given in table 1.10.

Table 1.10: Details on fishing activities in the waters of the Chagos Archipelago

Year	No. of trips	No. of vessels	Fishing days	Bad weather days	Catch (t)	Fisherman days	CPFD (kg)
2007	1	1	44	6	130	2 376	54.5
2008	0	0	0	0	0	0	0.0
2009	3	2	72	9	161	1 872	85.8
2010	0	0	0	0	0	0	0.0
2011	0	0	0	0	0	0	0.0

1.3 St. Brandon inshore fishery

Eight fishing carrier boats (namely *Eliza*, *Etretat*, *Keoli*, *La Derive, Marie Charlotte*, *Ouvea, Sam I* and *Sam III*) operated in St. Brandon and carried out 47 trips. Thirty contractual fishermen and twenty fibreglass boats were active in the St. Brandon fishery. A total amount of 254.7 tonnes of fish including octopus and lobster was landed. Hand-lines were used to catch fish and harpoons for octopus while

lobsters were handpicked. The catch was frozen or chilled and some were salted. The different products landed from the St. Brandon fishery from 2007 to 2011 are given in table 1.11.

Table 1.11: St. Brandon inshore fishery production in tonnes (product weight)

Year	Trips	Frozen Fish	Chilled fish	Salted fish	Frozen Octopus	Frozen Lobster	Total
2007	14	98.4	21.9	16.4	3.6	0.0	140.2
2008	33	313.0	90.9	41.2	6.1	2.8	454.1
2009	64	4.5	337.0	45.8	1.8	0.8	389.9
2010	62	86.4	238.6	36.5	1.8	3.3	366.6
2011	47	36.1	155.8	56.2	4.8	1.8	254.7

The catch consisted mainly of white fish (lethrinids) and other species, namely: *Plectropomus maculatus* ('babonne'), *Variola spp*. ('croissants'), *Siganus sutor* ('cordonnier'), *Naso unicornis* ('licorne'), *Scarus spp.* ('cateau'), serranids ('vieille'), *Octopus sp*. and *Panulirus argus* (spiny rock lobster).

1.3.1 Sampling of fish from St. Brandon

Sampling of the main fish species, *Lethrinus mahsena,* was carried out at the fishing port during the unloading of fishing vessels from St. Brandon. Length-weight data of 616 specimens were recorded. The lengths varied between 300 and 590 mm while the weight ranged from 480 to 3 550g. Figures 1.6 and 1.7 show the length/weight relationship and the length frequency distribution of fish from the inshore area of St. Brandon.

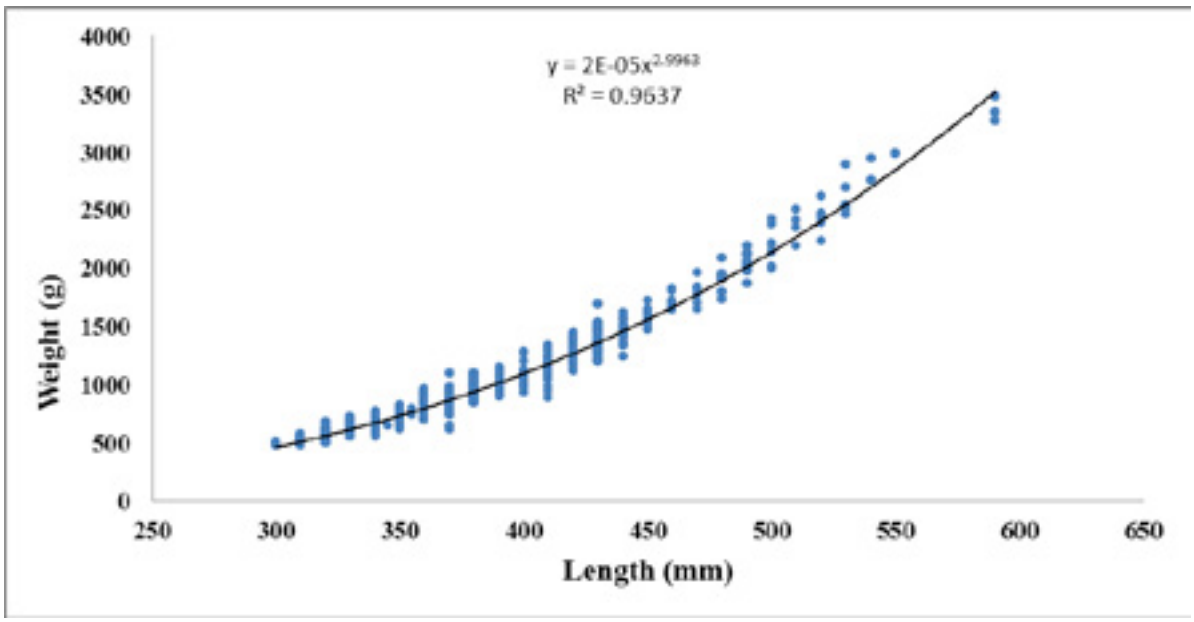

Figure 1.6: Length/weight relationship of *Lethrinus mahsena* from St. Brandon

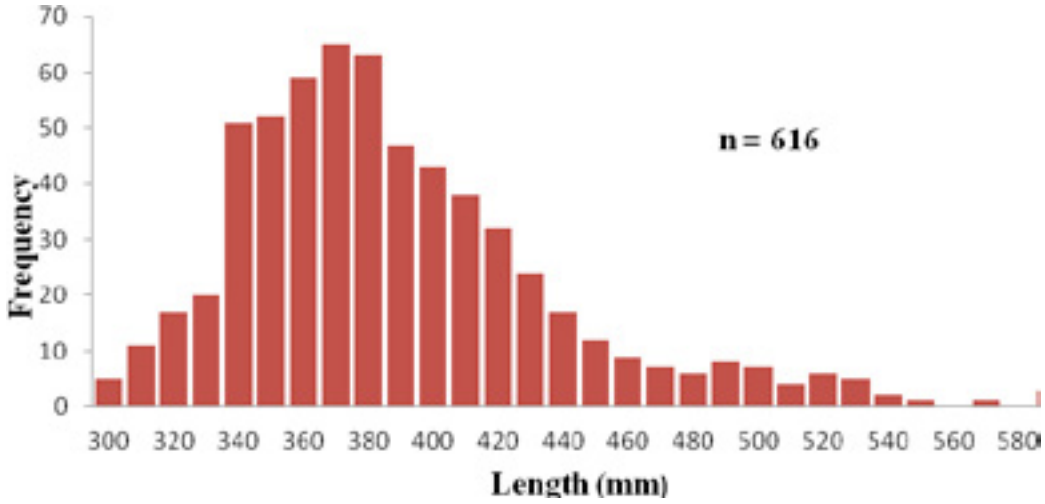

Figure 1.7: Length frequency distribution of *Lethrinus mahsena* from St. Brandon

1.4 The semi-industrial fishery-banks shallow water

Twenty fishing boats operated on the Soudan, Albatross and Nazareth banks and carried out 190 trips with an average duration of 12 days each. A total of 180.4 tonnes of chilled fish were landed during the year. Table 1.12 shows the details of the boats while the species composition of the catch by banks is given in table 1.13.

Table 1.12: Details of boats operating in the semi-industrial fishery

Fishing boat	LOA(m)	GRT(t)	Fish hold(t)	Crew	No of F/men	Joined in
Dai Fah No. 1	20.9	14.5	5.0	2	4	2002
Eliza*	18.8	36.7	7.0	4	16	2005
Etretat*	22.0	90.4	8.0	2	8	2008
Keoli* (Ex Amina 1)	14.1	29.7	10.0	2	6	2008
La Derive*	17.0	58.4	9.0	4	10	1995
Mahi-Mahi	14.8	24.0	6.0	2	4	2002
Makaira	17.0	14.5	5.5	2	4	1996
Marie Charlotte*	22.8	66.5	15.0	2	4	2008
Ouvea*	20.3	97.4	25.0	2	10	2009
Pierre Prudence	9.2	5.0	1.0	2	3	2011
Quo Vadis	12.4	26.9	4.0	2	3	2003
Sam I*	14.9	17.8	10.0	2	6	2011
Sam III*	18.4	25.0	20.0	4	16	2011
Sea Quest	19.8	59.0	20.0	7	7	2004
Sea Tiger	23.9	77.8	25.0	5	15	2008
Sea Treasure	19.9	75.0	35.0	4	14	2007
Snapper	16.3	14.0	10.0	3	7	2008
Vimaya	21.8	50.9	20.0	2	13	2000
Vivano	13.1	11.0	3.5	2	3	2005
Zanahary	15.1	50.0	15.0	2	4	2011

*Acted as carrier boat

Table 1.13: Catch (kg) by species and fishing area

Fishing area	Catch chilled			Total chilled
	Lethrinids	Snapper/grouper	Tuna and others	
Albatross bank	160 419	6558	0	166 977
Nazareth bank	10 609	1389	0	11 998
Soudan bank	1 359	0	46	1 405
Total	**172 387**	**7947**	**46**	**180 380**

The total catch increased by 20% as compared to 2010. The increase was attributed to more 'Lethrinids', and 'Tuna and others' in the catch compared to the previous year.

The catch, effort and catch per fisherman-day (CPFD) in the different fishing areas are presented in table 1.14.

Table 1.14: Catch, effort and CPFD in the fishery

Fishing area	Catch (kg)	Fishing days	Fisherman-days	CPFD (kg)
Albatross bank	166 977	466	3 004	55.5
Nazareth bank	11 998	36	258	46.5
Soudan bank	1 405	9	54	26.0
Total	**180 380**	**511**	**3 316**	

1.4.1 Sampling of fish from the Albatross Bank

Sampling of 1 127 specimens of *Lethrinus mahsena* from Albatross bank was carried out upon arrival of the fishing boats. The length ranged from 250 to 630 mm while the weight ranged from 260 to 3 670 g. Figures 1.8 and 1.9 illustrate the length-frequency distribution and the length-weight relationship of the fish landed.

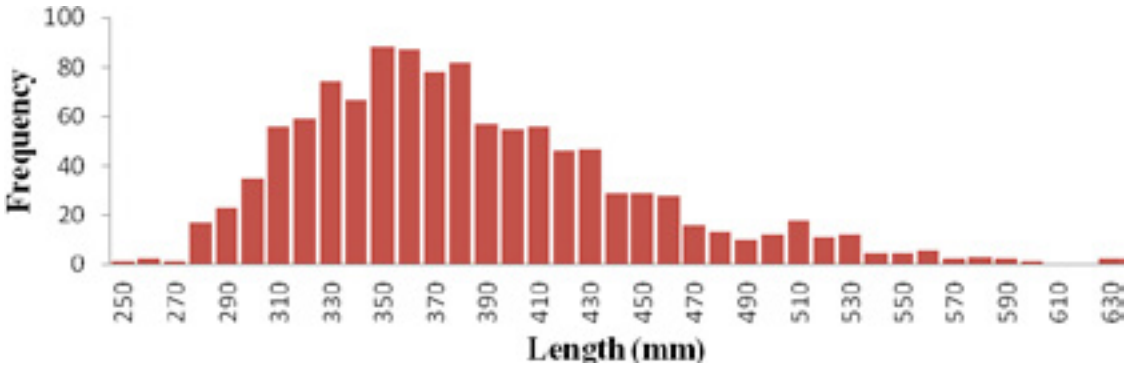

Figure 1.8: Length frequency of *Lethrinus mahsena* from the Albatross bank

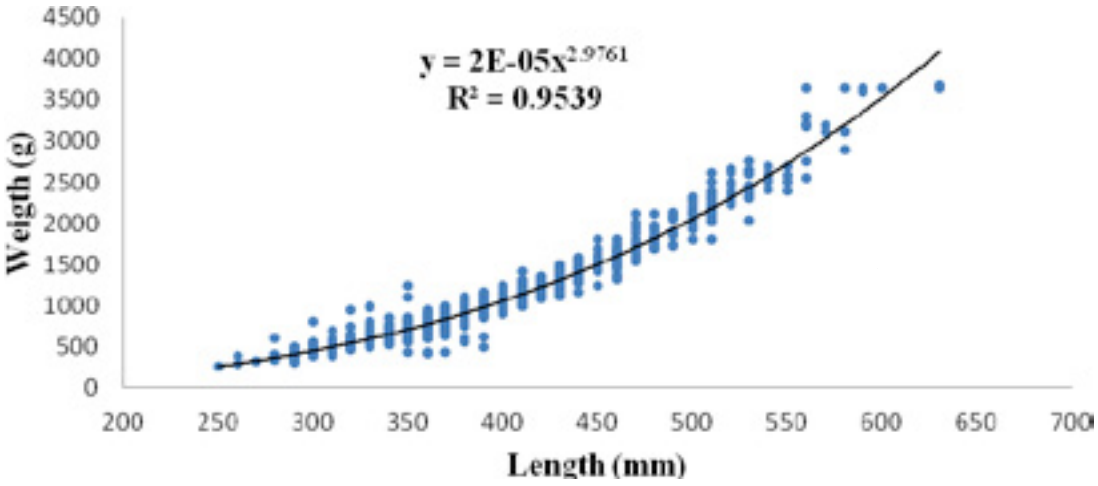

Figure 1.9: Length-weight relationship of *Lethrinus mahsena* from Albatross bank

1.5 The semi-industrial fishery-drop-offs of banks

Nine fishing vessels were active in the fishery on the drop-offs of the Nazareth, Saya de Malha, FAD, Sphyrna, Hawkins and North West banks targeting snappers and groupers. A total of 146.4 tonnes (wet weight equivalent) of frozen fish and 148.3 tonnes of chilled fish were landed. The details of the catch are given in table 1.15.

Table 1.15: Catch by species and fishing location from drop-off fishery of the banks

	Catch chilled (kg)				Total	Catch frozen (kg)				Total
Fishing areas/Banks	**SCH***	**GPD***	**VLB***	**VAC***	**Chilled**	**SCH***	**GPD***	**VLB***	**VAC***	**frozen**
Nazareth	64 518	24 719	8 087	14	**97 338**	12 053	36 985	3 305	0	**52 343**
Saya de Malha	40 371	5 770	1 404	2 194	**49 739**	80 656	4 068	2 224	7 156	**94 104**
Albatross	78	9	53	16	**166**	0	0	0	0	**0**
Hawkins	373	25	30	25	**453**	0	0	0	0	**0**
FAD	245	55	50	0	**350**	0	0	0	0	**0**
North West	160	5	5	0	**170**	0	0	0	0	**0**
NW/Sphyrna/FAD	50	0	0	0	**50**	0	0	0	0	**0**
Total	**105 795**	**30 593**	**9 629**	**2 249**	**148 266**	**92 709**	**41 053**	**5 529**	**7 156**	**146 447**

SCH* -'sacréchien'; GPD*- 'geule pavée d'orée' ; VLB*-vieille la boue' ; VAC*- 'vacoas'

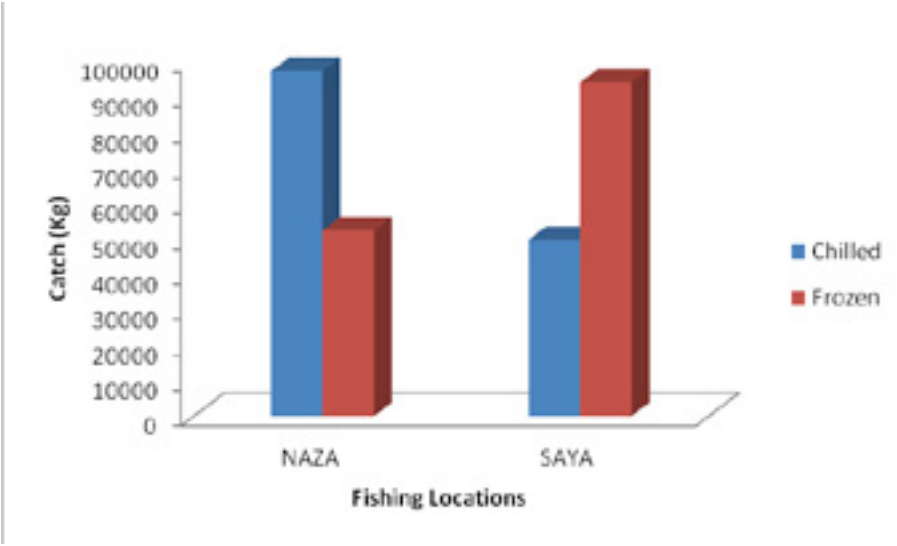

Figure 1.10: Breakdown of chilled and frozen catch by fishing locations on the drop-offs of Nazareth (NAZA) and Saya de Malha (SAYA) banks

The percentage of the total catch from the Nazareth bank was 51%, Saya de Malha bank 48% and Hawkins bank less than 1%. The breakdown of the catch which was of the snapper/ grouper category consisted of "sacré-chien" (67%), "gueule pavée dorée" (25%)," vieille laboue" (5%) and "vacoas" (3%) and is given in figures 1.11 and 1.12, respectively.

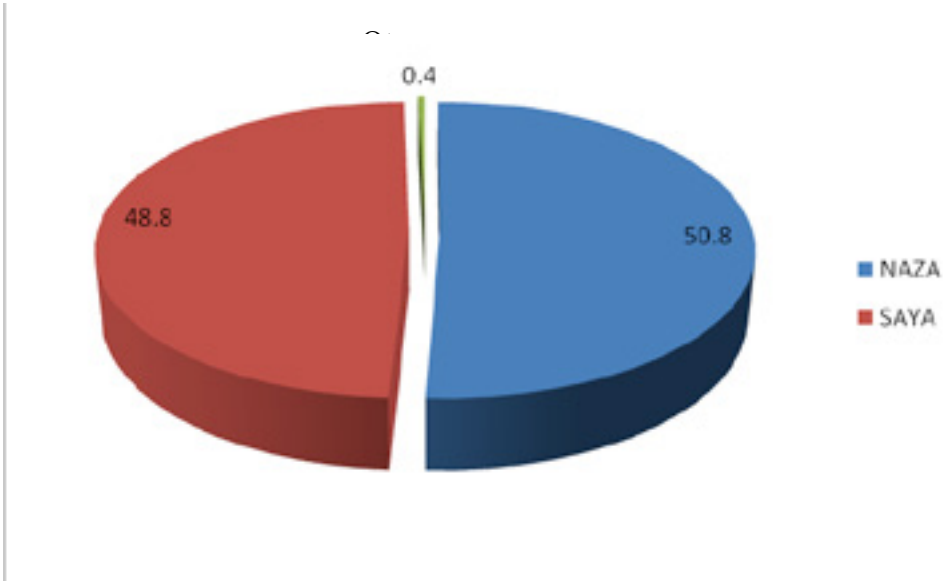

Figure 1.11: Percentage representation of catch by bank

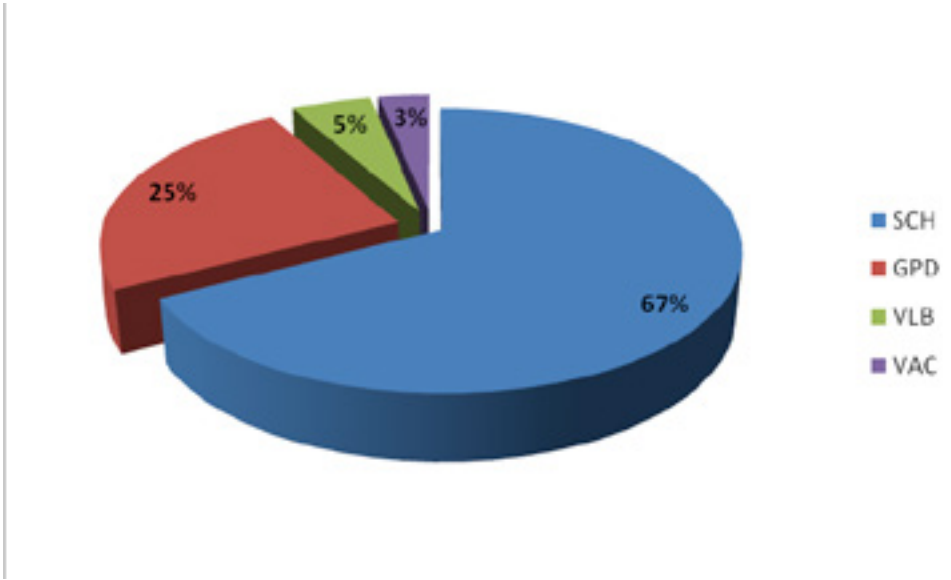

Figure 1.12: Percentage representation of the deep-water snapper and grouper fishery by species (SCH-'sacré-chien'; GPD-'gueule pavée dorée'; VLB- 'vieille laboue'; VAC-'vacoas')

A total of 526 specimens of *Polysteganus baissaci* ("gueule pavée doré") were sampled for length and weight distribution. The length frequency distribution ranged from 290 - 710 mm and weight ranged from 330 - 6 300 g. The highest frequency was observed at 390 mm. Results are shown in figure 1.13 and fig 1.14.

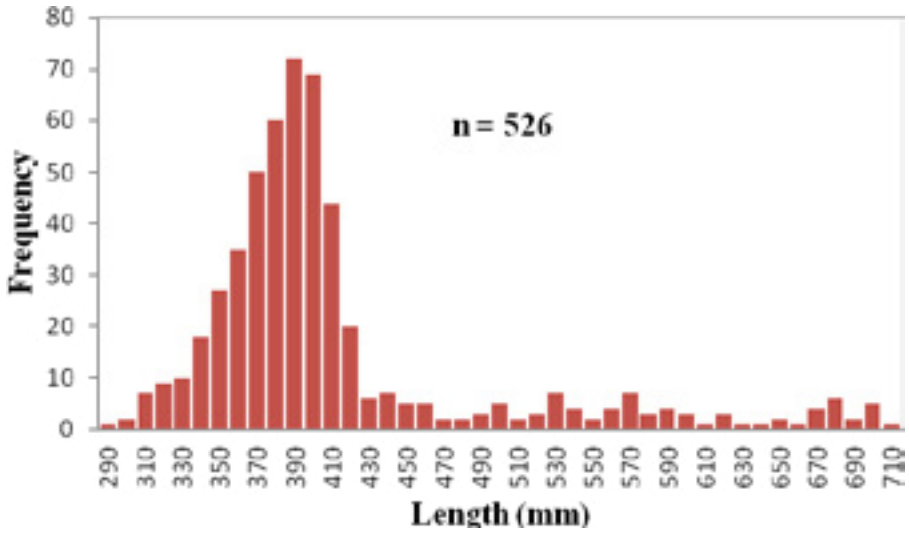

Figure 1.13: Length frequency of *Polysteganus baissaci* ("gueule pavée doré") from Nazareth bank

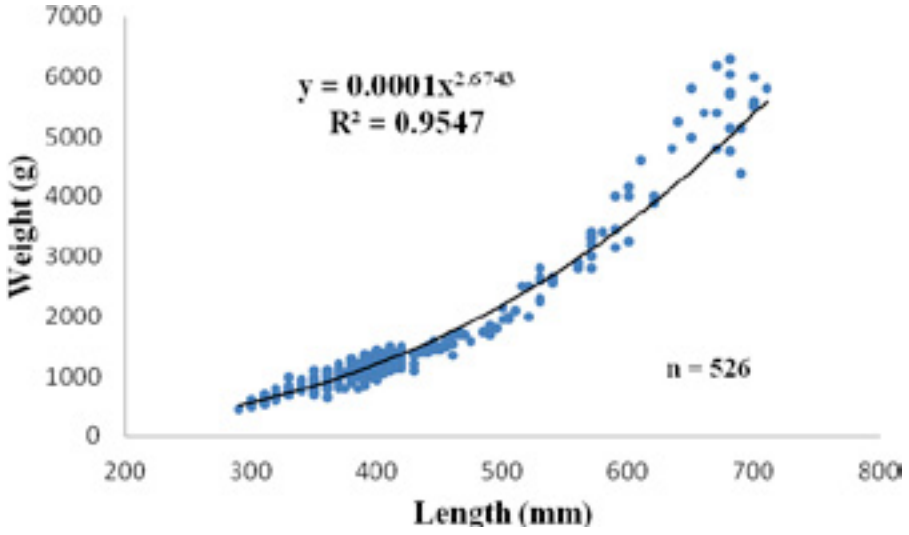

Figure 1.14: Length weight relationship of *Polysteganus baissaci* ("gueule pavée dorée") from Nazareth bank

1.6 Summary of catch from fishing banks

The table 1.16 shows the total catch from all the fishing banks (Saya de Malha, Nazareth, Albatross, St Brandon, Soudan and Hawkins) expressed in wet weight.

Table 1.16: Total catch by products (wet weight) in tonnes

Frozen fish	Chilled fish	Salted fish	Octopus	Lobster	Total Catch
1956.1	484.1	112.4	4.8	1.8	2559.2

1.7 Fish production, consumption and trade balance

1.7.1 Total fish production

The total annual production by different fisheries is given in the table 1.17.

Table1.17: Total fish production (wet weight) in tonnes

Sector	2007	2008	2009	2010	2011
Mauritius	640	682	820	831	892
Rodrigues	1 067	1 758	1 900	1 900	2303
Agalega	30	30	30	30	30
Sports fishery	650	650	650	650	650
Amateur fishery	300	300	300	300	300
Barachois	2	2	0	0	1
Ponds (prawn & fish)	17	62	57	66	60
Marine aquaculture (cage)	550	181	366	498	460
FAD Fishery	164	167	390	330	258
Sub-total	**3 420**	**3 832**	**4 513**	**4 605**	**4954**
Shallow water banks	2 848	2 428	2 685	2 137	1766
Banks deep water snappers	0	285	627	452	295
St Brandon inshore	*54	*173	437	421	318
Semi-industrial-shallow water	171	173	459	446	180
Tuna fishery	803	475	246	306	-
Semi-industrial pelagic fish	184	41	8	27	89
Demersal trawlers	0	0	0	0	-
Sub-total	**4 060**	**3 402**	**4 462**	**3 789**	**2 738**
Grand Total	**7 480**	**7 234**	**8 975**	**8 394**	**7 694**

*only chilled and salted

1.7.2 Per capita consumption of fish

The per capita consumption of fish is given in table 1.18.

Table 1.18: Per capita consumption of fish (kg)

Year	Quantity
2006	19.9
2007	18.3
2008	21.5
2009	21.1
2010	21.7
2011	22.2

Source: Central Statistics Office

1.7.3 Trade balance in relation to total imports and exports

The import and export of fish and fish products and trade balance are given in table 1.18

Table 1.18: Import and export of fish and fish products and trade balance

	Import		Export		Balance
Year	**Qty(t)**	**Value(MR)**	**Qty(t)**	**Value(MR)**	**Value(MR)**
2006	150 728	6 720.9	79 580	7 120.4	395.5
2007	129 085	7 068.0	86 170	8 172.8	1 104.8
2008	113 608	8 547.4	66 205	8 015.2	-532.2
2009	139 342	7 108.3	87 938	9 041.2	1 932.9
2010	155 000	7 810.0	104 740	10 118.0	2 308.0
2011	163 000	9 280.0	89 490	9 481.0	201.0

Source: Central Statistics Office; MR – Million rupees*

2. LABORATORY DIVISION

The Laboratory Division was created in 2011. It comprises the Marine Chemistry, Marine Bacteriology and Fish Toxicity Laboratories and a documentation unit/ marine information centre. The laboratories conduct tests for (a) physico-chemical parameters of coastal waters; (b) coliform bacteria at selected public beaches and (c) ciguatoxin in marine fish tissue. The division is also involved in the monitoring of potentially harmful marine microalgae besides investigating cases of fish mortality and alleged marine pollution.

2.1 Accreditation process

The three laboratories at AFRC have embarked in the process of accreditation to ISO/IEC 17025:2005 to be in line with Government policy to operate according to international norms. Accreditation will give international recognition to the testing competencies of the laboratories.

Three Scientific Officers were appointed in July 2011 to lead the Marine Chemistry, Marine Bacteriology and Fish Toxicity Laboratories. The recruitment of a Scientific Officer for Quality Control was initiated. Tenders were launched for the recruitment of a project manager for the accreditation of laboratories but none of the bids received met the requirements.

2.2 Coastal water quality

2.2.1 Monitoring of physico-chemical parameters

Coastal water quality was monitored at the 74 established stations of the 24 sites around the island and at three additional sites comprising 24 stations at the sewerage outfalls. 248 samples were analysed for chemical oxygen demand (COD), nitrate-nitrogen (NO_3-N) and phosphate (PO_4^{3-}). Physical parameters recorded were temperature, sea state, weather conditions, conductivity and pH.

The AFRC provided data on physico-chemical parameters for Trou aux Biches, Mon Choisy, Grand Baie, Pereybère, Albion, Flic en Flac, Le Morne and Bel Ombre for the Lagoon Water Quality Index Project implemented under the Ministry of Environment and Sustainable Development.

The results of the analyses over the last three years are shown in Table 2.1.

Table 2.1: Range of values for results of water analyses (2009 - 2011)

Site	Year	Nitrate-Nitrogen (mg/l)	Phosphate (mg/l)	Chemical Oxygen Demand (mg/l)
Ile aux Benitiers	2009	<0.1	0.01 - 0.05	0.3 - 0.6
	2010	<0.1	0.01 - 0.08	0.1 - 1.7
	2011	<0.1 - 0.2	0.01 - 0.03	0.2 - 1.2
Bel Ombre	2009	<0.1	0.01 - 0.08	0.1 - 0.7
	2010	<0.1	0.02 - 0.07	0.1 - 1.0
	2011	0.3	0.01 - 0.05	0.1 - 1.1
Bambous Virieux	2009	<0.1	0.01 - 0.04	0.3 - 0.5
	2010	<0.1	0.03 - 0.08	0.2 - 0.5
	2011	<0.1	0.02 - 0.04	0.1
Trou d'Eau Douce	2009	<0.1	0.01 - 0.06	0.1 - 1.9
	2010	<0.1	0.07 - 0.09	0.1 - 0.2
	2011	<0.1 - 0.2	0.01 - 0.13	0.1 - 1.6
Anse la Raie	2009	<0.1	0.01 - 0.06	<0.1 - 0.6
	2010	<0.1	0.02 - 0.08	0.2 - 1.4
	2011	<0.1 - 0.2	0.02 - 0.04	0.2 - 1.3
Trou aux Biches	2009	<0.1	0.01 - 0.05	<0.1 - 1.2
	2010	<0.1	0.01 - 0.08	<0.1 - 0.9
	2011	<0.1	0.01 - 0.07	0.1 - 2.6
Pointe aux Sables	2009	<0.1	0.02 - 0.07	0.1 - 1.4
	2010	<0.1	0.01 - 0.08	<0.1 - 0.9
	2011	<0.1 - 0.1	0.03 - 0.08	<0.1 - 1.2
Bain des Dames	2009	<0.1	0.03 - 0.05	0.1 - 1.4
	2010	<0.1	0.01 - 0.08	0.1 - 1.2
	2011	<0.1	0.02 - 0.08	0.1 - 2.2
Grand Baie	2009	<0.1	0.01 - 0.08	0.1 - 2.2
	2010	<0.1	0.01 - 0.07	0.1 - 1.2
	2011	<0.1 - 0.1	0.01 - 0.05	0.2 - 0.8
Baie du Tombeau	2009	<0.1	0.01 - 0.19	0.1 - 1.3
	2010	<0.1	0.02 - 0.08	<0.1 - 2.2
	2011	<0.1	0.01 - 0.15	0.1 - 2.4
Harbour	2009	<0.1	0.04 - 0.08	0.1 - 0.7
	2010	<0.1	0.03 - 0.09	0.1 - 1.0
	2011	<0.1	0.01 - 0.07	0.2 - 1.6
Poudre d'Or	2009	<0.1 - 0.2	0.01 - 0.27	<0.1 - 3.7
	2010	<0.1	0.01 - 0.24	<0.1 - 1.9
	2011	<0.1	0.03 - 0.08	0.1 - 2.3
Balaclava	2009	<0.1	0.02 - 0.05	<0.1 - 0.3
	2010	<0.1	0.02 - 0.06	<0.1 - 0.8
	2011	<0.1	0.03 - 0.06	0.1 - 1.0
Blue Bay	2009	<0.1 - 1.8	<0.01 - 0.09	0.2 - 0.7
	2010	<0.1	0.04 - 0.08	<0.1 - 0.8
	2011	0.2 - 0.5	<0.01 - 0.08	0.4 - 1.2
Belle Mare	2009	<0.1	0.01 - 0.07	0.2 - 1.5
	2010	<0.1	<0.01 - 0.06	<0.1 - 1.3
	2011	<0.1 - 0.3	0.02 - 0.08	0.2 - 0.8
Albion	2009	<0.1 - 1.8	0.03 - 0.06	0.1 - 1.2
	2010	<0.1	0.06 - 0.18	0.1 - 0.4
	2011	<0.1	0.01 - 0.11	0.2 - 2.0

Flic en Flac	2009	<0.1	0.02 - 0.06	0.1 - 0.8
	2010	<0.1	0.03 - 0.07	0.1 - 0.4
	2011	<0.1 - 0.2	0.01 - 0.07	0.9 - 2.2
Palmar	2009	<0.1	0.01 - 0.08	0.1 - 1.0
	2010	<0.1	0.01 - 0.08	0.4 - 1.9
	2011	<0.1 - 0.3	0.01 - 0.05	0.2 - 0.9
Mon Choisy	2011	<0.1	0.01 - 0.06	0.1 - 1.8
Pereybère	2011	<0.1	0.01 - 0.06	0.1 - 0.5
Le Morne	2011	<0.1 - 0.2	0.01 - 0.07	0.3 - 2.2
Bain Boeufs	2011	<0.1 - 0.3	0.01 - 0.04	0.4 - 1.5
Ferme Marine de Mahebourg	2011	< 0.1	0.01 - 0.02	0.4 - 1.0
Sable Noir	2011	<0.1 – 0.8	0.05 - 0. 38	0.42 – 2.67

Note: Detection limit for phosphate – 0.01 mg/l; Detection limit for nitrate-nitrogen – 0.1 mg/l
Coastal Water Quality Guideline Limits (Conservation): nitrate – nitrogen - 0.3mg/l, phosphate - 0.05 mg/l and COD –2mg/l
Coastal Water Quality Guideline Limits (Recreation): nitrate – nitrogen - 0.8mg/l, phosphate - 0.08mg/l and COD - 5mg/l
Coastal Water Quality Guideline Limits (Industrial): nitrate – nitrogen – 1.0 mg/, phosphate – 0.1mg/l and COD - 5mg/l

The levels of nitrate-nitrogen ranged between < 0.1 and 0.8 mg/l while that of phosphate between <0.01 and 0.38 mg/l and COD between <0.10 and 2.67 mg/l. The results were within the "*Guidelines for Coastal Water Quality Requirements for various categories: Govt. Notice No. 620 of 1999 (CWQG)"* except at one station at Trou d'Eau Douce, Baie du Tombeau, Poudre d'Or, Blue Bay, Albion and Sable Noir where high levels of phosphate were recorded. The high levels of phosphate recorded at these stations could be attributed to the influx of fresh water from the nearby rivers. The COD and nitrate levels were within the CWQG.

2.2.2 Trace metal analysis

Monitoring of the concentration of trace metals, namely lead and cadmium in water samples collected near river mouths at Grand River North West, Rivière Lataniers, Pointe Roches Noires, Grand River South East, Mahebourg, l'Escalier, Baie du Cap and Tamarin were carried out twice during the year. The levels of these two trace metals recorded were below their detection limits in all of the samples analysed. Similarly the level of mercury was also monitored at the same sites. Results of analyses indicated that levels of mercury in the water samples were below the detection limit. The detection limits using the

Atomic Absorption Spectrophotometer were: lead (Pb) – 0.013 mg/l, cadmium (Cd) – 0.0028 mg/l and mercury (Hg) – 0.030 µg/l.

2.2.3 Independent Environmental Audit on Wastewater Projects

The main objective of the monitoring exercise is to have an impartial assessment of the overall impacts of the wastewater projects on the coastal and marine environment. The monitoring of seawater quality was conducted at Pointe Moyenne, Montagne Jacquot and Baie du Tombeau outfalls and 56 sea water samples were collected for analysis. Results of analyses of seawater samples were within the *Coastal Water Quality Guidelines (Industrial)* as shown in Table 2.2 except for a high level of phosphate recorded in March and a high COD recorded in December at Montagne Jacquot Outfall.

Table 2.2: Water quality at the three outfalls (2009 – 2011)

Site	Year	Nitrate-Nitrogen (mg/l)	Phosphate (mg/l)	Chemical Oxygen Demand (mg/l)
Pointe Moyenne	2009	<0.1	0.02 - 0.08	0.1 - 1.0
	2010	<0.1	0.02 - 0.06	0.1 - 1.3
	2011	<0.1 - 1.0	0.02 - 0.09	0.1 - 4.1
Montagne Jacquot	2009	<0.1	0.01 - 0.08	0.1 - 4.6
	2010	<0.1	0.06 - 0.09	0.1 - 0.8
	2011	<0.1 - 0.7	0.02 - 0.12	0.2 - 6.1
Baie du Tombeau	2009	<0.1	0.01 - 0.07	0.1 - 0.5
	2010	<0.1	0.05 - 0.09	<0.1 - 0.5
	2011	<0.1	0.03 - 0.07	0.1 - 3.3
CWQG limit (Industrial)		**1.0**	**0.10**	**5.0**

The Ministry contributed in the preparation of the report (September 2010 - August 2011) on the Independent Environment Audit on Wastewater Projects (IEAWP) which monitors the quality of ground water (from boreholes),surface water (from rivers), seawater (in lagoons and at outfalls) and treated effluents (discharged from the treatment plants).

2.2.4 Fish mortality and alleged pollution

Two cases of alleged pollution were reported at Poste de Flacq and Pomponette. Cases of fish mortality were reported at Albion, Balaclava, Pointe Moyenne, Case Noyale and Rivulet Terre Rouge. Results of

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seawater analysed were within *CWQG* except at Pointe Moyenne where high levels of phosphate were detected at two of the stations of the outfall.

2.3 Monitoring of coliform bacteria at public beaches

Monitoring of the levels of total coliform (TC) and faecal coliform (FC) in seawater at selected public beaches was pursued on a monthly basis at 10 sites, namely: Flic en Flac, Trou aux Biches, Mon Choisy, Blue Bay, Albion, Pointe aux Sables, Grand Baie, Le Goulet, Belle Mare and Pereybère. The Blue Bay and Balaclava Marine Parks were sampled once during the year.

Results of water analyses showed that the levels of TC and FC at the selected beaches and the two marine parks were within the *CWQG* limits for primary contact (TC<1000 colonies/100ml and FC<200 colonies/100ml). Table 2.3 shows the levels of TC and FC at the various sites for the last five years.

Table 2.3: Results of coliform analysis at the monitoring sites

Beach	Station No.	Average Colony Forming Unit (CFU) per 100ml									
		2007		2008		2009		2010		2011	
		TC	FC	TC	FC	TC	FC	TC	FC	TC	FC
Flic en Flac	1	23	9	39	9	36	10	44	8	63	13
	2	36	8	55	15	48	13	55	11	58	11
	3	20	3	32	7	69	18	69	15	96	19
	4	42	14	71	21	76	20	100	23	109	22
	5	62	14	93	23	83	19	101	26	266	53
Trou aux Biches	1	33	10	36	7	42	13	139	32	90	18
	2	30	11	61	13	51	18	62	16	57	12
Mon Choisy	1	35	11	47	12	47	13	89	20	43	8
	2	27	7	26	7	44	16	55	15	34	7
	3	24	6	27	6	45	13	60	13	39	7
	4	32	8	39	10	53	15	51	13	45	7
Blue Bay	1	14	3	16	4	26	8	41	7	126	32
	2	20	6	27	6	29	8	53	10	50	14
	3	34	8	42	10	51	14	60	12	23	5
Albion	1	29	9	39	10	39	10	90	18	158	32
	2	83	24	172	36	71	36	227	48	329	63
Pointe aux Sables	1	763	148	624	117	853	172	805	175	143	27
	2	740	146	541	114	675	147	650	135	916	182
	3	25	7	101	24	67	20	249	56	896	186
	4	384	80	154	42	196	54	221	49	486	95
Grand Baie	1	21	5	55	20	45	12	76	22	75	15
	2	32	10	70	21	48	14	80	19	81	18
	3	14	4	54	14	50	14	115	27	115	27
	4	138	37	309	69	234	49	181	36	52	10
	5	298	67	332	72	189	38	148	30	65	16

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Le Goulet	1	21	7	24	6	26	9	69	18	266	53
Belle Mare	1	34	8	35	10	75	18	45	15	41	10
	2	26	7	58	13	86	22	71	19	77	18
	3	21	6	50	12	77	22	65	16	55	11
	4	24	6	58	12	57	14	54	14	71	14
	5	16	4	65	15	122	32	83	23	104	23
Pereybère	1	27	8	26	7	47	13	36	9	34	8
	2	43	15	7	7	48	12	45	9	46	9
	3	126	29	55	12	60	18	45	9	46	11
	4	164	34	63	14	97	24	81	19	49	13
Blue Bay Marine Park	1	ND	ND	4	ND	6	2	41	7	ND	ND
	2	ND	ND	ND	ND	ND	ND	53	10	13	3
	3	ND	ND	2	ND	8	2	60	12	25	5
Balaclava Marine Park	2	ND	ND	16	3	4	ND	6	2	ND	ND
	3	ND	ND	10	3	16	3	12	4	ND	ND
	4	ND	ND	4	1	5	1	3	ND	4	1
	6	ND	ND	ND	ND	ND	ND	7	2	ND	ND
Coastal Water Quality Guideline limits (CWQG)	**TC:** 1000 CFU/100ml **FC:** 200 CFU/100ml										

ND: Not Detected

The data collected on the TC and FC are submitted to the Ministry of Environment and Sustainable Development (MoESD) and other authorities, upon request, for purposes such as, assessment of coastal development projects, public health aspects and issues related to pollution as shown below:

- Committee on Lagoonal Pollution in Port Louis Region (MoESD)
- Independent Environment Audit on Wastewater Projects (MoESD)
- Sewage Master Plan (Ministry of Energy and Public Utilities)

2.4 Ecotoxicology

2.4.1 Fish toxicity tests

Three fish samples were received from the Ministry of Health and Quality of Life (Bambous Health Office, Rose Belle Health Office and Souillac Health Office) and one sample from the Import/Export Unit of the ministry to carry out toxicity tests. The specimens could not be identified as only parts of the fish were received. The samples were tested through the mongoose bioassay for ciguatoxin. Mongooses were fed on the flesh of the suspected fish specimen at 10% body weight for three consecutive days and the

animals were observed for any signs of intoxication. The fish samples received from the Bambous Health Office and the Rose Belle Health Office were found to be highly toxic.

2.4.2 Harmful marine microalgae

Monitoring of potentially harmful marine microalgae was undertaken at the four established sites, namely: Albion, Blue Bay, Le Morne and Trou aux Biches on a quarterly basis to determine the presence and density of harmful marine microalgae. The main species of dinoflagellates recorded were *Prorocentrum lima* and *Ostreopsis* sp. while *Gambierdiscus toxicus* and *Coolia* sp**.** associated with ciguatera fish poisoning were not observed. The number of dinoflagellates recorded is shown in table 2.4.

Table 2.4: Total number of dinoflagellates recorded (cell count/ml)

Species	Blue Bay	Trou aux Biches	Albion	Le Morne
***Ostreopsis* sp.**	2	9	2	nil
Prorocentrum lima	4	11	1	nil
Prorocentrum concavum	1	1	nil	nil
***Prorocentrum* sp.**	4	4	nil	nil
***Sinophysis* sp.**	2	nil	nil	nil

Small microscopic cells which are less than 1-5 microns discolour the water at much higher densities, around 100 000 cells per ml while those which are moderate to large algal cells (greater than 15 to 20 microns in diameter) which exceed 15 000 cells per ml of water are referred to as a bloom. (source: Department of Water, Government Western Australia, www.water.wa.gov.mu/PublicationStore /first/10085.pdf)

3. AQUACULTURE

Seed production of berri rouge, (a hybrid of *Oreochromis* spp.) of the Malaysian variety and giant freshwater prawn *(Macrobrachium rosenbergii)* were pursued and the fingerlings were supplied to fish farmers. A broodstock of mud crab (*Scylla seratta*) was constituted for seed production. Breeding and culture of freshwater ornamental fish namely gold fish *(Carassius auratus),* platy (*Xiphophorus maculatus*) and molly (*Poecilia latipinna*) were also undertaken.

3.1 Plankton culture

The seeds of the phytoplankton, *Nannochloropsis* sp. and *Tetraselmis* sp. were maintained in the phytoplankton room. Mass production of *Nannochloropsis* sp. was undertaken in outdoor tanks for mass culture of the zooplankton, *Brachionus rotundiformis,* a rotifer, to provide live feed for crab larvae.

3.2 Giant freshwater prawn culture

3.2.1 Broodstock

Berried females were procured from private farms for seed production of the giant freshwater prawn from October to April to service 25 small farmers. A total of 189 prawn spawners of body weight ranging from 15 to 25 g were acquired from Medine Sugar Estate, SODIA (a private firm), Riche en Eau Sugar Estate and from a farm at Montagne Longue for the production cycle. They were fed with chopped frozen mussels and shrimps and were maintained under controlled conditions for spawning.

3.2.2 Seed production

Larval rearing cycles were carried out in water of salinity 12 ppt. The giant freshwater prawn larvae were fed daily on brine shrimp nauplii, *Artemia* sp. and "egg cake". Post-larvae were obtained after a culture period ranging between 35 and 50 days after which the salinity of the water was gradually brought down to zero. A total of 169 150 juveniles was produced and sold to 19 farmers for culture.

3.3 "Berri rouge" culture

3.3.1 Broodstock and fingerling production

The broodstock of "berri rouge" was maintained in outdoor concrete ponds. The fish were fed on extruded red snapper pellets. Reproduction occurred naturally in the ponds. A total of 6 570 fingerlings was collected out of which 2 270 were distributed free of charge to 51 small scale farmers while 4 300 were sold to two commercial farmers at Rs. 1.25/unit.

3.4 Breeding and seed production of freshwater ornamental fish

Breeding and seed production of goldfish (*Carassius auratus)* was continued and a total of 488 gold fish was sold to 30 individuals. Sailfin molly (*Poecilia latipinna*) and platy (*Xiphophorus maculates)* cultured in the hatchery were kept for broodstock constitution and distribution.

3.5 Aquaculture extension service

Technical advice was provided on site selection, water quality, pond management, disease surveillance and harvesting amongst others to 102 persons interested in aquaculture. Site visits were undertaken to assist the potential fish farmers. Eight projects were examined, out of which, six were recommended.

3.6 Marine ranching programme

A total of 75 000 cordonnier (*Siganus* sp) fry was collected from the lagoon of Pointe aux Cannoniers in November. The fry of average length 1 cm and body weight 0.27 g was reared in the hatchery for 25 days and fed on crushed macro algae prior to stocking in outdoor ponds for further growth so as to be released in the wild.

3.7 Ferme Marine de Mahebourg Ltd. (FMML)

The Ferme Marine de Mahebourg Ltd. (FMML) is involved in the culture of red drum and sea bass in floating cages in the lagoon. Two consignments of sea bass (*Dicentrarchus labrax*) were imported from France for culture purposes. The activities of the farm and growth of sea bass were monitored as per the

conditions set by the Ministry. The production of red drum and sea bass was 456 tonnes and 2 tonnes respectively.

3.8 Project on "Post-Larval Capture and Culture" of marine ornamental fish

The "Post Larval Capture and Culture" (PCC) of marine ornamental fish was undertaken by a private promoter at Pointe aux Sables in collaboration with the Aquaculture Division. The post-larvae were collected in the fore-reef of Albion using the "Collect by Artificial Reef Eco-friendly Devices" (CAREs) method. A total of 1 289 fish mainly "demoiselle bleue et jaune" (*Pomacentrus caeruleus*), "chromis de l'Ocean Indien" (*Chromis nigrura*), "demoiselle a queue jaune" (*Plectroglyphidodon imparipennis*) and "dacyllus à trois points" (*Dascyllus trimaculatus*) were cultured and exported to France. 574 damsel fishes (*Chromis spp.)* and snappers (*Ludjanus fulviflamma*) were released in the lagoon at Albion.

3.9 Aquaculture production

Production of red drum and sea bass for the local market amounted to 458 tonnes, out of which 236 tonnes of chilled red drum were exported mainly to France, South Africa, USA, Portugal, Spain and Italy. An estimated amount of 1 tonne of fish and 1.2 tonne of mud crab were harvested from different barachois. The production of freshwater fish (berri rouge) and freshwater prawn was 71.1 tonnes and 3 tonnes respectively. The production details are shown in table 3.1.

Table 3.1: Aquaculture production

Fish	Quantity (tonnes)
"Berri rouge"*	71.1
Freshwater prawn	3.0
Marine fish (barachois)	1.0
Mangrove crab (barachois)	1.0
Red drum, seabass (floating cages)	458.0
Total	534.1

*** (Production of "berri rouge": Val Farms=20.5 T, Bel Air SE =11 T, Riche en Eau=37 T, Estimates of other farmers = 2.6 T)**

4. MARINE CONSERVATION

The Marine Conservation Division is responsible for the conservation of marine biodiversity in the marine protected areas. The division also participated in the evaluation of Environmental Impact Assessment (EIA) reports and Preliminary Environmental Reports (PER), in post-EIA monitoring for coastal development projects and assessment of coastal and tourism-related development projects.
In addition the division represented the Ministry in various inter-ministerial committees, sub-committees and boards namely of the Maurice Ile Durable (MID) Project, National Ramsar Committee, Integrated Coastal Zone Management Committee and Wild Life Advisory Board.

4.1 Blue Bay Marine Park (BBMP)

4.1.1 Management

The management of the BBMP involved the monitoring, control and surveillance of permissible activities in the park which included glass bottom boating, snorkelling, diving, fishing, water skiing, swimming and non-motorised boating. Seven (7) picked up cases of illegal fishing implements were recorded comprising prohibited fishing gear such as basket traps (3), underwater fishing equipment (2), line and hooks (1) and fishing nets (1). Twelve (12) contraventions were established which included access to the park without a permit (6) and illegal fishing (6).

4.1.2 Permit fees

During the year, Rs. 1 022 900 was collected against the delivery of 422 permits for permissible activities in the park. 67 permits were delivered free of charge as they were issued to registered artisanal fishermen. Details on the charge for each permit, monthly permits issued with revenue collected and new and renewed permits are given in table 4.1.

Table 4.1: Return of permits

Permit	Charge per permit	New Issue	Renewal	No charge*	Total	Amount (Rs)
Boat Vessel (B/V)	Rs. 5000 Yearly/Renewal Rs. 100 weekly No charge for registered fishermen	44	102 Out of the 102 1 (renewed for 4 weeks) and 2(renewed for 1 week)	34	146	**531 100**
Commercial (COM)	Rs. 5000 Yearly/Renewal	21	46	Nil	67	**335 000**
Line Fishing (L/F)	Rs. 200 Yearly/Renewal No charge for registered fishermen	2	97	15	99	**16 800**
Recreational (REC)	Rs. 1000 Yearly/renewal	3	80	Nil	83	**83 000**
Temporary Interference (T/INT)	Rs 7 000 per month or part thereof	Nil	8	Nil	8	**56 000**
Basket trap (BTR)	Rs. 1000 Yearly/renewal for non-registered fishermen No charge for registered fishermen	6	13	18	19	**1000**
TOTAL		**76**	**346**	**67**	**422**	**1 022 900**

*: No charge for registered fishermen

4.1.3 Coral reef ecosystem monitoring at the BBMP

The monitoring of the five permanent stations was continued. Data on corals, macro-algae, marine invertebrates and fish were collected. Tabular corals were the dominant species in the park (Table 4.2). The dominant fish species belonged to the Acanthuridae, Labridae, Scaridae, Chaetodontidae and Pomacentridae families (Table 4.3).

Table 4.2: Percentage substrate cover in the Blue Bay Marine Park

Life form categories	Station 1		Station 2		Station 3		Station 4		Station 5	
	2010	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
Acropora branching	7.6	29	12.5	41.9	27.2	25.5	<0.1	<0.1	<0.1	<0.1
Acropora digitate	3.1	<0.1	1.5	7.3	0.8	<0.1	<0.1	<0.1	<0.1	<0.1
Acropora tabular	0.1	1.75	21.4	<0.1	3.5	<0.1	<0.1	<0.1	<0.1	<0.1
Coral foliose	<0.1	<0.1	9.3	0.75	2.0	6.8	<0.1	<0.1	<0.1	<0.1
Coral massive	0.6	0.5	7.3	<0.1	1.8	<0.1	<0.1	<0.1	<0.1	<0.1
Coral submassive	0.5	0.6	9.7	<0.1	0.5	2.5	<0.1	<0.1	<0.1	<0.1
Mushroom coral	<0.1	<0.1	0.2	1	<0.1	1.6	<0.1	<0.1	<0.1	<0.1
Coral encrusting	0.1	0.3	<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	<0.1
Total live coral cover	**12**	**32.15**	**61.9**	**50.95**	**38.1**	**36.4**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Sand	14.0	2.5	1.9	1.6	3.2	<0.1	96.8	97.2	20.1	19.8
Rock	25.5	<0.1	<0.1	<0.1	5.3	<0.1	2.5	2.3	37.4	37.2
Rubble	29.5	52.3	<0.1	<0.1	3.0	<0.1	<0.1	<0.1	10.9	12.8
Dead coral	18.2	12.9	35..8	44.8	31.2	59.8	<0.1	<0.1	<0.1	<0.1
Macroalgae	3.2	<0.1	<0.1	<0.1	9.4	2.7	<0.1	<0.1	25.9	29.4
Coralline algae	0.3	<0.1	0.4	<0.1	8.9	0.5	<0.1	<0.1	<0.1	<0.1
Turf algae	<0.1	<0.1	<0.1	1.6	<0.1	0.5	<0.1	<0.1	<0.1	<0.1
Sea grass	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zoanthid	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Table 4.3: Number of fish/100 m^2 in the Blue Bay Marine Park

Family	Station 1	Station 2	Station 3	Station 4	Station 5
Fast fish					
Acanthuridae	57	63	49	n.o	24
Aulostomidae	2	3	6	n.o	n.o
Balistidae	3	3	n.o	n.o	12
Blenniidae	n.o	n.o	2	3	n.o
Chaetodontidae	23	15	19	n.o	13
Gobidae	2	n.o	3	8	n.o
Labridae	34	19	36	n.o	17
Lethrinidae	6	5	18	n.o	n.o
Monacanthidae	1	n.o	n.o	n.o	n.o
Mugilidae	27	57	34	n.o	17
Mullidae	n.o	n.o	2	8	n.o
Scaridae	35	48	41	n.o	27
Serranidae	5	2	5	n.o	2
Siganidae	6	8	31	n.o	18
Sparidae	n.o	n.o	n.o	n.o	21
Zanclidae	2	4	14	n.o	n.o
Total	**180**	**227**	**260**	**19**	**151**
Sedentary fish					
Plotosidae	n.o	n.o	n.o	32	n.o
Pomacentridae	78	98	189	n.o	58
Total	**258**	**325**	**449**	**51**	**209**

n.o: not observed

4.2 Balaclava Marine Park (BMP)

4.2.1 Management

The Balaclava Marine Park core enforcement staff regularly carried out coast and afloat patrols in the marine park area. Information on the Marine Protected Areas Regulations was disseminated to users of the marine park comprising registered and amateur fishers, pleasure craft and private boat operators, tourists and the public at large. They were sensitised on the conservation and protection of the marine ecosystem.

23 artisanal fishing boats, 6 glass-bottom boats, 17 speedboats, 6 security/rescue boats, 9 diving/snorkelling boats, 2 parasails, 22 pedalos, 46 kayaks, 17 lasers, 5 hobby cats, 23 windsurfs and 124 snorkelling sets operated in the park. Fishing activities observed within the park area were mainly with handlines and basket traps.

4.2.2. Construction of the BMP Centre

Consultations for the construction of the BMP Centre were held with the hotel promoter and representatives of the Ministry of Housing and Lands, Ministry of Public Infrastructure and the Ministry of Finance and Economic Development.

4.2.3 Coral reef ecosystem monitoring at the BMP

Long-term monitoring was carried out at all the seven established permanent stations within the park. The Line Intercept Transect method was used to collect data on the sea-bottom substrate in terms of coral cover, algae and abiotic components. Data on abundance of fish and marine invertebrates were also recorded.

The coral cover at most of the stations in the park remained stable except for station 1 and station 6 which showed signs of coral degradation. This may be attributed to sedimentation and anthropogenic activities.

The branching acropora corals were pre-dominant in the back-reef (lagoonal) stations of the park whilst in the fore-reef stations of the park the massive and sub-massive corals were the most abundant ones. The details of results on percentage substrate cover are given in table 4.4.

Table 4.4: Percentage of substrate cover at the BMP

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
Life form categories	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**	**2010**	**2011**
Acropora branching	28.2	7.0	2.0	8.2	18.2	< 0.1	48.0	49.9	<0.1	0.2	1.7	5.5	0.0	< 0.1
Acropora digitate	3.1	< 0.1	18.3	< 0.1	3.2	< 0.1	<0.1	< 0.1	<0.1	< 0.1	<0.1	< 0.1	0.0	< 0.1
Acropora tabular	4.2	< 0.1	0.0	< 0.1	1.3	< 0.1	5.3	< 0.1	<0.1	< 0.1	<0.1	< 0.1	0.0	< 0.1
Coral encrusting	4.0	< 0.1	0.0	< 0.1	3.3	9.3	0.1	< 0.1	3.2	9.0	<0.1	< 0.1	11.7	12.3
Coral foliose	2.0	< 0.1	0.2	< 0.1	1.2	< 0.1	7.0	< 0.1	<0.1	< 0.1	<0.1	< 0.1	0.0	< 0.1
Coral massive	6.8	2.6	17.2	23.5	11.2	33.8	<0.1	0.5	27.3	14.3	<0.1	2.8	11.1	8.5
Coral sub-massive	2.3	0.8	11.6	1.3	3.3	12.1	1.0	3.7	2.1	1.5	5.5	0.8	1.3	4.6
Mushroom Coral (solitary coral)	1.2	0.3	0.0	< 0.1	1.0	< 0.1	<0.1	2.0	<0.1	< 0.1	<0.1	< 0.1	0.0	< 0.1

Millepora (fire coral)	<0.1	0.2	0.0	< 0.1	<0.1	< 0.1	2.2	< 0.1	<0.1	< 0.1	<0.1	< 0.1	0.0	< 0.1
Soft coral	<0.1	< 0.1	0.0	< 0.1	<0.1	< 0.1	<0.1	0.3	<0.1	5.3	<0.1	< 0.1	0.8	1.0
Total live coral cover	**51.8**	**10.5**	**49.3**	**33.1**	**42.7**	**55.3**	**63.6**	**56.4**	32.6	**30.3**	7.2	**9.2**	**24.9**	**26.4**
Rubble	2.6	19.8	4.4	1.8	5.9	18.1	0.5	6.3	6.8	< 0.1	10.2	48.7	1.4	1.8
Rock	4.2	11.9	6.9	0.3	7.6	1.5	<0.1	< 0.1	17.7	35.6	<0.1	< 0.1	67.9	67.1
Sand	3.5	3.0	6.1	4.7	5.0	4.2	<0.1	< 0.1	7.4	7.3	<0.1	4.3	2.1	2.7
Turf algae	1.3	1.1	12.5	< 0.1	<0.1	7.5	7.2	13.0	<0.1	3.1	<0.1	0.8	0.0	0.8
Macroalgae	1.2	< 0.1	2.0	4.5	3.3	7.4	0.1	9.8	30.0	21.9	<0.1	3.1	2.6	1.0
Coralline algae	4.2	8.5	0.5	8.3	3.5	< 0.1	6.2	0.7	5.5	1.8	<0.1	1.5	0.0	0.2
Dead coral	31.2	44.8	16.0	47.4	26.0	6.1	22.4	13.8	<0.1	< 0.1	82.6	32.5	1.0	< 0.1

Fish belonging to the Acanthuridae, and Pomacentridae families were more abundant as compared to the Labridae, Chaetodontidae and Scaridae families. Processed data on the fish count per family at the different stations is presented in table 4.5.

Table 4.5: Number of fish/100m^2 at BMP

Family	**Station**	**Station**	**Station**	**Station**	**Station**	**Station**	**Station**
Fast fish	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Acanthuridae	287	41	77	180	143	195	76
Chaetodontidae	2	37	15	7	3	11	7
Labridae	31	19	23	7	1	108	11
Scaridae	27	25	9	46	15	35	30
Serranidae	14	4	38	11	2	17	13
Siganidae	7	3	11	15	7	8	3
Total	**368**	**125**	**173**	**266**	**171**	**374**	**140**
Sedentary fish							
Holocentridae	n.o	n.o	n.o	n.o	n.o	n.o	n.o
Pomacentridae	314	286	44	371	37	50	39
Pomacanthidae	n.o	n.o	n.o	n.o	n.o	n.o	n.o
Haemilidae	n.o	n.o	n.o	n.o	n.o	n.o	n.o
Fistulariidae	n.o	n.o	n.o	n.o	n.o	n.o	n.o
Zanclidae	n.o	n.o	n.o	n.o	n.o	1	5
Total	**314**	**286**	**44**	**371**	**37**	**51**	**44**

n.o: not observed

4.3. Permits/Clearances

4.3.1 Interference Permits within MPAs

Twelve (12) temporary interference permits were issued against payment of Rs 84 000 as overall fees for firework displays in MPAs around the island while one permanent interference permit was issued for a swimming zone at the Black River Fishing Reserve against payment of a sum of Rs 75 000.

4.3.2 Firework displays

Sixty requests were received for firework displays out of which 11 were carried out in Marine Protected Areas and required the payment of interference permits. Underwater surveys were carried out at these sites in order to identify suitable locations for the placing of barges from which fireworks were shot. Firework displays are permitted according to a set of conditions.

4.4 Environmental Impact Assessment (EIA)

Twenty five (25) new EIA applications were assessed and recommendations were made to the Ministry of Environment and National Development Unit (Appendix 9). Eighteen of the EIA applications involved major coastal projects such as hotel development, integrated resort schemes (IRS), beach re-profiling, dredging works, construction of rock revetments and jetties as indicated in appendix 9**.**

4.5 Underwater surveys in connection with coastal development projects

Eighteen (18) underwater ecological surveys were carried out in the lagoon at various sites around Mauritius in connection with coastal development projects.

4.6 Partnerships for Marine Protected Areas (MPAs) in Mauritius and Rodrigues

The co-funded UNDP/GEF/GOM Project "*Partnerships for Marine Protected Areas in Mauritius and Rodrigues"* was in its final year of implementation. A Management Plan was developed for the South East Marine Protected Area (SEMPA) of Rodrigues while the draft Management Plans for the Blue Bay and Balaclava Marine Parks were finalised. The legal framework for the MPAs was reviewed. A study on the carrying capacity of both parks was completed. Educational tool kits for school children were developed for sensitisation campaigns on MPAs.

4.7 Network of Marine Protected Areas of the Countries of the Indian Ocean Commission (NMPA-IOC)

A workshop was conducted at AFRC in March 2011 on the proposed "*Draft Regional Strategy and Action Plan for Conserving Marine Ecosystems and Fisheries in the Western Indian Ocean Islands Marine Eco-Region*" – *WIOMER* Project.

4.8 Coastal ecosystem research

4.8.1 Long-term monitoring of the coral reef ecosystem

The long-term monitoring of the coral reefs was carried out at 3 established sites viz: Pointe aux Sables (1 station), Anse la Raie (2 stations) and Poudre d'Or (1 station). Data on substrate cover were collected using the Line Intercept Transect (LIT) method. The data were processed by the COREMO software and the average percentage cover of substrate is shown in figure 4.1 and table 4.6. The abundance of fish, sea urchins and sea cucumbers is given in table. 4.7.

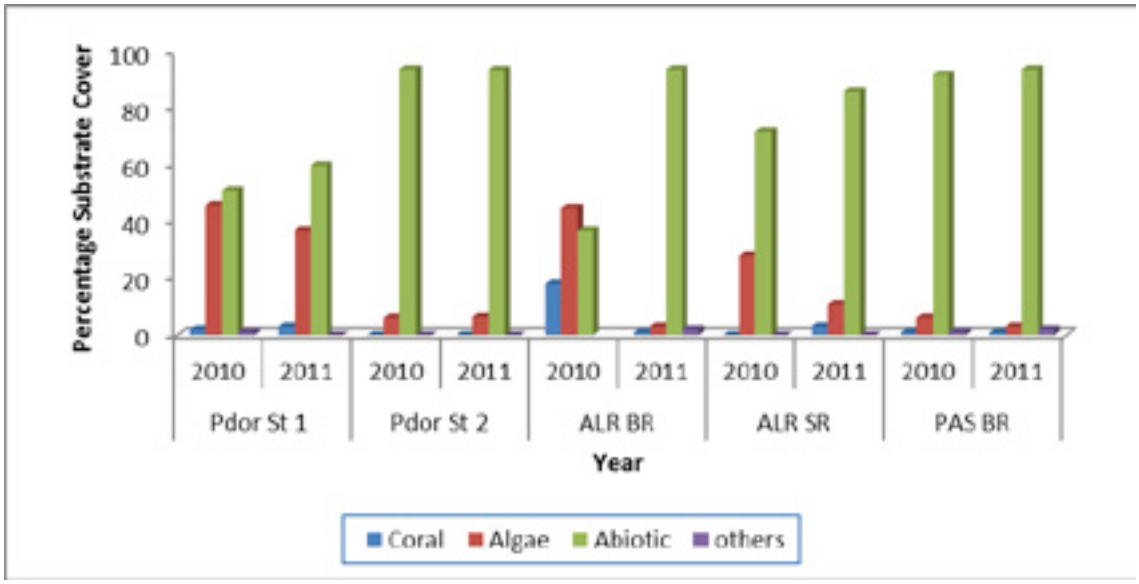


Figure 4.1: Average percentage of substrate cover at monitoring stations

Pdor St 1- Poudre d'Or Stn 1 , Pdor St 2- Poudre d'O r Stn 2 ; ALRBR – Anse la Raie back reef, ALRSR – Anse la Raie shore reef ; PASFR- Pte aux Sables fore reef, PASBR- Pte aux Sables back reef

Table 4.6: Percentage of substrate cover at monitoring stations

Site	Stations	Year	Coral	Algae	Abiotic	Others
Poudre d'Or	site 1	2011	3.0	37.0	60.0	-
		2010	2.0	46.0	51.0	1.0
	site 2	2011	0.0	6.3	93.7	-
		2010	0.0	6.0	94.0	
Anse la Raie	back reef	2011	0.3	3.3	94.6	1.8
		2010	18.0	45.0	37.0	
	shore reef	2011	2.8	11.2	85.9	-
		2010	0.0	28.0	72.0	1.0
Pointe aux Sables	back reef	2011	0.5	3.3	94.4	1.7
		2010	1.0	6.0	92.0	1.0

Table 4.7: Abundance of fish, sea urchins and sea cucumber

SITE	Stations	Year	Pomacentridae & Chaetodontidae	Acanthuridae	Labridae	Scaridae	Sea cucumber	Sea urchin
Poudre d'Or	site 1	2011	xxxx	*	x	*	1	*
	Site 2	2010	xxxx	x	*	xxx	*	*
Anse la Raie	Back reef	2011	xxxx	*	xx	xx	*	*
	Shore reef	2010	xxxx	*	*	xx	2	*
Pointe aux Sables	Back reef	2011	*	*	x	*	*	139

*** Not observed; X – 0-10, XX- 10-50, XXX – 50-100, XXXX - >100**

4.8.2 Coral farming

The pilot project on coral farming started in 2008 in the lagoon of Albion and the main objective was to farm corals in ocean based nurseries. As the coral fragments continued to grow under normal conditions in the ocean based nursery a reef ecosystem was thus created attracting various fish species such as the damsel fish, *Chromis viridis,* and "domino", *Dascyllus aruanus.* Coral larvae also adhered on the basal table to grow as new colonies as shown in figure 4.2.

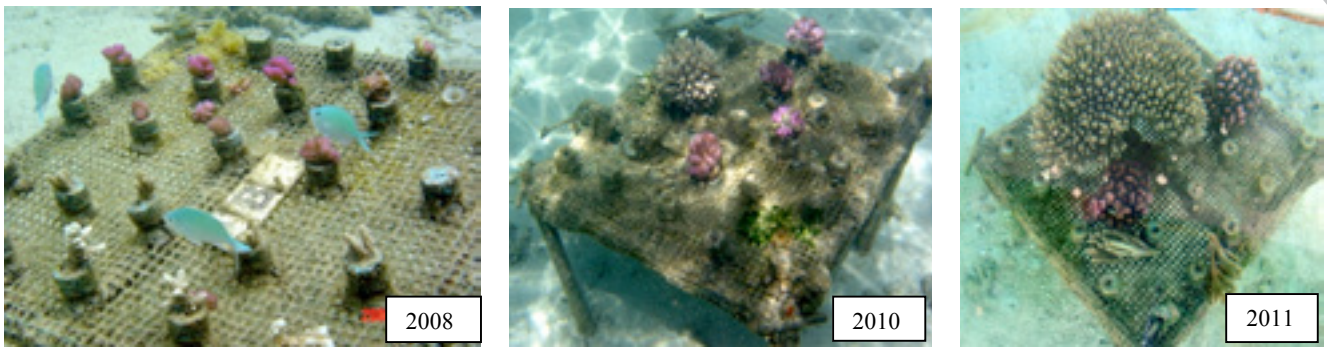


Figure 4.2: Basal table in 2008, 2010 and 2011

4.8.2.1 Africa Adaptation Programme (AAP)

The *"Africa Adaptation Programme (AAP) – Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa"* is a project funded by the Government of Japan under its Cool Earth Partnership for Africa, implemented by the UNDP and coordinated by the Ministry of Environment and Sustainable Development. With the success of the pilot project and the need to conserve and protect this fragile ecosystem, a demonstration project on coral farming was approved for an amount of Rs. 1.2 M to be implemented at 3 sites in Mauritius and 2 sites in Rodrigues.

In Mauritius, the lagoons of Albion, Trou aux Biches and Pointe aux Sables were chosen due to their degraded state of corals. Twenty five basal tables (50 x 50 cm) were constructed, out of which five were fixed in the lagoon of Albion. Underwater surveys were carried out for the selection of areas for the fixing of basal tables in the lagoons of Pointe aux Sables and Trou aux Biches. The basal tables were fixed at a depth of about 2m (figure 4.3) having a good tide flushing rate so as to give optimum growth factors to the coral fragments.

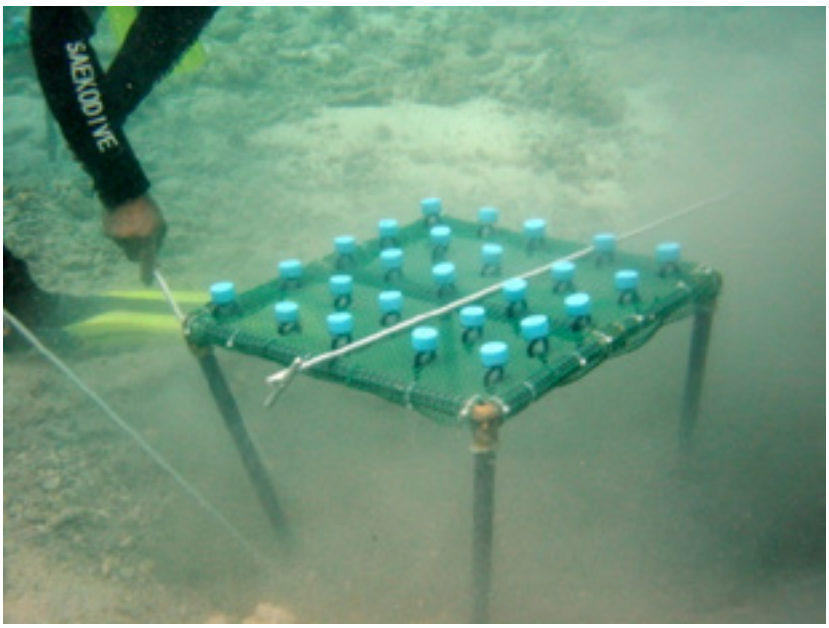


Figure 4.3: Fixing of basal tables at sea

4.8.3 Collaboration with Mauritius Research Council (MRC)

Under the project 'Development of Seaweed Industry in Mauritius and Rodrigues', the Ministry of Fisheries and Rodrigues assisted the MRC in the collection of five species of seaweeds, namely: *Padina gymnospora, Ulva lactuca, Turbinaria spp, Acanthophora spp. and Sargassum binderi.* As from June the five species of seaweed were collected, identified and provided to the University of Mauritius for further analysis.

4.8.4 Mangrove propagation

Following representations made by the Fishermen Association (South) in connection with problems of erosion at Le Batelage, Souillac, the fishermen agreed to plant mangroves in the estuary. In March a planting demonstration was carried out with mangrove propagules which were collected and planted along the eastern border of the river. As the fruiting season for the year had elapsed the activity was postponed to 2012.

Requests for the plantation of mangroves were received from NGOs, namely: "Association pour le Développement Durable (ADD)" and "Eco Sud". Officers assisted these organisations in the planting exercise. ADD planted mangroves at Quatre Soeurs, Pointe aux Feuilles and Le Morne while Eco Sud planted mangroves in the region of Pointe Jerôme, La Chaux and Rivière des Créoles.

4.8.5 Ad-hoc surveys

4.8.5.1 Survey for dredging of boat passage at Le Batelage, Souillac

An underwater ecological survey was conducted at Le Batelage, Souillac, following a representation from fishermen of the region in connection with accessibility of boats to navigable waters at low tide. The survey conducted in the presence of fishermen from the "Association des Pêcheurs Professionels du Sud" revealed that the existing boat passage was obstructed with river runoff. The absence of marine biota was noted and the dredging of the obstructed boat passage was thus recommended as it was the only navigation channel to deeper waters.

4.8.5.2 Underwater survey at FITEC in the lagoon of Pointe aux Sables

An underwater survey carried out showed that the dredged boat passage of FITEC in the lagoon of Pointe aux Sables to the open sea was completely filled with rubble and gravel and the dredging of the boat passage was recommended.

5. FISHERIES RESEARCH, DEVELOPMENT AND TRAINING

5.1 Training of fishermen in small scale tuna longline fishing

Nineteen fishermen followed the training course organised under the "Rehabilitation of Fisheries Facilities Project" of the Overseas Fisheries Cooperation Foundation of Japan (OFCF). Mr. H. Muto, OFCF expert, conducted the training course.

5.2 Training in fish handling, preservation and marketing

The training course targeting fishmongers was launched in 2009 and continued in 2010 and 2011. A total of 728 trainees completed the course.

151 fishmongers attended the 5 half-day training course in 5 batches in 2011 as shown in table 5.1. The main objective of the training course was to inculcate in fishmongers good fish handling and preservation practices.

Table 5.1: Number of fishmongers trained from 2009 - 2011

Year	No. of fishmongers trained
2009	269
2010	308
2011	151
Total	728

5.3 ISO certification of FiTEC

The validity of the MS ISO 9001:2008 certificate was continued after the "External Audit" carried out by the Mauritius Standards Bureau (MSB).

5.4 FAD Fishery

Fish Aggregating Devices (FADs) have been set at 27sites around the island and as at the end of the year 21 FADs were active. One new single buoy FAD was proposed to be deployed at a site identified at Pointe aux Caves. Figure 5.1 shows the location of the FADs while the details of the FADs locations are given in table 5.2.

Figure 5.1: Location of fish aggregating devices around Mauritius

Table 5.2: Location of fish aggregating devices

Sn	Name	Depth (m)	Δ Coast (nm)	Date set	Lat. (South)	Long. (East)
1	Pte aux Sables	300	1.20	25/06/10	20° 09' 584	57° 25' 055
2	Albion	1350	2.35	30/06/09	20° 09' 410	57° 23' 263
3	Port Louis I	3560	12.10	01/10/09	20° 03' 160	57° 15' 454
4	Tombeau Bay	1050	2.60	4/11/2011	20° 04' 413	57° 27' 890
5	Trou aux Biches II	2730	6.82	20/10/11	20° 01' 559	57° 24' 136
6	Trou aux Biches I	2000	4.30	23/9/2011	20° 00' 161	57° 27' 841
7	Flat Island	750	9.64	08/10/09	19° 49' 434	57° 34' 373
8	Poudre D'or II	240	4.20	05/05/09	20° 02' 327	57° 46' 035
9	Trou D'eau Douce	992	2.87	08/01/09	20° 13' 884	57° 51' 561
10	Grand Carreau	260	8.20	31/03/11	20° 21' 622	57° 55' 339
11	Souillac	1001	2.10	06/10/09	20° 33' 676	57° 31' 058
12	Baie du Cap	855	2.70	31/03/11	20° 33' 073	57° 23' 283
13	Riv. Noires I	914	4.50	13/01/11	20° 23' 596	57° 16' 771
14	Riv. Noires III	3090	9.02	14/12/11	20° 17' 901	57° 12' 119
15	Riv. Noires II	480	2.20	13/04/11	20° 21' 69	57° 19' 780
16	Tamarin	450	2.20	30/9/2011	20° 19' 554	57° 19' 643
17	Flic en Flac I	1200	2.50	09/03/11	20° 15' 99	57° 19' 39
18	Flic en Flac II	190	0.91	25/05/11	20' 17' 808	57' 20' 707
19	La Preneuse	2500	5.20	16/04/09	20° 17' 786	57° 16' 379
20	Port Louis II	3400	8.35	21/12/11	20° 08' 403	57° 16' 088
21	Blue Bay	968	2.40	05/05/09	20° 29' 110	57° 43' 540
22	Mon Choisy	600	1.70	16/10/09	20° 01' 422	57° 30' 348
23	Maritime	410	1.43	12/01/10	20° 04' 210	57° 29' 218
24	Medine	2510	5.17	13/04/11	20° 12' 765	57° 17' 627
25	Roches Noires	740	5.40	27/05/11	20' 02' 542	57' 48' 885
26	Albion II	430	1.20	06/09/11	20' 17' 808	57' 20' 707
27	Pte aux Caves	**Site identified for single buoy FAD**				

5.5 FAD fishery monitoring

Data were collected throughout the year for the FAD Fishery based on the stratified sampling method. Enumerators collected primary data at selected fish landing stations. Data were processed using the Statistical Package for Social Sciences (SPSS) software.

In 2011 the total catch was estimated to be 258 tonnes and the catch per fisherman day (CPFD) was 16 kg and higher as compared to that of the lagoon/off-lagoon (6.9 kg).
Catch, effort and CPFD are given in the table 5.3.

Table 5.3: Catch, effort and CPFD per month

FAD statistics			
Month	**Catch (kg)**	**Effort (fisherman days)**	**CPFD (kg)**
Jan	51 181	2 699	19
Feb	1 457	114	13
Mar	10 585	579	18
Apr	15 640	1 251	13
May	12 355	1 087	11
Jun	1 396	145	10
Jul	378	122	3
Aug	6 836	871	8
Sep	239	47	5
Oct	29 975	3 262	9
Nov	71 590	3 182	23
Dec	56 698	2 752	21
Total	**258 329**	**16 111**	**16**

The CPFD was observed to be higher in the summer months with a peak of 23 kg in November and minimum of 3 kg in July.

The catch per species over the year indicates that "germon" (*Thunus alalunga)* constitutes the bulk of the catch (57.3%) with a peak of 50 tonnes in November. The catch also comprises "thon jaune" (*Thunus albacares)* – 31.2%, "dorade" (*Coryphaena hippurus)* - 3.5%, "bonite" (*Katsuwonus pelamis)* – 7.0%, "becune" *(Acanthocybium solanrdri)* - 10.6% and shark (*Carcharinus sp.)* - 0.4%. Details of catch per species for the year are shown in table 5.4 and figure 5.3.

Table 5.4: Catch per species (live weight in kg))

Year 2011										
Common Name		Germon	Thon jaune	Dorade	Bonite	Becune	Shark	Big-eye	Other	**Total Catch (Kg)**
Scientific Name		*Thunus alalunga*	*Thunus albacares*	*Coryphaena hippurus*	*Katsuwonus pelamis*	*Acanthocybium solandri*	*Carcharinus spp.*	*Thunnus obesus*		
Month	January	43363	6276	110	697	344	391	Nil	Nil	51181
	February	669	789	Nil	Nil	Nil	Nil	Nil	Nil	1457
	March	5472	1864	1550	904	796	Nil	Nil	Nil	10585
	April	5592	9200	Nil	779	47	22	Nil	Nil	15640
	May	5657	4491	1070	636	Nil	502	Nil	Nil	12355
	June	1312	Nil	26	57	Nil	Nil	Nil	Nil	1396
	July	Nil	313	65	Nil	Nil	Nil	Nil	Nil	378
	August	Nil	5983	Nil	854	Nil	Nil	Nil	Nil	6836
	September	Nil	164	Nil	74	Nil	Nil	Nil	Nil	239
	October	2328	26410	783	219	235	Nil	Nil	Nil	29975
	November	50023	8440	3986	9140	Nil	Nil	Nil	Nil	71590
	December	33079	16189	1736	5573	121	Nil	Nil	Nil	56698
Total		**147495**	**80118**	**9325**	**18933**	**1543**	**915**	**Nil**	**Nil**	**258329**

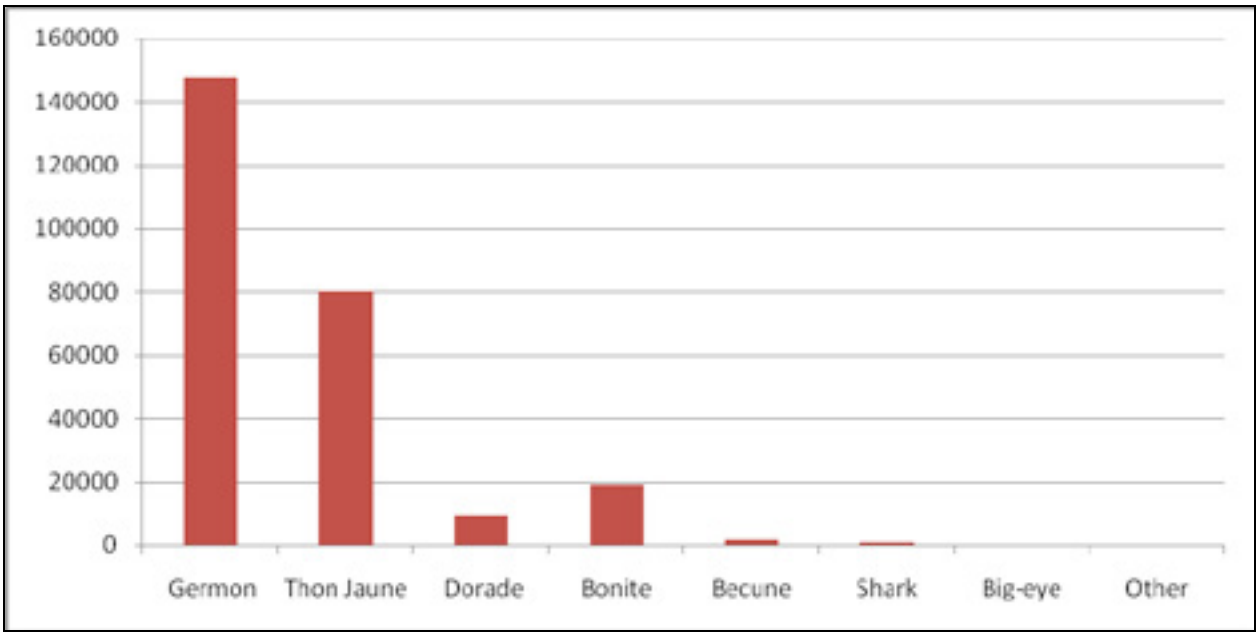


Figure 5.2 Catch per species for 2011 (kg)

5.6 Research and training boats

The research and training boats “Maustral” and “Sphyrna II” carried out a total of 53 sea trips for the deployment and maintenance of FADs and the training of fishermen.

6. LICENSING/TUNA/IMPORT AND EXPORT

6.1 Licensing of fishing boats and vessels

Different fishing licences were issued to authorise local and foreign fishing boats and vessels to fish in the Exclusive Economic Zone (EEZ) of Mauritius. Mauritian fishing boats and vessels were licensed to operate in the semi-industrial fishery, banks fishery and longline fishery. Fishing licences were issued to foreign vessels under a set of conditions against payment of the licence and application fees.

6.1.1 Licensing of Mauritian fishing boats and vessels

Licences were issued to 24 Mauritian fishing boats more than 12m but less than 24m LOA engaged in the semi-industrial fishery. These boats targeted mainly shallow-water demersal species on the Albatross and Nazareth banks. Nine fishing boats were also engaged in the deep-water demersal fishery on the slopes of the St Brandon bank and one boat was active in the deep-water shrimp fishery.

Five fishing vessels were active in the banks fishery and operated on the Saya de Malha and Nazareth banks.

6.1.2 Licences issued to foreign fishing vessels

Longline fishing licences were issued to 98 vessels of various nationalities to fish in the waters of Mauritius out of which 62 were granted extension of their licences. Taiwan, Province of China, had the highest number of vessels (83) operating in the waters of Mauritius.

Sixty nine (69) purse seine fishing licences were issued to European Union vessels. Two Mauritian-owned foreign-flagged fishing vessels were also licensed to fish on the banks. Details are given in tables 6.1 and 6.2.

6.1.3 Licences issued to foreign vessels under fishing agreements

Seven purse seiners and seven longliners were licensed to fish in the EEZ of Mauritius under the Fishing Agreement with the Republic of Seychelles.

No application for fishing licence was received in 2011 under the Fishing Agreement with Federation of Japan Tuna Fisheries Co-operative Associations (FJTFCA). One of the reasons could probably be piracy threats in the region.

Table 6.1: No. of foreign fishing vessels licensed by nationality and vessel type

Nationality	Longliner	Purse seiner	Banks fishing vessels
Belize	2		
Indonesia	7		
Malaysia	5		
Oman	1		
Taiwan (Province of China)	83		
France		8	
Mayotte		6	
Spain		13	-
Madagascar			1
Comoros			1
Total	**98**	**27**	**2**

6.1.4 Licence fees from foreign fishing vessels

Licence fees obtained from foreign fishing vessels amounted to USD 1 370 910 (1 USD = MUR. 30) and MUR 35 000 from the two foreign-flagged bank fishing vessels.

6.1.5 Licences issued to foreign fishing vessels over the last five years

Table 6.2 shows the total number of licences issued to foreign fishing vessels over the last five years.

Table 6.2: Licences issued to foreign fishing vessels by gear type

Year	Surface Longliner	Purse seiner	Banks (handline)	Total
2007	141	59	3	**203**
2008	81	16	3	**100**
2009	119	61	9	**189**
2010	161	63	5	**229**
2011	160	69	7	**236**

6.1.6 Fishing vessels licence fees

The licence fees for foreign fishing vessels were revised in October 2011. The licence fee for a foreign longline fishing vessel of length overall (LOA) 24 metres and above (except for vessels fishing under fishing agreements) was USD 12 000 for an initial period of 90 days and USD 4000 for any additional 30 day period or part thereof. For fishing vessels less than 24 metres LOA the licence fee was USD 9 000 for a minimum licence period of 90 days and USD 3 000 for an additional 30 days or part thereof. A refundable logbook deposit fee of USD 1 000 was also levied. A non-refundable sum of USD 900 was charged to cover the costs of all communications for normal periodic reporting and polling of the vessel or boat under the Vessel Monitoring System (VMS) for a period of 90 days and USD 300 for any additional 30 day period or part thereof.

The licence fee for a foreign purse-seiner was USD 7 500 for an initial period of 90 days and USD 2 500 for any additional 30 day period or part thereof. The licensee has to pay a non-refundable sum of USD 900 at the time of payment of the licence fee to cover the costs of all communications for normal periodic reporting and polling of the vessel or boat under the Vessel Monitoring System (VMS) for a period of 90 days and USD 300 for any additional 30 day period or part thereof. A refundable logbook deposit fee of USD 1 000 was also levied.

6.2 Import and export of fish and fish products and fish processing

6.2.1 Import of fish and fish products

The type, quantity and quality of fish and fish products imported were subject to a permit system and 2 306 permits were issued to 152 importers including 18 permits to import fish samples and fish bait. Permits were issued on a consignment basis and revenue collected amounted to Rs. 4 621 000.

The total amount of raw material imported by the tuna processing plants was 101 298 tonnes out of which 50 581 tonnes were from Seychelles (transshipped by French and Spanish vessels) and the remaining from purse seiners unloading at Port Louis for processing purposes.

11 514 tonnes of fish and fish products were imported for direct consumption while 834 tonnes of frozen ‘barracouta’ were imported from New Zealand, Namibia and South Africa for the production of salted snoek.

Out of a total of 111 270 tonnes of fish and fish products imported about 10% constituted the amount for local consumption.

6.2.1.1 Imports for direct consumption

Imports for direct consumption have been classified into four categories, namely: fish, crustaceans, cephalopods and shellfish. Fish consisted of fresh, chilled, frozen, smoked, canned, dried and salted and other processed fish products. Crustaceans consisted of prawn, shrimp, crab and lobster (live, chilled and frozen), that of cephalopods consisted of frozen octopus, squid and cuttlefish while shellfish comprised chilled and frozen mussels, oysters, clams and scallop. Details are given in figure 6.1.

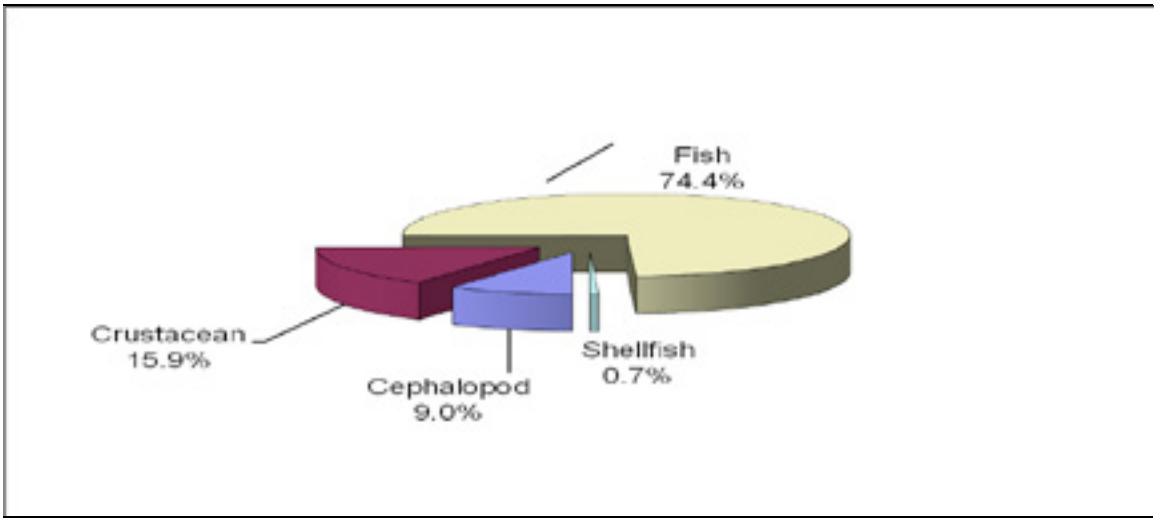


Figure 6.1: Imports per category

Imports totalled 11 514 tonnes comprising mainly frozen fish products (8167 tonnes) and canned fish (2 960 tonnes) and smaller amounts of dried, chilled and smoked products with 8 tonnes of live crustaceans as shown in figure 6.2.

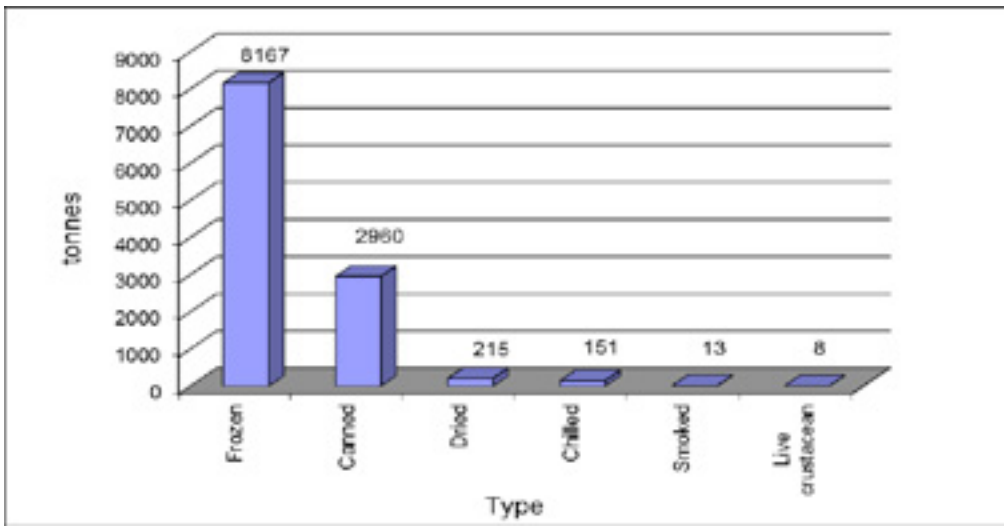


Figure 6.2: Categories of fish and fish products for direct consumption

Imports were mainly from South Africa, France, India, Thailand, China, Freeport Development of Mauritius, Indonesia, Singapore, Madagascar and Morocco. Canned fish products were imported mainly from Morocco and Chile while frozen fish was procured from South Africa, India, Madagascar, Thailand, Indonesia, Vietnam, Malaysia, calling vessels and the Freeport Development of Mauritius. Dried 'bombay duck' and prawn were imported from India. In addition 480 tonnes of fish caught in the high seas and 881 tonnes of fish were imported through the Freeport Development of Mauritius. Details on imports of fish and fish products by country of origin are presented in figure 6.3.

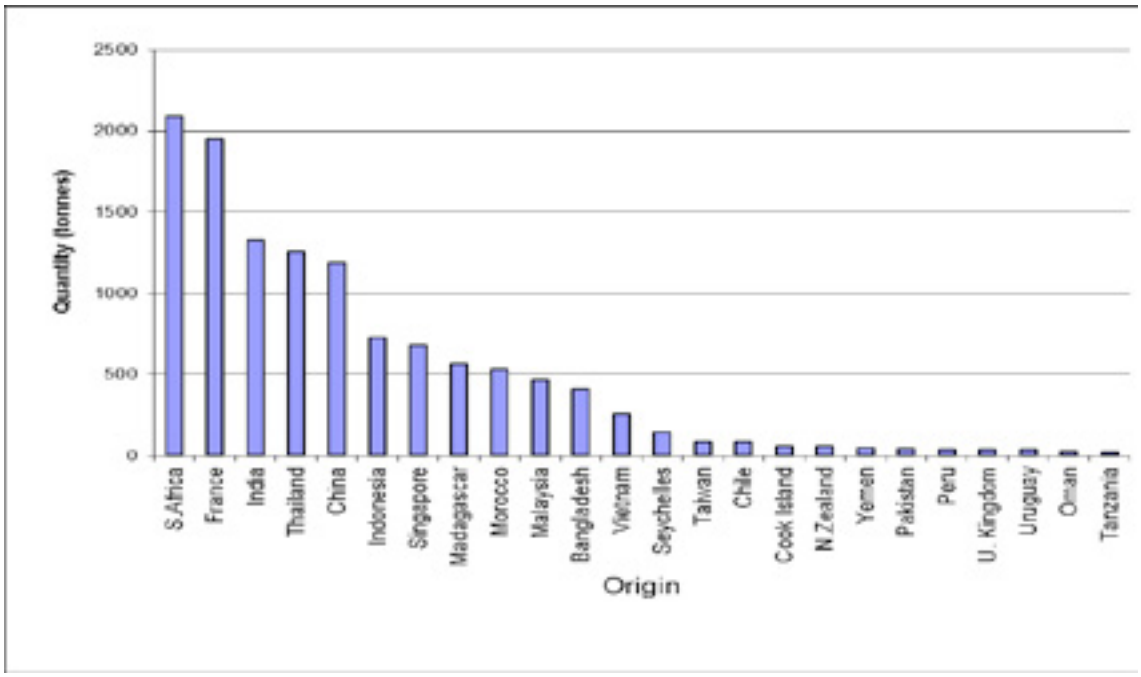


Figure 6.3: Imports of fish and fish products by country of origin

Table 6.3: Imports of fish and fish products by country of origin

Country	Qty (t)	SN	Country	Qty (t)	Sn	Country	Qty (t)
S. Africa	2 089	9	Morocco	530	17	N. Zealand	56
France	1 951	10	Malaysia	468	18	Yemen	45
India	1 327	11	Bangladesh	411	19	Pakistan	39
Thailand	1 256	12	Vietnam	259	20	Peru	38
China	1 187	13	Seychelles	147	21	U. Kingdom	35
Indonesia	724	14	Taiwan	86	22	Uruguay	35
Singapore	684	15	Chile	85	23	Oman	27
Madagascar	566	16	Cook Island	60	24	Tanzania	18

6.2.1.2 Chilled fish and fish products

Chilled fish and fish products amounting to 151 tonnes were mainly imported from France and Seychelles.

Products imported from France amounted to 97 tonnes and consisted of salmon, cooked shrimp, fish eggs, oysters, mussels and 'noix de St. Jacques'. A total of 25 tonnes of fish was imported from Seychelles and comprised among others 'bourgeois' (authorized for sale exclusively to hotels), 'capitaine', 'sacréchien' and 'vacoas'. Details of the imports of chilled fish and fish products as per categories are shown in table 6.4.

Table 6.4: Imports of chilled fish and fish products (tonnes)

Fish	Shellfish	Crustacean	Cephalopod	Total
117	25	8	1	151

6.2.1.3 Frozen fish and fish products

Import of frozen fish and fish products amounted to 8 167 tonnes and the details are presented in table 6.5.

Table 6.5: Imports of frozen fish and fish products (tonnes)

Fish	Crustacean	Cephalopod	Shellfish	Total
5 398	1 693	1 022	54	**8 167**

The frozen fish species imported consisted mainly of moonfish (497 tonnes), parrot fish (436 tonnes), sailfish, mackerel, 'capitaine', "dorado", hake and marlin as shown in figure 6.4.

Imports also included by-catch of 133 tonnes of "becune", moonfish, sailfish, oil fish, tuna and angelfish landed by tuna longliners which were acquired by the Agricultural Marketing Board for sale to fishermen cooperatives.

Import of products in the form of fish fingers, fish cakes and fish balls amounted to 969 tonnes.

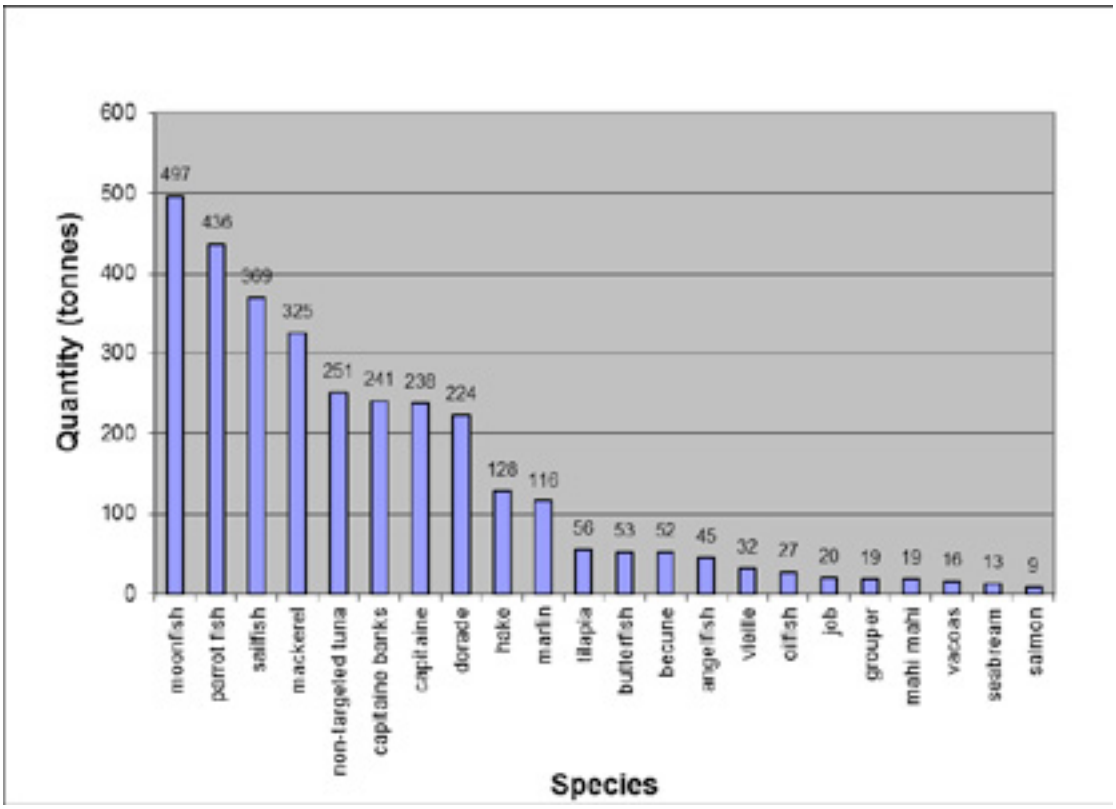


Figure 6.4: Import of main frozen fish by species

6.2.1.4 Dried fish

Dried fish was imported mainly from India, Singapore and Pakistan. The total import amounted to 215 tonnes as presented in table 6.6.

Table 6.6: Imports of dried fish and fish products (tonnes)

Fish	Bombay duck	Prawn	Total
4	124	87	**215**

6.2.1.5 Smoked fish and fish products

Fifteen tonnes (15t) of smoked fish and fish products comprising salmon, eel, herring, trout and mackerel were imported from France, Denmark, South Africa, Norway and the United Kingdom for the local markets.

6.2.1.6 Canned fish and fish products

A total of 2 960 tonnes of canned fish and fish products such as sardines, pilchards, mackerels, tuna, anchovy, salmon, crabmeat, prawn and mussels were imported from Morocco, Madagascar, Chile, Peru, South Africa, Thailand, India, Hong Kong, China, France and the United Kingdom. Details are presented in table 6.7.

Table 6.7: Imports of canned fish (tonnes)

Sardines	Pilchards	Mackerel	Tuna	Others	Total
543	1 186	813	363	55	**2 960**

6.2.1.7 Live crustaceans

Four traders imported eight tonnes (8t) of live crab, *Scylla serrata,* from Madagascar exclusively for hotels and restaurants.

6.2.1.8 Live ornamental fish

A total of 763 675 units of fresh water ornamental fish were imported mainly from Singapore and Malaysia by seventeen (17) pet shop owners. Fish commonly imported are gold fish, koi, tetra, guppies, mollies, cichlids, arrowana and fresh water turtles. 3 740 units of these live ornamental fish were sent to Rodrigues for re-sale.

6.2.1.9 Fish eggs and live feed for culture purposes

400 000 units of fish eggs comprising 200 000 of sea-bass also called 'bar' **(***Dicentrarchus labrax***)** and 200 000 of red drum (*Sciaenops ocellatus)* and rotifers (for use as live feed) were imported from France by a private fish farm for culture purposes.

6.2.1.10 Fishmeal and fish feed

A total of 25 tonnes of dried fishmeal and 3 422 tonnes of fish waste were imported by a local fish feed factory for the production of animal feed and fish oil from France and the Mauritius Freeport Development (tuna processing plants) respectively. These were processed to produce 1 122 tonnes of fish feed out of which 348 tonnes were exported and 774 tonnes were sold locally. The factory also exported 874 tonnes of shrimp feed from 880 tonnes produced.
Pet shop owners' imported 43 tonnes of aquarium fish feed from China, France, Germany and Thailand.

6.2.1.11 Pet food

A total of 176 tonnes of pet food with fish derivatives was imported mainly from Thailand for sale on the local market.

6.2.1.12 Seashells

48 825 units of ornamental seashells were imported from Philippines for sale.

6.2.2 Export of fish and fish products

6.2.2.1 Export of chilled fish

A total of 9.3 tonnes of chilled fish were exported to Reunion. The species exported were 'vieille rouge' (*Epinephelus fasciatus*), 'croissant queue blanc' (*Variola albimarginata*), 'vieille maman rouge' (*Cephalopolis sonnerati*), 'vivano' (*Pristipomoides zonatus*) and 'cabot' (*Epinephelus multinotatus*).
121 tonnes of chilled fish and 16 tonnes of frozen fish cultured in floating cages in the lagoon were exported to Germany, UK, USA and Switzerland.

6.2.2.2 Export of marine ornamental fish

6 561 units of live ornamental marine fish caught in the lagoon were exported to USA, Hong Kong, United Kingdom, Germany, Israel, France and Spain.

6.2.3 Fish processing

6.2.3.1 Canned tuna

The local cannery imported 53 199 tonnes of raw tuna from European vessels and produced 48 330 tonnes of canned tuna. 37 031 tonnes were exported to European countries and 1 066 tonnes were put on sale on the local market.

6.2.3.2 Tuna loins/chunks/flakes

48 099 tonnes of raw frozen tuna were imported by the processing plant engaged in the production of tuna loins for export. 20 586 tonnes of tuna loins and tuna in cans and pouches were exported to European countries and USA.

6.2.3.3 Salted fish

Two companies imported 834 tonnes of raw barracouta (*Thyrsites atun*) and produced 812 tonnes of salted snoek. 589 tonnes were sold on the local market and 94 tonnes were exported as shown in table 6.8.

Table 6.8: Import, production and sale of salted fish (tonnes)

Year	2007	2008	2009	2010	2011
Import of barracouta	1 066	956	776	1 126	834
Production of snoek	651	613	645	780	812
Local sale of snoek	491	516	543	451	589

6.2.3.4 Fish meal production

One company was involved in the production of fish meal. The raw materials (tuna offal) obtained from the local fish processing factories were used to produce fishmeal. Out of the 12 206 tonnes of fishmeal produced, 3 545 tonnes were sold on the local market and 8 661 tonnes were exported to Madagascar, Spain, Hong Kong, Egypt, Taiwan, Germany, Indonesia, South Africa and Korea. The production for the past five years is given in table 6.9.

Table 6.9: Production of fish meal (tonnes)

Year	Production
2007	10 393
2008	9 198
2009	11 119
2010	12 595
2011	12 206

6.2.3.5 Fish oil production

Another by-product from fish waste is fish oil. A total of 1 016 tonnes of crude fish oil was produced during the year. 147 tonnes were sold locally and 869 tonnes were exported to Madagascar, Hong Kong and South Korea.

6.2.3.6 Re-export of canned products

Some 59 tonnes of imported canned products namely sardines, pilchards and mackerel were re-exported mainly to Madagascar, Comoros and Seychelles.

6.3 Tuna fisheries

Tuna fishing in the waters of Mauritius are mainly carried out by foreign longliners and purse-seiners operating under fishing licences against payment of a licence fee. Mauritian boats, less than 24m LOA, targeting swordfish, also land tuna species. The fishery is monitored through the collection, processing and analysis of fishing data obtained through logbooks from the local and foreign licensed vessels.

The fishing zones of the licensed foreign purse seiners were mostly distributed between latitudes 01º S-20º S and longitudes 43º E - 66º E as shown in Fig**.** 6.5. The fishing zones of the licensed foreign longliners varied between latitudes 02º N - 27º S and longitudes 50º E - 87º E with most of the effort being distributed between latitudes 10º S - 19º S and longitudes 55º E - 64º E as shown in Fig 6.6. The fishing area of the local boats in the semi-industrial fishery extended between latitudes 15° - 19° S and longitudes 56° - 60° E (Fig. 6.7).

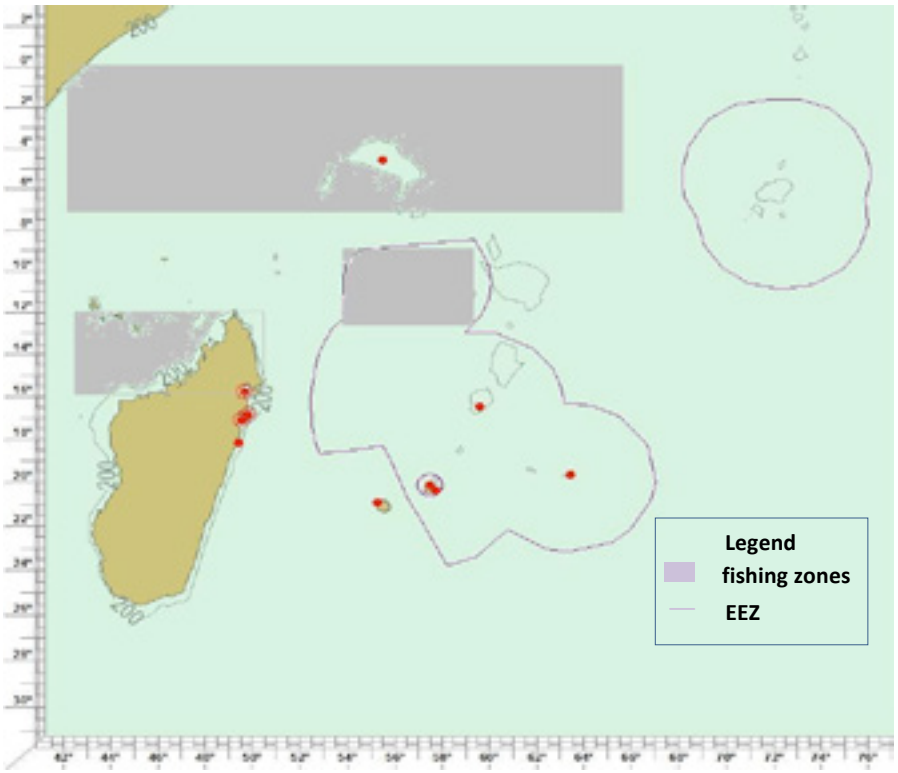


Figure 6.5: **Main fishing zones of foreign licensed purse seiners**

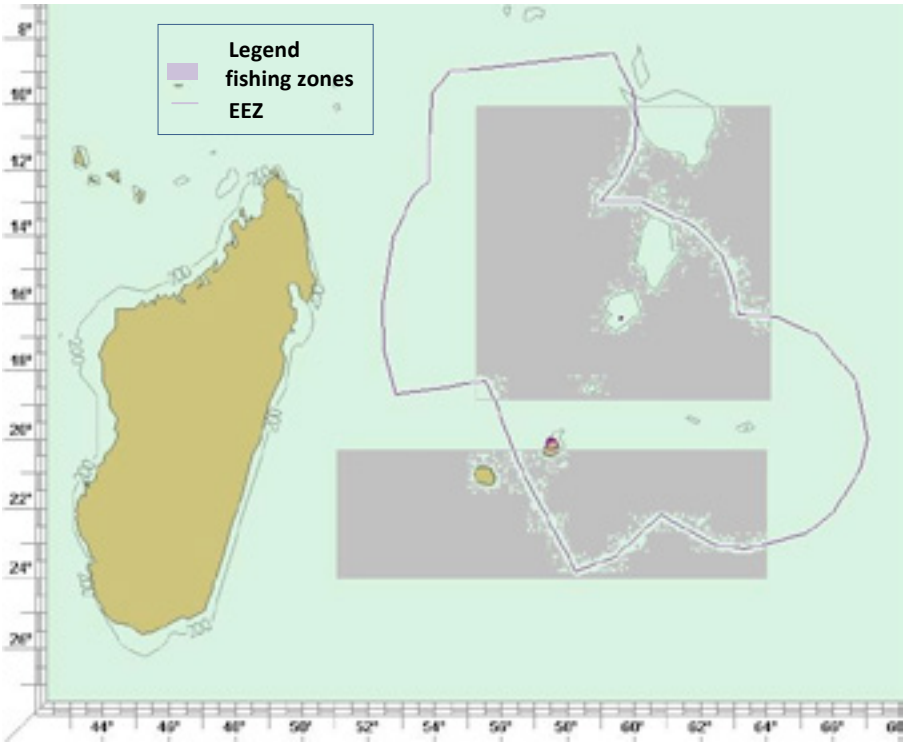


Figure 6.6: Main fishing zones of foreign licensed longliners

Figure 6.7: Main fishing zones of local licensed longliners

6.3.1 Catch of licensed purse seiners

A total of 35 logbooks were received from the licensed purse seiners and the catch landed amounted to 22 179 tonnes. The fishing zones of the licensed purse seiners were widely distributed between latitudes 01º S - 20º S and longitudes 43º E - 65º E. The main species caught were skipjack tuna (48%) followed by yellowfin tuna (45%) and bigeye tuna (5%). A smaller percentage of albacore tuna (1%) was also caught as by-catch. The species composition of the catch of the licensed foreign purse seiners is shown in figure 6.8.

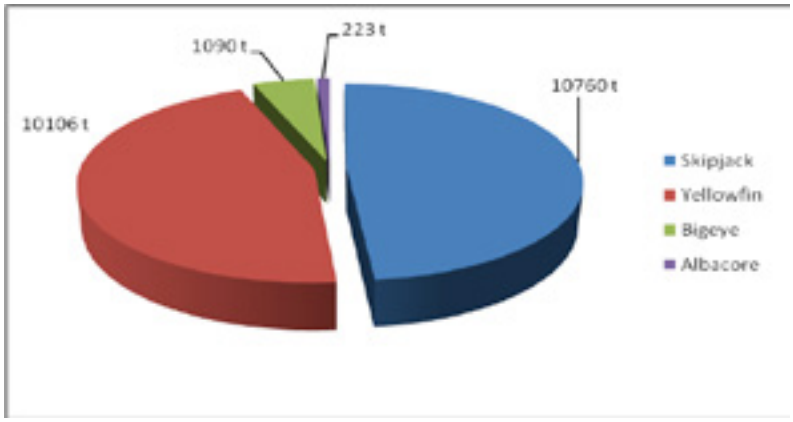


Figure 6.8 : Catch (tonnes) of licensed purse seiners

6.3.2 Sampling of catch from licensed purse seiners

Length-frequency data on the catch of licensed purse seiners were collected. A total of 2 503 tunas comprising 1 654 skipjack, 589 yellowfin and 260 bigeye were sampled.

6.3.2.1 Length-frequency distribution of skipjack tuna (*Katsuwonus pelamis*)

The length of skipjack tuna ranged from 38 to 71 cm with the mode at 48 cm and the mean at 50.8 cm. 64% of the fish sampled were between 45 and 53cm. The length-frequency distribution is shown in figure 6.9.

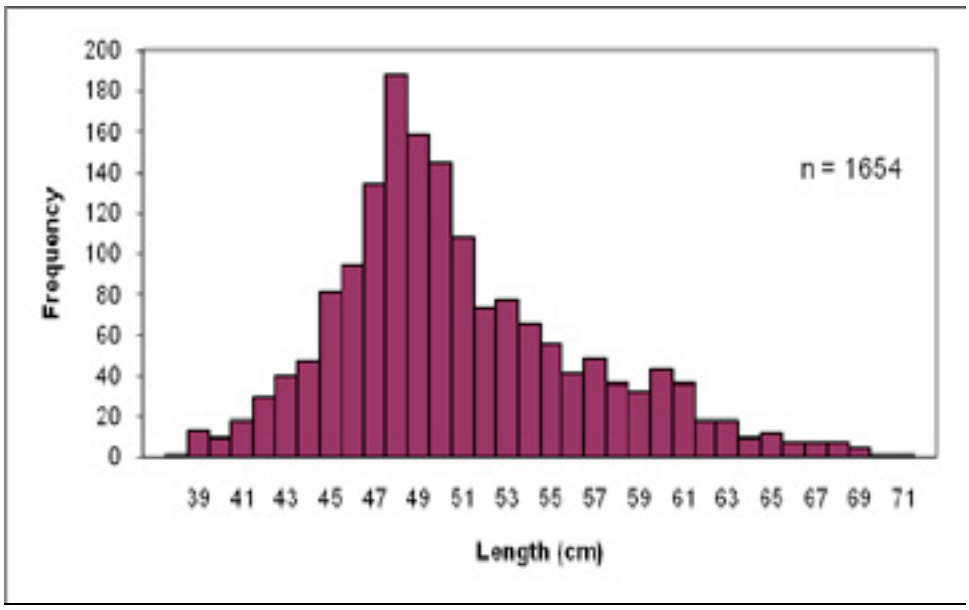


Figure 6.9: Length-frequency distribution of skipjack tuna

6.3.2.2 Length-frequency distribution of yellowfin tuna (*Thunnus albacares*)

The yellowfin tuna had a length range between 45 and 182cm with a mean of 93.1cm. 56% of yellowfin tuna caught were between 64 and 96 cm. The length-frequency distribution is given at figure 6.10.

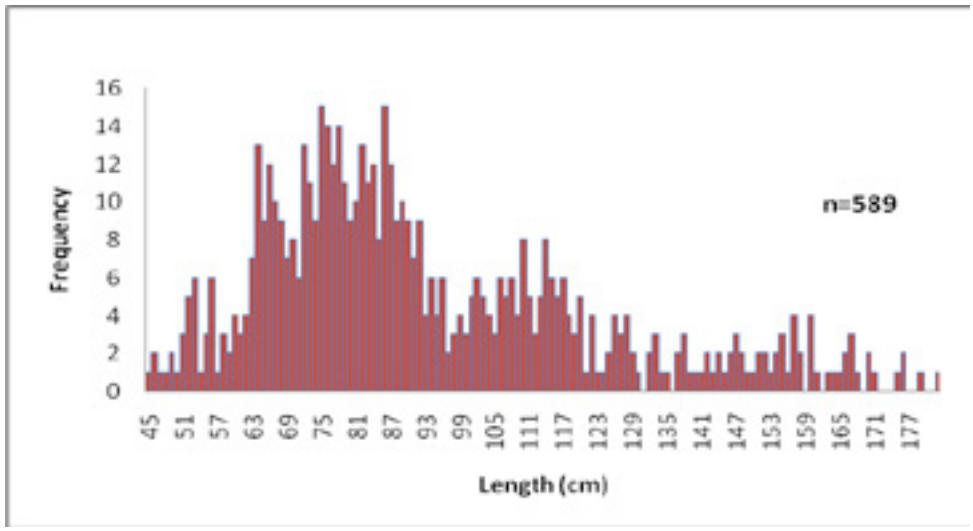


Figure 6.10: Length-frequency distribution of yellowfin tuna

6.3.2.3 Length-frequency distribution of bigeye tuna (*Thunnus obesus*)

The length of the bigeye tuna ranged between 47 and 161cm with a mean of 90.5cm. 55% of the bigeye tuna caught by the purse seiners were between 78 and 161cm. The length frequency distribution is presented in figure 6.11.

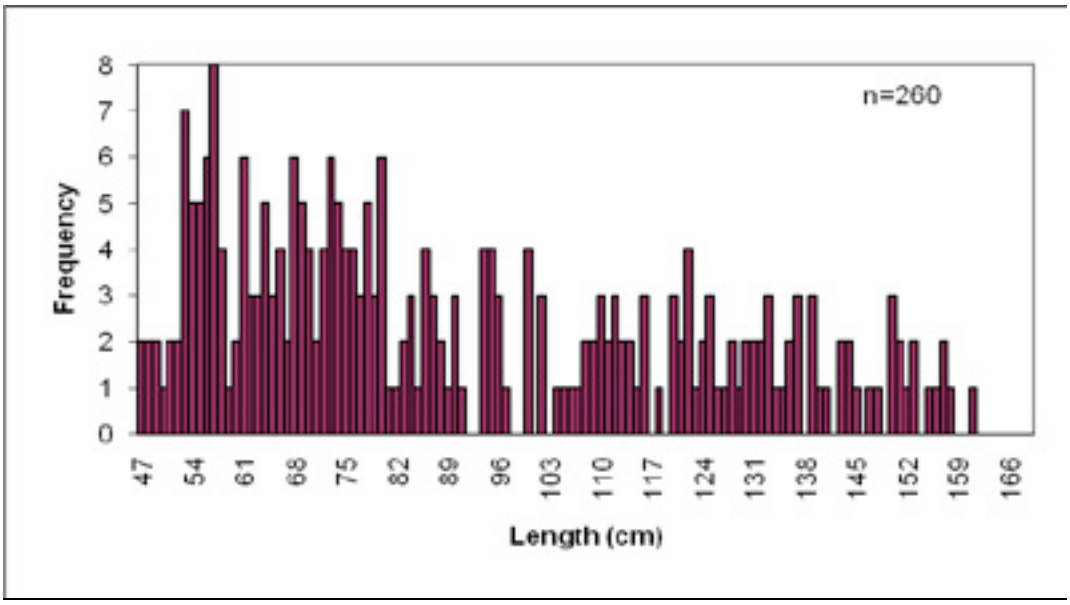


Figure 6.11: Length-frequency distribution of bigeye tuna

6.3.3 Monitoring of the catch of licensed longliners

A total of 203 logbooks obtained from the longliners were processed. The total catch from licensed foreign longliners amounted to 6 024 tonnes. The fishing area spreads widely in the Western Indian Ocean between latitudes 02º N - 27º S and longitudes 50º E - 87º E. The total catch obtained from the EEZ of Mauritius was 5 121 tonnes.

6.3.3.1 Species composition of the catch of licensed longliners

The major part of the catch (59.4%) was composed of albacore tuna which is the target species of most of the Asian longliners followed by yellowfin tuna (12.6%) and a lesser amount of swordfish (1.9%).

The species composition of the catch of the licensed foreign longliners is shown in table 6.10.

Table 6.10: Species composition of the catch of licensed foreign longliners

Common name	Scientific name	Catch (t)	%
Albacore	*Thunnus alalunga*	3580	59.4
Yellowfin	*Thunnus albacares*	761	12.6
Bigeye	*Thunnus obesus*	135	2.2
Swordfish	*Xyphias gladius*	114	1.9
Sharks		14	0.2
Others		908	15.1
Other billfishes		512	8.5
Total		**6 024**	**100.0**

6.3.3.2 Sampling of catch of licensed longliners

Length-frequency data of the albacore tuna were obtained during regular sampling exercises carried out on landings from the licensed longliners. A total of 1 923 albacore tuna was sampled. The length varied from 70 to 126cm with a mode of 100cm. 76% of the catch comprised fish in the range of 96 to 111cm. The length frequency distribution is shown in figure 6.12.

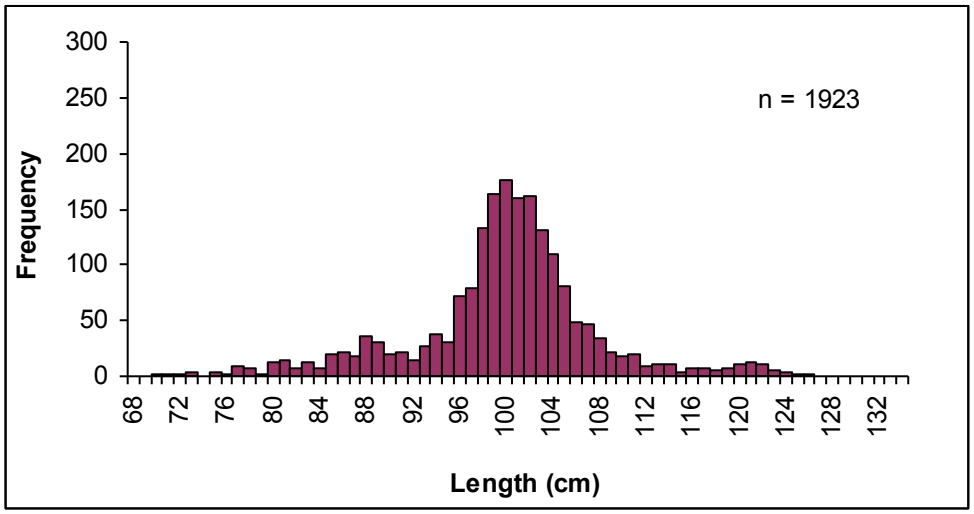


Figure 6.12: Length-frequency distribution of albacore tuna

6.3.4 The local semi industrial chilled pelagic fishery

Four boats operating under the Mauritian flag undertook 70 fishing trips and the catch unloaded amounted to 89 tonnes of chilled pelagic fish. The catch per unit effort was 0.35kg per hook. Around 50% of the catch was composed of swordfish followed by yellowfin tuna (18.4%), bigeye tuna (12.1%), albacore tuna (9.4%) and marlin (3.2%). Miscellaneous species caught consisted mainly of "dorado" (*Coryphaena hippurus*), "wahoo" (*Acanthocybium solandri*) and oilfish (*Ruvettus pretiosus*). The fishing area was between latitudes 15° - 19° S and longitudes 56° - 60° E. No catch was recorded in 2009 as no fishing vessel operated in this fishery during that period. The species composition of the landings is shown in table 6.11.

Table 6.11: Species composition of local semi industrial chilled fish pelagic boats

Year	Swordfish	Yellowfin	Bigeye	Albacore	Marlin	Shark	Sailfish	Misc.	Total
2007	45 913	65 924	-	56 416	6 597	1 056	2 156	6 264	**184 326**
2008	8 858	14 076	-	14 570	2 183	67	163	1 462	**41 379**
2010	17 070	7 621	410	4 998	260	-	-	1 925	**32 224**
2011	43 999	16 476	10 826	8 415	2 876	-	655	6 147	**89 394**

6.3.5 Transshipment by tuna longliners and carriers

A total of 40 013 tonnes of tuna and tuna-like species were transshipped at Port Louis by tuna fishing vessels and carriers which effected 558 and 55 calls respectively. Albacore tuna constituted 40% of the total catch. A sharp increase in the amount of yellowfin and skipjack tunas transshipped was observed due to transhipment effected by some European purse seiners which target mostly these species. The species composition of the fish transhipped is shown in table 6.9. Miscellaneous species included mostly "dorado", "wahoo", oilfish, moonfish (*Lampris guttatus*), spearfish (*Tetrapturus* spp.), angelfish (*Lepidotus brama*), bonito (*Sarda* spp.), Spanish mackerel (Sc*omberomorus commerson*) and "gastero" (*Gasterochima melanpus*).

Table 6.12: Species composition of fish transhipped (t)

Year	Albacore	Yellowfin	Bigeye	Skipjack	Swordfish	Bluefin	Marlin	Sailfish	Shark	Misc.	Total
2007	12 182	3 281	494	134	2 305	8	67	486	1 881	3 110	**23 948**
2008	11 375	1 479	596	133	3 301	34	142	167	1 728	1 972	**20 927**
2009	21 627	2 003	574	2 363	2 111	11	203	147	1 328	4 721	**35 088**
2010	23 908	5 929	2 173	2 839	1 494	410	380	90	2 432	4 068	**43 723**
2011	16 138	7 165	1 979	4 993	525	155	587	1082	3 420	3 969	**40 013**

7 FISHERIES PLANNING

7.1 Regional and International Cooperation

7.1.1 Cooperation with Turkey

Mauritius and Turkey signed a Free Trade Agreement (FTA) in September 2011. The aim of the FTA is to remove trade barriers between the two countries, to improve economic and commercial relations and to generate fair conditions of competition. Negotiations for an Agreement on Trade and Economic Cooperation between Turkey and Mauritius are also underway to enable both countries to have cooperation in other sectors of the economy including fisheries as a service sector.

7.1.2 Cooperation with Russia

A Memorandum of Understanding (MoU) has been prepared on conditions for the export of fishery and aquaculture products from the Republic of Mauritius to the Russian Federation. The conditions set are based on the agreed administrative measures between the Federal Service for Veterinary and Phytosanitary Surveillance (Rosselkhoznadzor) of the Russian Federation and the Competent Authority – Seafood of the Ministry of Fisheries and Rodrigues.

7.1.3 Cooperation with Greece

The construction of the Fish Auction Market with assistance from the Hellenic Republic which began in May 2010 was supervised by the officer- in- charge of the Competent Authority-Seafood. The building was completed and handed over by the contractor on 06 June 2011. The facility of an area of about 532m^2 on a plot of land of 1 642m^2 at Fort Williams, Les Salines, was thereafter equipped with cold rooms and associated equipment. The commissioning of the cold rooms was done on 12 December 2011.

In parallel with the supply and installation of the cold rooms, an invitation for "Expression of Interest" was launched in November 2011 to local and international prospective operators for the leasing of the Fish Auction Market. No operators had signified interest in the invitation by the closing date of 19 December 2011.

7.1.4 Cooperation with Japan

The Overseas Fishery Cooperation Foundation of Japan completed its third project entitled "Rehabilitation of Fisheries Facilities for Fisheries Development in Mauritius" in March. The project which started in October comprised the training of fishermen and trainers on longline fishing techniques and maintenance of marine diesel engines as well as undertaking the rehabilitation of the fishing boat "MEXA-1" of the Fishermen Investment Trust.

The Japan Tuna Fisheries Cooperatives Association (JTFCA) in collaboration with the Fisheries Agency of Japan and the Overseas Fishery Cooperation Foundation of Japan trained one officer of the Ministry and an operator of the private sector in Japan on fish handling, processing and value addition.

A delegation from JTFCA visited Mauritius in August and November to explore the possibility of transshipment of Japanese longliners in Port Louis and to consider the possibility of entering into partnership with Mauritian operators in the seafood sector for the production of sashimi-grade tuna for the Japanese market.

7.1.5 Bilateral Cooperation in fisheries between Mauritius and Mozambique

In the context of the Implementation of the MoU on Fisheries between Mauritius and Mozambique a mission was undertaken to Beira in the Sofala province of Mozambique in July. The delegation comprised 3 fishermen sitting on the board of the Fishermen Investment Trust including one from Rodrigues. The objectives of the mission were to exchange knowledge in the setting up and the operation of a system of auto-saving and credit without external funds, to learn on the co-management processes for the protection and conservation of the marine resources and to familiarise with small pelagic fishing using gill nets.

7.1.6 Bilateral Cooperation between Mauritius and Norway

The 3rd Annual Meeting (2011) was held in April through Digital Videoconference from Mauritius and conducted with the Norwegian Agency for Development Cooperation (NORAD) and the Centre for Development Cooperation in Fisheries (CDCF) in Oslo, Norway and through telephone conference with the Royal Norwegian Embassy in Maputo, Mozambique with objectives to discuss progress achieved in project implementation throughout 2010 and to approve the Annual Work Plan and Budget 2011.

A request for a second phase to the current project was forwarded to the Norwegian authorities in Maputo for consideration.

The Royal Norwegian Embassy in a "Note Verbale" in October responded positively to the request as the Embassy recognized that certain activities under the bilateral cooperation agreement had not yet been completed.

The activities related to the project extension were raised and discussed at the Preparatory Session for the Final Wrap-up meeting which was held in Mauritius from 30 November to 02 December 2011 and attended by the Norwegian Project Coordinator. During the session the progress achieved in project implementation was assessed, outstanding activities for 2011were reviewed and the financial statements evaluated.

7.1.7 Fisheries Partnership Agreement (FPA)

The Directorate General for Maritime Affairs and Fisheries (DG-MARE) of the EC carried out an "Ex-Ante Evaluation of Existing Conditions in the Fisheries Sector in Mauritius" towards the conclusion of a new FPA and Protocol with Mauritius.

7.1.8 Implementation of Interim Economic Partnership Agreement

The Interim Economic Partnership Agreement was signed by four Eastern Southern African countries, namely Seychelles, Mauritius, Madagascar and Zimbabwe with the EU in August 2009. Mauritius, Seychelles and Madagascar ratified the agreement.

7.1.9 Tuna derogation under the ESA/EPA Interim Agreement

Upon ratification of the Interim Economic Partnership Agreement in July 2011 Mauritius would benefit from an automatic derogation and a quota of 3 000 tonnes of preserved tuna and 600 tonnes of tuna loins for the EU market.

7.2 Fisheries Project Appraisal

A total of nine projects were assessed as follows: (a) seven projects for off-lagoon fishing and on the banks for frozen and chilled fish for fishermen who group themselves into cooperatives or associations and (b) two aquaculture projects, one in floating cages and the other in a barachois which included eco-

tourism activities. The projects were found to be feasible. "Letters of Intents" were issued to the applicants to proceed with the implementation of the projects.

7.3 Programme Based Budgeting (PBB)

The PBB 2012- 2015 based on the Fisheries Sector Strategic Plan of the Ministry was prepared and the final version submitted to the Ministry of Finance and Economic Development in August 2011. The PBB detailed proposals of the Ministry for the three coming fiscal years under the three existing programmes namely:-

(i) Programme 751: Policy and Strategy for Fisheries and Rodrigues
(ii) Programme 487: Fisheries Development and Management
(iii) Programme 311: Rodrigues Development

7.4 Fisheries Master Plan

The Ministry of Fisheries and Rodrigues provided the logistics support and funded the organisation of "Les Assises de la Pêche" both in Mauritius and Rodrigues in March 2011 and April 2011 respectively. "Les Assises de la Pêche" was a consultation process which served as a tool for the Ministry to inform, consult and involve stakeholders in the process for the development of the Fisheries Master Plan besides ensuring that relevant stakeholder views and aspirations were taken on board.

The Fisheries Master Plan for Mauritius, Rodrigues and the Outer Islands was elaborated in May 2011 under technical assistance from the ACP FISH II programme and funded under the 9th European Development Fund (EDF) aiming at strengthening fisheries management in ACP countries. It was finalised and submitted to the Ministry of Fisheries and Rodrigues for implementation.

8. MONITORING, CONTROL AND SURVEILLANCE

8.1 Port state control

8.1.1 Monitoring of fishing boats and vessels

All local licensed fishing boats and vessels are issued a departure clearance following inspection on board to ensure that conditions of the fishing licence are complied with prior to leaving for a fishing campaign.On return from fishing campaigns enforcement officers board boats and vessels to collect logbooks, check the quality of the catch and the presence of toxic fish before granting clearance for unloading.

All foreign fishing vessels calling at the port for loading and unloading fish and fish products, transshipment, bunkering, change of crew, provisions, repairs and other ancillary activities are inspected for compliance with fisheries conservation and management measures by enforcement officers.

8.1.1.1 Local fishing boats and vessels

A total of 339 clearances were issued comprising 161 for the demersal chilled and frozen fish fisheries, 26 for the deep water shrimp fishery, 87 to swordfish fishing boats, 52 to carrier vessels from St Brandon and 13 to banks fishing vessels**.**

8.1.1.2 Foreign fishing vessels

A total of 613 foreign fishing vessels and reefers called at the Port Louis harbour. Details of types of fishing vessels and reefers, port of registration and number of calls are given in tables 8.1 and 8.2.

Table 8.1: Calls of foreign fishing vessels and reefers

Type of vessel	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Reefers	5	4	3	3	7	4	4	6	5	5	5	4	**55**
Squid vessels	5	0	0	0	3	0	0	0	0	0	0	0	**8**
Trawlers	1	1	1	1	1	0	2	1	1	1	3	0	**13**
Purse seiners	3	4	3	3	5	1	3	2	1	4	1	4	**34**
Tuna longliners	38	93	27	12	12	9	17	31	114	32	56	39	**480**
Longliners and trawlers for patagonian toothfish	0	2	2	2	3	4	1	1	1	1	3	2	**22**
Factory vessel	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Total	**52**	**104**	**36**	**21**	**32**	**18**	**27**	**41**	**122**	**43**	**68**	**49**	**613**

Table 8.2: Calls of fishing vessels and reefers by port of registration

Type of vessel	Flag country	Number of calls
Reefer	Bahamas	4
	Indonesia	6
	Malaysia	9
	Mauritius	6
	Netherland Antilles	7
	Panama	8
	Singapore	1
	Spain	2
	Taiwan (Province of China)	7
	Thailand	2
	Vanuatu	3
	Sub total	**55**
Squid fishing vessel	Taiwan (Province of China)	8
	Sub total	**8**
Trawler	Australia	3
	Cooks Islands	5
	France	2
	Japan	2
	Korea	1
	Sub total	**13**
Purse seiner	France	32

	Spain	2
	Sub total	**34**
Tuna longliner	Belize	18
	United Kingdom	4
	Indonesia	55
	Japan	3
	Korea	5
	Malaysia	50
	Oman	12
	Portugal	3
	Seychelles	10
	Spain	8
	Taiwan (Province of China)	307
	Thailand	5
	Sub total	**480**
Longliner for patagonian toothfish	Australia	6
	France	15
	Sub total	**21**
Trawler for patagonian toothfish	Australia	1
	Sub total	**1**
Factory vessel	Madagascar	1
	Sub total	**1**
	TOTAL	**613**
Banks fishing vessel (Mauritian owned vessels with foreign flag)	Comoros	4
	Madagascar	3

For the past five years the number of calls of foreign fishing vessels to Port Louis has remained around 600 as shown in table 8.3.

Table 8.3: Calls of foreign fishing vessels (2007 – 2011)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	82	44	29	47	48	50	66	41	79	52	51	75	**664**
2008	50	40	48	33	45	67	53	39	64	30	43	56	**568**
2009	62	68	38	32	57	40	31	40	96	29	54	57	**604**
2010	60	74	50	14	32	31	29	48	114	32	49	67	**600**
2011	52	104	36	21	32	18	27	41	122	43	68	49	**613**

8.1.3 Monitoring of patagonian toothfish fishing vessels

A total of 22 calls of patagonian toothfish fishing vessels were recorded. 15 were of French nationality and called for bunkering, repairs, provision and change of crew. The remaining 7 from Australia transshipped a total of 2 108 tonnes of patagonian toothfish. Transshipment activities were monitored by enforcement officers and the Dissostichus Catch Document was counter-verified and endorsed. The quantity of toothfish transshipped during the past five years is presented in table 8.4.

Table 8.4: Transshipment of patagonian toothfish (tonnes)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	0	0	0	0	551	0	213	556	0	0	595	0	**1 914**
2008	0	0	0	0	527	0	218	200	136	0	0	684	**1 764**
2009	0	0	9	0	483	0	152	0	0	197	435	0	**1 276**
2010	0	0	435	0	307	178	0	430	193	0	613	0	**1 543**
2011	0	44	0	0	531	197	0	0	158	468	710	0	**2 108**

8.1.4 Calls and transshipment of deep-sea trawlers

There were 13 calls by deep-sea trawlers in the port and they included 8 calls for transshipment. 2 628 tonnes of deep-sea demersal fishes were transshipped. The main species were alfonsino, cardinal, orange roughy, blue nose, spiky dory, smooth dory, butter fish, boar fish, black dory, black barracouda, icefish,

travella, armour head, ribaldo and grouper. The amount of fish transshipped for the past five years is given in table 8.5.

Table 8.5: Transshipment by trawlers (tonnes)

Year	Amount transshipped
2007	1 826
2008	1 901
2009	3 931
2010	3 318
2011	2 628

8.2 Vessel Monitoring System

8.2.1 Reporting to the Fisheries Monitoring Centre (FMC)

A total of 232 fishing vessels transmitted data on navigation speed, direction and position to the FMC which comprised 40 local and 192 foreign vessels. Table 8.6 gives a breakdown of the fishing vessels by nationality and transponder type.

Table 8.6: Vessels reporting to the FMC

Vessel	Inmarsat	Argos	Total
Local	**28**	**12**	**40**
Foreign			
Taiwanese	59	53	112
Malaysian	17	4	21
Indonesian	5	11	16
Malagasy (non tuna)	0	1	1
Belize	5	1	6
Seychelles	3	10	13
China	2	0	2
Comores (non tuna)	1	0	1
Oman	0	1	1
Sub Total	**92**	**81**	**173**
Total	**120**	**93**	**213**
EU			
French	3	9	12
Spanish	0	6	6
Portuguese	0	1	1
Total	**3**	**16**	**19**
Grand Total	**123**	**109**	**232**

8.2.2 Logbook verifications

A total of 467 logbooks from the local and foreign fishing vessels reporting to the FMC were verified against data reports recorded at the centre. 16 anomalies were observed for the local vessels while 45 for the foreign vessels. In such cases logbook deposit fees were forfeited as per the licence conditions.

9. FISHERIES PROTECTION SERVICE

The main function of the Fisheries Protection Service (FPS) is to protect the fisheries resources and environment through the enforcement of the fisheries legislation and provide services to fishermen. The FPS also provides technical support to the AFRC, the FiTEC, the Marine Parks and the One Stop Shop.

9.1 Artisanal fishermen

As at end of December, there were 2 214 registered artisanal fishermen. Three cards were re-issued and 45 fishermen deregistered. Details of registered fishermen as per gear category are given in table 9.1.

Table 9.1: Details of registered fishermen

Fisheries Post	Net	Basket trap	Line	Basket trap /line/ harpoon	Total
Port Louis	0	1	47	60	**108**
Tombeau Bay	0	11	55	76	**142**
Trou aux Biches	4	0	83	99	**186**
Grand Gaube	28	15	61	181	**285**
Poudre d'Or	0	12	1	128	**141**
Poste Lafayette	16	5	0	71	**92**
Trou d'Eau Douce	18	8	31	56	**113**
G.R.S.E	0	0	6	91	**97**
Bambous Virieux	0	15	17	177	**209**
Mahebourg	29	16	39	236	**320**
Riambel	6	3	3	75	**87**
Baie du Cap	3	7	20	56	**86**
Case Noyale	10	2	5	110	**127**
La Preneuse	18	2	48	76	**144**
Pointe aux Sables	11	2	33	31	**77**
Total	**143**	**99**	**449**	**1 523**	**2 214**

9.2 Registration of artisanal fishing boats

Seventy-three new fishing boats were registered in the artisanal fishery bringing the total to 2 540. Details of numbers of registered fishermen and boats by fisheries posts and fish landing stations are given in table 9.2

Table 9.2: Artisanal fishermen and fishing boats registered at fish landing stations

Fisheries Post	Landing Station	No of Fishermen	No of fishing boats owned by fishermen
Port Louis	GRNW	11	15
	Bain des Dames	97	107
	TOTAL	**108**	**122**
Baie du Tombeau	Roches Bois	58	76
	Baie du Tombeau	84	110
	TOTAL	**142**	**186**
Trou aux Biches	Pointe aux Piments	16	31
	Trou aux Biches	51	70
	Pointe aux Cannoniers	11	30
	Grand Bay	108	97
	TOTAL	**186**	**228**
Grand Gaube	Grand Gaube I	77	69
	Grand Gaube II	55	57
	Melville	33	47
	Missie Pitit	13	17
	Saint Francois	10	13
	Cap Malheureux	71	59
	Bain des Boeufs	26	42
	TOTAL	**285**	**304**

Poudre d'Or	Poudre d'Or	48	61
	Roche Noires	37	37
	Pointe des Lascars	36	51
	Bain de Rosnay	20	28
	TOTAL	**141**	**177**
Poste Lafayette	Poste Lafayette	15	15
	Poste de Flacq	56	64
	Belle Mare	21	36
	TOTAL	**92**	**115**
Trou d'Eau Douce	Trou d'Eau Douce	103	113
	Morcy	3	1
	Palmar	7	11
	TOTAL	**113**	**125**
G.R.S.E	G.R.S.E	8	13
	Camp des Pêcheurs	44	74
	Deux Fréres	12	31
	Quatre Soeurs	33	51
	TOTAL	**97**	**169**
Mahebourg	Mahebourg	168	159
	Ville Noire	32	52
	Grand Port I	18	29
	Grand Port II	34	46
	Blue Bay	25	23
	Pointe d'Esny	29	75
	Le Bouchon	11	3
	Rivière des Creoles	3	14
	TOTAL	**320**	**401**

Bambous Virieux	Anse Jonchée	12	18
	Bois des Amourettes	15	24
	Bambous Virieux	101	77
	Grand Sables	59	68
	Petit Sables	22	21
	TOTAL	**209**	**208**
Riambel	Souillac(Battelage)	37	28
	Riambel	21	1
	St Felix	29	7
	TOTAL	**87**	**36**
Baie du Cap	Baie du Cap 1	29	20
	Baie du Cap 2	18	28
	St Martin	28	34
	Baie du Jacotet	11	3
	TOTAL	**86**	**85**
Case Noyale	Le Morne	56	59
	La Gaulette	40	71
	Case Noyale	28	23
	Petite Rivière Noire	3	6
	TOTAL	**127**	**159**
La Preneuse	La Preneuse	30	32
	Tamarin	79	91
	Black River	35	32
	TOTAL	**144**	**155**
Pointe aux Sables	Flic en Flac	4	4
	Albion	18	20
	Pointe aux Sables I	36	26
	Pointe aux Sables II	19	20
	TOTAL	**77**	**70**
	GRAND TOTAL	**2 214**	**2 540**

9.3 Licences

The numbers of the different types of licences issued in the artisanal fishery are given in table 9.3.

Table 9.3: Number of licences issued

Fisheries Post	Large net	Gill net	Bait gear
Port Louis	0	0	26
Baie du Tombeau	0	0	39
Trou aux Biches	1	1	24
Grand Gaube	3	0	7
Poudre d'Or	0	0	3
Poste Lafayette	2	0	7
Trou d'Eau Douce	1	1	18
G.R.S.E	0	0	6
Bambous Virieux	0	0	24
Mahebourg	3	2	44
Riambel	1	0	10
Baie du Cap	0	1	10
Case Noyale	1	0	10
La Preneuse	3	0	48
Pointe aux Sables	1	0	9
Total	**16**	**5**	**285**

The numbers of fishmonger licences issued during the last five years are detailed in table 9.4.

Table 9.4: Details of fishmongers licences issued (local and import)

Year	Local	Import	Total
2007	690	143	**833**
2008	664	177	**841**
2009	668	172	**840**
2010	851	160	**1011**
2011	907	199	**1106**

9.4 Illegal fishing

Details of illegal fishing cases reported by the Fisheries Protection Service in the coastal regions over the last five years are given in table 9.5 with numbers for 2011 by region shown in table 9.6.

Table 9.5: Number of illegal fishing cases reported (2007-2011)

Year	Underwater fishing	Other illegal means	Illegal net fishing	Length of illegal nets seized (m)
	No. of interventions			
2007	64	49	123	2 837
2008	154	47	96	6 809
2009	126	51	134	8 184
2010	132	43	186	6 320
2011	182	51	213	7 785

Table 9.6: Number of illegal fishing cases reported by region (2011)

Region	Underwater fishing	Other cases	Illegal net fishing	Length of nets seized (m)
North	31	7	86	4346
East	75	12	29	1 132
South	40	29	54	1 581
West	36	3	44	726
Total	**182**	**51**	**213**	**7 785**

9.5 Allowances to artisanal fishermen

9.5.1 Bad weather allowance

The number of beneficiaries for bad weather allowance ranged from **1 938** to **2 021** on a monthly basis during the year. The daily rate for bad weather allowance was increased from Rs. **217** to Rs **224** as from 1st January**.** A total of Rs **47 067 328** was paid to artisanal fishermen by the Ministry of Social Security, National Solidarity and Senior Citizens Welfare and Reform Institutions. Details are shown in table 9.7.

Table 9.7: Payment of bad weather allowance

Year	Region		Total bad weather days	No of beneficiaries	Total (Rs)
2007	Lagoon	Zone 1	15	1 935 – 2 260	47 380 770
		Zone 2	22		
		Zone 3	50		
		Zone 4	45		
	Off-lagoon		149		
2008	Lagoon	Zone 1	28	2 048 – 2 208	56 737 336
		Zone 2	35		
		Zone 3	48		
		Zone 4	47		
	Off-lagoon		151		
2009	Lagoon	Zone 1	12	2 063 – 2 235	53 601 880
		Zone 2	19		
		Zone 3	27		
		Zone 4	17		
	Off-lagoon		131		
2010	Lagoon	Zone 1	5	2 039 – 2 187	56 446 271
		Zone 2	8		
		Zone 3	11		
		Zone 4	7		
	Off-lagoon		130		
2011	Lagoon	Zone 1	4	1 938 – 2 165	47 067 328
		Zone 2	15		
		Zone 3	21		
		Zone 4	14		
	Off-lagoon		106		

9.5.2 Closed season allowance for net fishing

During the closed season for net fishing from 1st October to the last day of February of the following year a net fisherman is entitled to a closed season daily allowance (excluding sundays and public holidays). However, an extension of ten days to the closed season was granted to net fishermen due to five consecutive bad weather days during the season as per provision made in the Fisheries and Marine Resources Act. The daily rate paid was Rs 224**.** A total of Rs. 3 572 352 was paid for the year and details are shown in table 9.8.

Table 9.8: Payment of closed season allowance

Year	No. of days	Rate (Rs)	Beneficiaries	Total (Rs)
2007	112	155-168	153-146	**2 565 825**
2008	115	168-200	146-144	**3 121 216**
2009	114	200-210	146-145	**3 421 950**
2010	115	217	145-143	**3 554 292**
2011	112	224	143-142	**3 572 352**

9.5.3 Sick leave allowance

Under the sickness allowance scheme a registered artisanal fisherman is eligible to a financial assistance of up to a maximum of 14 days when he is hospitalised for 14 consecutive days or more. The Fishermen Welfare Fund is responsible to provide such assistance to these fishermen. The daily rate payable for sick leave was Rs 224. Allowances paid for 2007-2011 are shown in table 9.9.

Table 9.9: Sick leave allowance

Year	Rate (Rs)	Total (Rs)
2007	155 - 168	**10 710**
2008	168 - 200	**8 540**
2009	200 – 210	**4 800**
2010	210 - 217	**15 978**
2011	224	**13 454**

9.6 Buy-back scheme for nets

The buy-back scheme introduced since 1996 for the reduction of the number of nets operating in the lagoon was continued. At the end of the year there were 16 large nets and 5 gill nets in operation. However, two net fishermen gave up net fishing and were compensated accordingly. Details of payments effected are shown in table 9.10.

Table 9.10: Amounts paid under the buy-back scheme

Year	Individual		Cooperatives		Nets surrendered			Total amount paid (Rs.)
	No. of fishermen	Amount paid (Rs.)	No. of fishermen	Amount paid (Rs.)	Large net	Gill net	Amount paid (Rs.)	
2007	1	35 000	3	210 000	-	-	-	**245 000**
2008	1	35 000	3	210 000	-	-	-	**245 000**
2009	-	-	4	280 000	-	-	-	**280 000**
2010	-	-	1	70 000	-	-	-	**70 000**
2011	-	-	2	140 000	-	-	-	**140 000**

10. MISCELLANEOUS

10.1 Visits

3 836 persons visited the Albion Fisheries Research Centre. Most of the visitors were students from primary and secondary schools. Table 10.1 shows the number of visitors by type of institutions.

Table 10.1: Visits to AFRC

Institutions/Organisations	Number of visitors
Pre-primary schools	250
Primary Schools	2 078
Secondary Schools	788
Pre-vocational institutions	15
Social organizations/welfare centres	667
Others (tourists, private firms, UoM* students)	38
Total	**3 836**

*University of Mauritius

10.2 Information Service

The Documentation Unit/Marine Information Centre continued to provide information and access to reference materials on fisheries and the marine environment to students and the public in general.

10.3 New library holdings

A total of two hundred and six new publications (local and foreign) and four CD-ROMs relating to fisheries were received during the year. An acquisition list is circulated on a monthly basis to the staff.

10.4 Sales and distribution of publications

Total income from sales of publications including posters, charts, maps and books published by the Ministry amounted to Rs. 17 080.

10.5 Reprints

Two thousand five hundred posters of both "Toxic Marine Organisms in Mauritius" and "Commercial Fishes of Mauritius" were re-printed for free distribution to the public in view of the Awareness Programme, World Food Day and the Open Day respectively. One thousand desk-calendars were also printed for distribution.

10.6 Grounding of the cargo vessel "Mv Angel 1" at Poudre d'Or

The cargo vessel, "Mv Angel 1", was grounded off Poudre d'Or on the night of 05 August at coordinates 020° 04′ 08″ S and 057° 44′ 68″ E. In pursuance to the National Oil Spill Contingency Plan the Ministry participated in the deployment of the anti-pollution oil booms in the lagoon and outer lagoon. The fishermen of the region were sensitised on issues related to oil spill and its impact on the marine environment. An ecological survey was carried out at the grounding site in December and no adverse impacts were observed.

10.7 'Plan Regional de Surveillance des Pêches dans le Sud-Ouest de L'Ocean Indien''- Commission de l'Ocean Indien/Monitoring, Control and Surveillance (COI/MCS) project

Four joint surveillance missions using patrol vessels "Osiris" (Reunion) and "Atsantsa" (Madagascar) were undertaken in the EEZ of the COI member states in January, February, March, September and December respectively under the 'Plan Regional de Surveillance des Pêches dans le Sud-Ouest de L'Ocean Indien' Commission de l'Ocean Indien/Monitoring, Control and Surveillance (COI/MCS) project. The Fisheries Monitoring Centre at Albion was used as the Mission Coordination Centre for Mauritius and provided Vessel Monitoring System data to the coordinating team when surveillance was carried out in Mauritian waters.

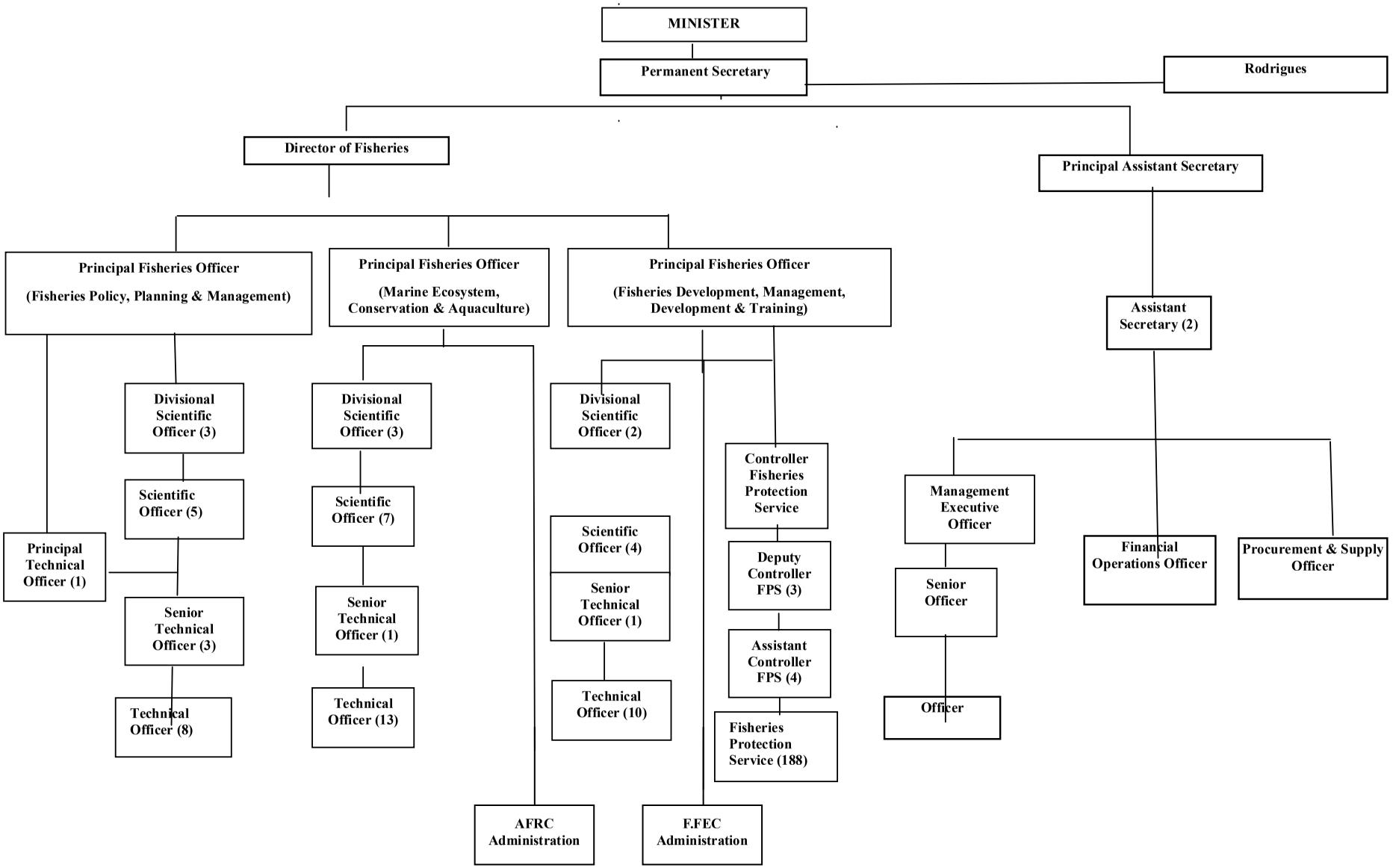
10.8 Participation in the elaboration of the Maurice Ile durable (MID) Strategic Action Plan

The MID project comprises five main pillars, namely: Education, Environment, Energy, Employment and Equity. It also embraces the concept of becoming self-sustaining and promoting sustainable development in the 5Es.The ministry participated in the consultative meetings for the elaboration of the MID policy and strategic action plan under the component "Environment".

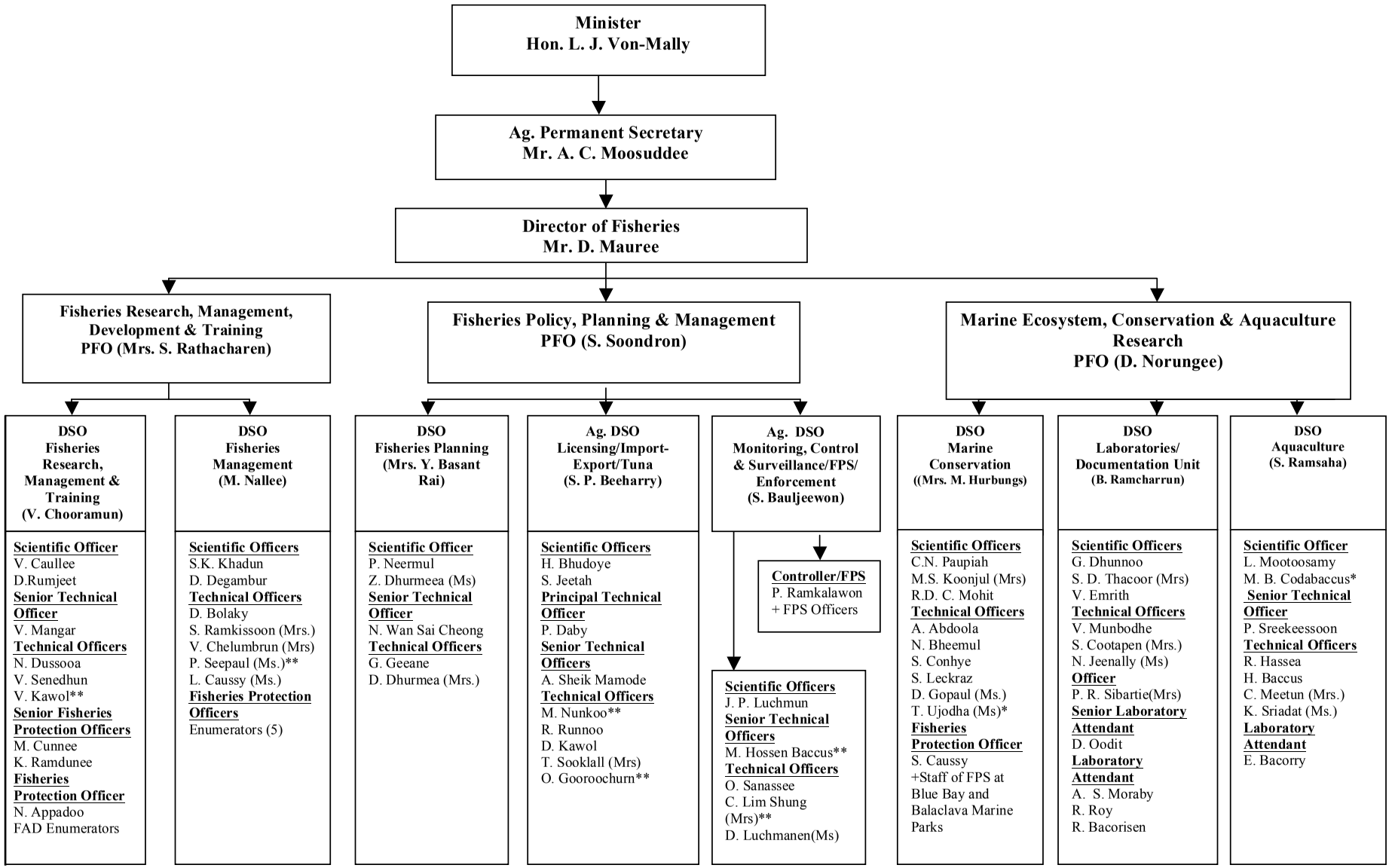
10.9 Indian Ocean and South East Asia (IOSEA) MoU for marine turtles

The national report on the IOSEA MoU for marine turtles was updated on-line. Mauritius participated in the 6th annual meeting of IOSEA Signatory States held in Thailand.

Appendix 1: Organisational Chart for the Ministry of Fisheries and Rodrigues



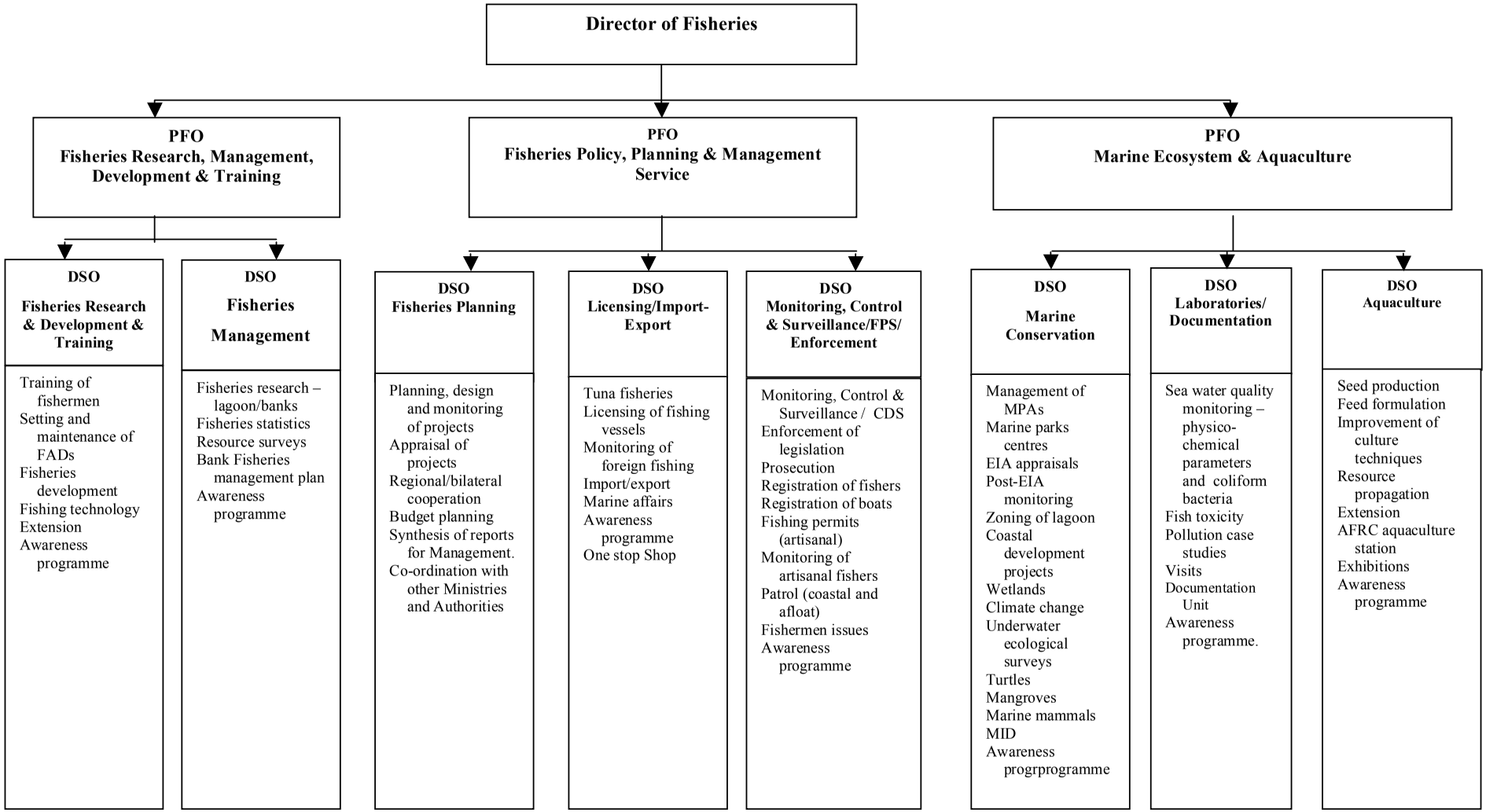
Appendix 2: Orgnisational Chart of the Fisheries Division



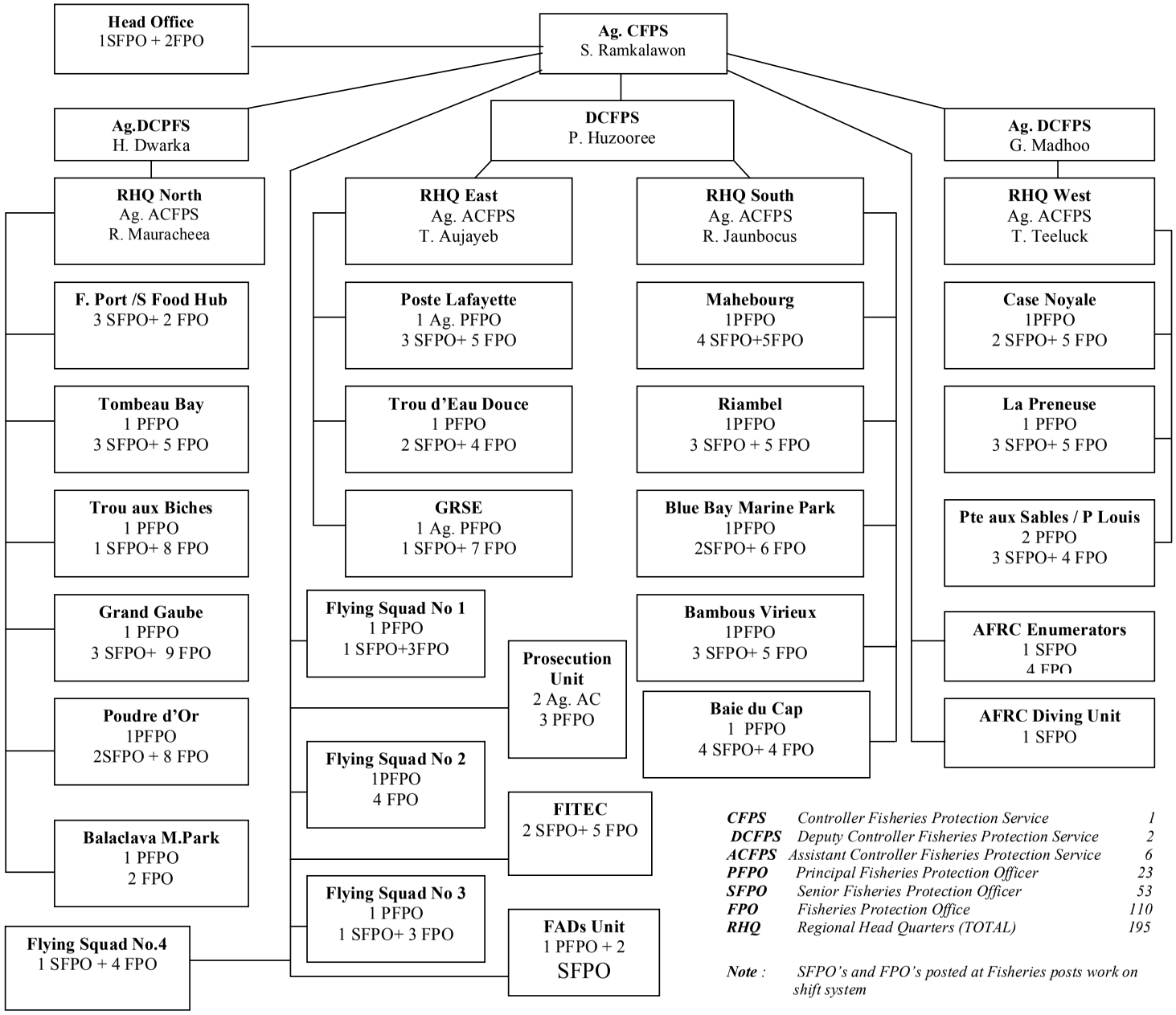
PFO: Principal Fisheries Officer
DSO: Divisional Scientific Officer
DCFPS: Deputy Controller, Fisheries Protection Service
ACFPS: Assistant Controller, Fisheries Protection Service

SFPO: Senior Fisheries Protection Officer, Fisheries Protection Service
FPO: Fisheries Protection Officer, Fisheries Protection Service
*: On study leave
** One Stop Shop

Appendix 3: Activities of the Fisheries Division (Technical Services)



Appendix 4: Organisation Chart for the Fisheries Protection Service



CFPS	*Controller Fisheries Protection Service*	*1*
DCFPS	*Deputy Controller Fisheries Protection Service*	*2*
ACFPS	*Assistant Controller Fisheries Protection Service*	*6*
PFPO	*Principal Fisheries Protection Officer*	*23*
SFPO	*Senior Fisheries Protection Officer*	*53*
FPO	*Fisheries Protection Office*	*110*
RHQ	*Regional Head Quarters (TOTAL)*	*195*

Note *: SFPO's and FPO's posted at Fisheries posts work on shift system*

List of projects and services

Fisheries Management Division

Project/services	Objective(s)	Main activities
Coastal fishery	• Maintain and update records of fishery statistics for estimation of fish landings	• Prepare sample survey programme • Collect and analyse data on coastal fish landings • Monitor fish catch at landing stations • Examine/identify fish specimens provided by NCG, FPS, CPU, MoH • Compile and submit statistical data to CSO, FAO and MoE&SD
Banks fishery	• Monitor fishing activities on the banks and provide scientific information for the sustainable management of the fishery	• Collect, process and analyse log book data • Carry out sampling of fish • Calculate TAC • Allocate quota to fishing operators
St. Brandon inshore fishery and semi-industrial fishery	• Monitor fishing activities at St. Brandon, Albatross, Soudan, Hawkins and the northern banks	• Collect data for length/weight frequency and analysis • Collect, verify, compile and analyse data from log books • Catch data entry for effort, fishing positions, species, fishing days and estimates of catch per fisherman day
South West Indian Ocean Fisheries Project	• Identify and assess fish stocks in the EEZ of the coastal states in the South West Indian Ocean region	• Setting up of a database on fishing resources in the EEZ • Carry out resource surveys

Laboratories/Document Unit

Project/services	Objective(s)	Main activities
Coastal Environment Research	• Monitor water quality in the lagoon and near sewage outfalls • Monitor coliform bacteria at selected public beaches • Long-term monitoring of trace metal levels in the lagoon	• Collection and chemical analysis of sea water samples • Record of physico-chemical parameters • Investigate cases of alleged marine pollution and fish mortality • Perform tests for coliform bacteria • Perform tests for trace metals • Work on procedures

		towards the accreditation of laboratories
Lagoon watch programme	• Monitor sea surface temperature in the lagoon	• Collect daily sea surface temperature at selected sites • Analysis of temperature data
Monitoring of marine environment at aquaculture sites	• Monitor the ecosystem and water quality	• Collect, process and analyse data on substrate cover • Collect and analyse seawater samples
Ecotoxicology	• Monitor toxic fish and harmful microalgae	• Perform bioassay tests with mouse • Collect and examine microalgal samples • Work on procedures towards the accreditation of laboratory
Documentation	• Disseminate information on fisheries and marine environment • Access to reference materials	• Provide information and distribute publications • Cataloguing of publications • Sale of ministry's publications • Supervise visits at AFRC

Aquaculture

Project/services	**Objective(s)**	**Main activities**
Freshwater fish culture	• Freshwater aquaculture development • Produce freshwater prawn juveniles and red tilapia fingerlings for distribution/sale to farmers	• Manage broodstock of red tilapia and freshwater prawns • Advise fish farmers on freshwater aquaculture • Produce red tilapia fingerlings • Operate and manage hatcheries • Produce juveniles of freshwater prawn • Manage culture ponds • Undertake field visits
Ornamental fish culture	• Train fish farmers in simple techniques on breeding and culture of fresh water ornamental fish.	• Manage broodstock and produce ornamental fish fry/train fish farmers • Manage culture ponds • Carry out field visits
Appraisal of aquaculture projects	• Aquaculture development	• Make recommendations on projects
Assess effects of marine /freshwater aquaculture projects	• Monitoring of marine/freshwater aquaculture projects	• Carry out field visits at fish farms

Marine Conservation

Project/services	Objective(s)	Main activities
Establishment and management of marine protected areas	Protect and conserve the marine habitats and biodiversity	• Construction of the Blue Bay Marine Park Centre • Co-ordinate activities for the construction of marine park centres • Delimit the different zones of the Balaclava Marine Park • Monitor coral reef ecosystems at the two marine parks • Enforce the MPA regulations • Issue permits for permissible activities in MPAs • Physical zoning of the Balaclava Marine Park
Coastal zone management	Ensure sustainable development of the coastal zone	• Examine and make recommendations on EIA and PER applications • Participate in post EIA monitoring • Carry out ecological underwater surveys for coastal projects
Coastal Ecosystem Research	Long-term monitoring of the coastal ecosystem at selected sites	• Collect, process and analyse data on substrate cover and coral bleaching • Address issues related to stranded mammals and fish mortality
Coral farming project	Study coral farming in an ocean-based nursery for rehabilitation of degraded reef areas	• Set coral tables at sea and fix coral fragments • Monitor growth of coral fragments
Monitoring of ex-sand mining sites	Follow up on the regeneration of ex-sand mining sites	• Carry out underwater surveys and collect data on bottom substrate and fish abundance at ex-sand mining sites
Mangrove propagation	Ensure conservation of the mangrove ecosystem	• Provide technical know-how and assistance to organisations/fishermen for mangrove propagation
SWIOFP – Component 5 Mainstreaming biodiversity in regional and national fisheries management	• Assess the state of knowledge of non-consumptive resources and marine biodiversity • Understand the interactions with fisheries • Follow on bio-indicators of ecosystem health	• Compile relevant biodiversity meta data onto web-based system • Produce local gap analysis for each country, regional gap analysis and detailed report • Organise regional component working group meetings • Produce annual year plan and budget

Fisheries Training, Development & Extension

Projects/Services	Objectives	Main activities
FAD fishery research and development	• Develop, deploy, and maintain FADs • Encourage fishermen to fish off-lagoon around FADs	• Design and construct FADs • Set and maintain FADs • Monitor the FAD fishery • Operate and manage research boats
Off-lagoon fishery development	• Promote and support the development of the off-lagoon fishery • Develop fishing techniques	• Demonstrate fishing techniques • Promote good fish handling and preservation practices
Training of fishermen and other stakeholders	• Improve knowledge and skills of fishermen to operate in the off-lagoon • Provide training to enhance safety and security at sea • Improve enforcement capabilities of the Fisheries Protection Service • Improve fish handling practices	• Train fishermen (General Course for Fisher) • Implement training programme for fishmongers

Monitoring, Control and Surveillance

Project/services	Objective(s)	Main activities
Fisheries Monitoring, Control and Surveillance	• Combat IUU fishing • Monitor movement and operation of fishing boats and vessels • Track licensed fishing boats and vessels in the EEZ through the VMS	• Enforce licence conditions • Issue clearances for departure and arrival • Monitor transhipment activities • Enforce Port State Measures • Issue licences to Mauritian and foreign fishing vessels • Monitor and record the position of licensed fishing boats and vessels • Interface VMS information with the National Coast Guard • Participate in joint surveillance missions under the IOC • Inspection of fish catch on calling vessels • Issue SPS certificate for export of fish and fish products

Fisheries Planning

Projects/Services	Objectives	Main activities
National / Regional / Bilateral / Multilateral Cooperation	• Cooperation with local institutions • Coordinate matters relating to regional/bilateral/ multilateral issues	• Assist in evolving of fisheries policies with respect to EU, WTO, SADC, COMESA, NEPAD, IOR – ARC, SWIOFC, FAO, NORAD, ACP FISH II, OFCF • Liaise and collaborate with other organisations
Project appraisals	Appraise feasibility of fisheries projects	• Assessment of the economic viability of fisheries projects
PBB Strategic plan for the fisheries sector	Develop strategic direction of the fisheries sector	• Coordinate with technical divisions and units of the ministry for non-financial inputs relating to the Programme Based Budget (PBB) • Process inputs from divisions and units for the 3-year forecast of the PBB strategic plan and the PBB proposals • Prepare progress on achievements for projects under programmes and sub-progammes as laid down in the PBB and the budgetary measures

Licensing/Import - Export

Projects/Services	Objectives	Main activities
Fish imports and exports	• Monitor the import and export of fish and fish products	• Issue import/export permits • Inspect imported fish and fish products • Advise importers/exporters/fish sellers on quality norms
Pelagic Fisheries	• Monitor catch trends, fishing areas, distribution and stock structure	• Collect and analyse data on catch and effort at landing • Data exchange with IOTC • Collect, process and analyse biological samples

Appendix 6: Meetings, workshops, seminars and training courses attended

Subject	Venue	Date	Officers
Joint Meeting and Policy Governance Assessment of the Western Indian Ocean	Nairobi, Kenya	17 – 20 January	Mr. V. Chooramun, DSO
IndiSeas-SWIOFP meeting	Cape Town, South Africa	18 - 19 January	Ms T. Ujoodha, TO Mr. D. Degambur, SO
Surveillance Mission under COI Regional Project	EEZ of Mauritius	26 January – 11 February	Mr. V. Bookun, FPO
Twenty-ninth Session of the COFI	Rome, Italy	31 January – 04 February	Mr. D. Mauree, DoF
Special meeting on allocation criteria	Nairobi, Kenya	14 – 18 February	Mr. D. Norungee, DSO Mr. L. Ujoodha, Ag.PAS
Semi-annual Steering Committee Meeting	Bergen, Norway	14 – 18 February	Mr. D. Mauree, DoF Mr. V. Chooramun, DSO
Surveillance Mission under COI Regional Project	EEZ of Mauritius	19 February – 2 March	Mr. S. Caussy, SFPO
EAF- Nansen Project Meeting	Pretoria, S. Africa	20 - 25 February	Mrs. S. Seeburun, TO Mr. M. Nallee, DSO
Instrumented Longline Fishing Training Course	Réunion Island	26 February - 04 March	Mr. M. Cunnee, PFPO
Hydrographic surveys of waters around Rodrigues and Mauritius on board "RV INS Sarvekshak"	EEZ of Mauritius	26 February – 19 March	Mr. K. Mungry, FPO Mr. V. Emrith, TO
Workshop on 3rd Global Fisheries Enforcement Training	Maputo, Mozambique	28 February – 04 March	Mr. V. Caullee, SO Mr. J. P. Luchmun, SO Mr. W.S. Choeng, STO
20th Meeting of 'Cellule de Coordination Régionale', COI/MCS project	Madagascar	7 – 8 March	Mr. A. Sheik Mamode, STO
SWIOFP Mid-term Review, 1st Session of the Regional Policy and Steering Committee and the 5th Session of the SWIOFC	Maldives	8 – 12 March	Mr. D. Mauree, DoF Mr. S. Soondron, DSO Mrs. M. Hurbungs, DSO
Symposium on the role of MPA's entities in the Western Indian Ocean	Mombasa, Kenya	14 – 17 March	Mrs. Y. Basant Rai, DSO Mrs B. Sibdoyal, AS
Programme monitoring workshop for Southern Africa, ACP Fish II	Maputo, Mozambique	15 – 16 March	Mr. P. Neermul, SO
IOTC – 8th Session of the Compliance Committee	Colombo, Sri Lanka	16 – 22 March	Mr. D. Norungee, DSO
1OTC - 5th Session of the Commission	Colombo, Sri Lanka	18 – 22 March	Mr. D. Mauree, DoF
EAF – Nansen Project Meeting	Acra, Ghana	21 - 24 March	Mr. M. Nallee, DSO
Workshop to review the draft programme - protocol on sustainable development for SADC	Johannesburg	24 – 25 March	Mrs. S. Rathacharen, PFO
Ocean Data and	Lomé, Togo	4 - 8 April	Mrs P. R. Sibartie,

Information Network for Africa (ODINAFRICA) Marine Information Management Training Course			Officer
'21ème Réunion de la Cellule de Coordination Régionale et CCR élargie' and Tuna Conference	Seychelles	6 – 8 April	Mr. D. Mauree, DoF Mr. D. Norungee, DSO
Tuna Conference	Seychelles	8 April	Hon. L. J. Von Mally, Minister of Fisheries and Rodrigues
Workshop on Coral Reefs and Climate Change in the WIO	Nairobi, Kenya	8 - 9 April	Mr. V. Mangar, STO
Workshop on Oil Spill Response Exercise	Mauritius	17 - 19 May	Mr. V. Emrith, TO
Training workshop on the project "Strengthening the Implementation of the IOTC Port State Measures Resolution"	Seychelles	16 – 20 May	Mr. P. Neermul, SO Mr. P. Luchmun, SO Mrs. C. Lim Shung, TO
Training programme in VMS and interpretation	Bergen, Norway	28 May – 03 June	Mr. S, C. Bauljeewon, SO Mrs. S. D. Thacoor, TO
Plan Regional de Surveillance des Pêches dans l'Ocean Indien	Reunion, Island	7 June	Mr. J. P. Luchmun, SO
Oil Spill Drill Exercise	Mauritius	16 June	Mr. V. Emrith, TO
Scientific dialogue to brainstorm for developing a regional mechanism of linking science	South Africa	21 – 22 June	Mr. D. Mauree, DoF
Training on fish handling, fish processing and value addition	Japan	19 - 28 June	Mr. N. Wan Sai Cheong, STO
Short course on "Microbiology: Fundamentals and Applications"	Mauritius	27 - 30 June	Mr. V. Emrith, SO
Coastal Marine Atlases Workshop	Mauritius	25 – 29 July	Mrs P. R. Sibartie, Officer Ms N. Jeenally, TO
Training course in preparation for MS ISO 9001:2008 assessment	Mauritius	11 - 12 July	Mr. D. Bolaky, TO Mrs. V. Chelumbrun, TO
Third Meeting of Tuna RFMOs (Kobe III)	California, USA	11 – 15 July	Mr. D. Mauree, DoF
2nd Stakeholder Consultation Meeting for Terrestrial and Marine Biodiversity	Addis Ababa, Ethopia	12 -14 July	Mrs. S. Rathacharen, PFO
Training course on internal auditing techniques in ISO 9001:2008	Mauritius	13 - 14 July	Mrs. V. Chelumbrun, TO Mr. D. Boolaky, TO

Implementation of the MoU on Fisheries between Mauritius and Mozambique	Mozambique	17 – 22 July	Mr. V. Chooramun, DSO Mr. H. Hemraz, Mr. L.M Orieux, Mr. J. J. R. Siroux (Fishermen Board members of FIT)
International Training Course on Climate Change Adaption	Thailand	22 – 31 August	Mr. S. Leckraz,TO
Youth Anticorruption Forum	Reduit	25 August	Mr. V. Emrith, SO
Working meeting for accountants of SWIOFP	Mombassa, Kenya	01 – 03 September	Mrs Y. Naidoo, AMFO
Cordobce Tuna Allocation Conference	Cordobce, Spain	04 – 08 September	Mr. D. Mauree, DoF
Trawl data analysis with Nansis software	Windhoek, Namibia	5 - 9 September	Mrs. V. Chelumbrun, TO
Training Course on Ecosystem Approach to Fisheries - EAF	Grahamstown, South Africa	8 August - 2 September	Mr. G. Geeane, TO Mr. D. Degambur, SO Mr. M. Nallee, DSO
SADC Task Force Meeting on Illegal, Unregulated and Unreported Fishing (IUU) and SADC Working Group Meeting on By-catch and Discards	Maputo, Mozambique	12 - 16 September	Mrs Y. Basant Rai, DSO
Regional Seminar on Fisheries Subsidies for African Countries	Rabat, Morocco	14 – 15 September	Mr. P. Neermul, SO
Workshop to discuss the implementation of resolutions on sustainable fisheries	New York	15 – 16 September	Mr. D. Mauree, DoF
SWIOFP Budget and Planning Meeting	Maputo Mozambique	19 - 29 September	Mrs. M. Hurbungs, DSO
BIOPS Workshop	Seychelles	21 – 23 September	Mrs. M. Koonjul, SO Mr. V. Mangar, SO
SWIOFP Budget and Planning Meeting	Maputo, Mozambique	23 - 29 September	Mr. D.Mauree, DoF Mrs. S. Rathacharen, PFO Mr. S. Soondron, PFO Mr. V. Chooramun, DSO Mr. S. Khadun, SO Mr. D. Degambur, SO Mrs. Y. Naidoo, AMFO
Regional Policy and Steering Committee Meeting and Session of the SWIOFC	Maputo, Mozambique	29 -30 September	Mr. A. C. Moosuddee, Ag. PS
Seminar on World Standard Day	Mauritius	14 October	Mrs. S. Thacoor. SO
Working Party on Tropical Tunas	Maldives	16 – 23 October	Mr. D. Kawol, TO
Working Party on	Maldives	24 – 26 October	Mr A. Sheik Mamode,

Ecosystems and By-catch			STO
COMESA Regional Training on Equivalence of Sanitary and Photosanitary Measures	Nairobi, Kenya	26 – 27 October	Ms B. Mungur, VO
Seaweed Farming in Mauritius and Rodrigues	Mauritius	07 November	Mr. V. Emrith ,SO Mr. V. Munbodhe, TO Ms N. Jeenally, TO Mrs S.Cootapen, TO
Scientific Committee of the SWIOFC – 2nd *Ad-hoc* Working Group on Demersal Fisheries	Mombassa, Kenya	14 – 18 November	Mr. D. Degambur, SO
Training on Arc View Software	Mauritius	15 - 18 November	Mrs. S. Cootapen, TO
Half-day GIS Training Short Course	Mauritius	21-25 November	Mr. G. Dhunnoo, SO Mrs. S. Thacoor, SO
6th Meeting of IOSEA Signatory States	Bangkok, Thailand	06 – 04 December	Mr. D. Norungee, PFO
Maintain your Microscope	Mauritius	06 - 09 December	Mr. V. Emrith, SO Mrs. S. Cootapen, TO
Workshop on Production of Oil Spill Sensitivity Atlas	Mauritius	07 December	Mr. G. Dhunnoo, SO

Appendix 7: Publications on Sale at the Documentation Unit

Title	Unit Price (Rs.)
Field Guide to Corals of Mauritius *Sale of a minimum of 10 copies at one purchase*	**250** **200**
Poisson Commerciaux du Sud-Ouest de l'Ocean Indien (Guide)	**110**
Bathymetric Charts: A. Ile Maurice B. Ile Maurice Nord I C. Ile Maurice Nord II (out of stock) D. Banc Soudan E. Banc Hawkins F. Rodrigues Ouest G. Ile Rodrigues	**50**
Posters **- Common Corals of Mauritius** **- Common Coral Reef Fishes of Mauritius** *Sale of a minimum of 25 units at one purchase*	 **80** **80** **55**
Field Guide to Coastal Fishes of Mauritius	**250**
Thematic Maps for coastal areas: - Format A4 - Format A3	 **55** **110**

Appendix 8: Environment Impact Assessment for proposed projects reviewed

1 Neo-town project – Les Salines

2 Setting up of a Health Care and Wellness Centre at Mont Blanc, Mare Aiguilles

3 Property development project, Petite Pointe aux Piments

4 Commercial, hotel and residential development, Baie du Tombeau

5 Setting up of an Ayurvedic Sanctuary, Palmar

6 Subdivision of land for residential and commercial purposes, Belle Mare.

7 Works for treatment of erosion, Le Prince Maurice Ltd.,

8 66 residential apartments, 20 pieds (B45), Pavillion, Cap Malheureux.

9 Sub-division of land for residential purpose, Palma, Beau Songes

10 Setting up of a crusher plant at Beemanique, Rose Belle.

11 Development of a hotel "Centara", Poste Lafayette

12 Construction and operation of a complex NPK fertilizer plant, Fort George

13 Installation and operation of a desalination plant, Trou aux Biches Hotel

14 Setting up of a 10 bed private hospital, Flic-en-Flac

15 Sub-division of land for residential purpose, Boulet Rouge, Flacq

16 Sub-division of land for residential purpose, Souillac

17 Sub-division of land, Gris Gris

18 Setting up and operation of a sand quarry, St Julien

19 Closure of Union St Aubin Sugar Mill in line with La Barraque Mill

20 Sub-division of land for residential purpose at Grande Rosalie

21 Installation and operation of distillery & CMS Fertilizer, La Baraque

22 Extension works at Cotton Bay Hotel, Pointe Cotton, Rodrigues

23 Hotel and residential land division, Haute Rive

24 Construction of Boutique Hotel, Poste de Flacq

Appendix 9: Missions, visits and attachments at AFRC

Name of visitor/s	Institution	Purpose	Date
Messrs Sigmund Engesater, Jens Altern Wathne and Sigbjorn Ulvatn	Directorate of Fisheries, Norway	Workshop on MCS and Port State Measures under the Bilateral Cooperation between Norway and Mauritius Presentation made: • International obligations on reporting and control (Mr J. Luchmun) • Fisheries Monitoring Centre (Mr O. Sunassee), Monitoring, Control and Surveillance (Mr R. Hossenbacus and Mr A. Rajapundit of the National Coast Guard) • Reporting requirements (entry/exit, codes and formats, strategic risk assessment); electronic logbook; port state measures and development of ELORV (Consultants). •	14 – 18 February
Mr. Gunnstein Bakke	Directorate of Fisheries Norway	• Preparation of standard operating procedures (SOP) and guidelines for inspections of calling fishing vessels in the port • Visit at AFRC in the context of bilateral cooperation Mauritius - Norway under the project "Combating Illegal Fishing, Marine Resource Management and Strengthening Quality of Fish Products". •	29 November – 4 December
Mr Jean Francois Dobelle	Ambassador of France	Visit to the FMC	21 December

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