1. Fisheries Research

1.1 Coastal (artisanal) fishery

Data from the artisanal fishery were collected monthly from 25 fish landing stations selected randomly from the 61 existing ones around the island to estimate the catch and effort by fish species and gear. During the year, 3 800 landings were thus recorded.

1.1.1 Catch, effort and catch per fisherman day

The production of fresh fish was estimated at 820 tonnes and comprised 496 tonnes from the lagoon and 324 tonnes from off-lagoon. Compared to 2008, an increase of 20.2% was noted due to an increase in catch from the large net fishery. The average catch per fisherman-day (CPFD) was 6.4kg and was 14.3% higher than that in 2008. 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
2005	545	402	947	153 771	77 429	231 200	3.5	5.2	4.1
2006	579	371	950	145 089	68 961	214 050	4.0	5.4	4.4
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

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

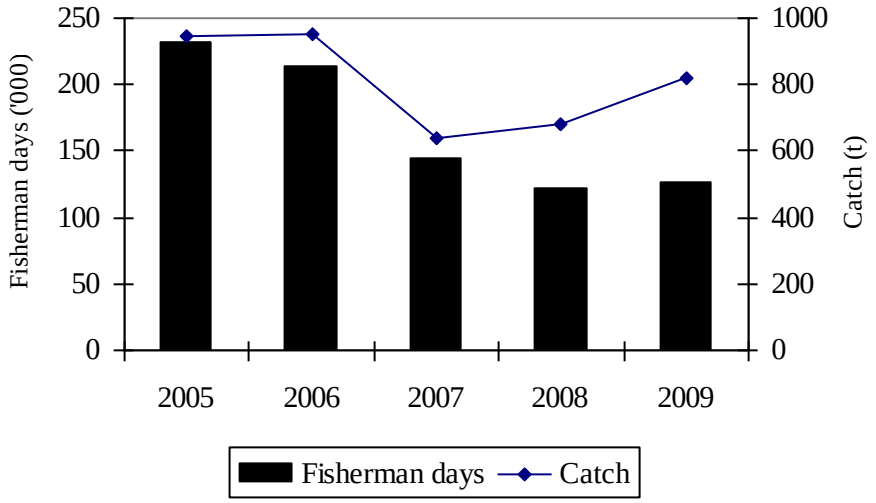


Figure 1.1: Fisherman-days and total catch

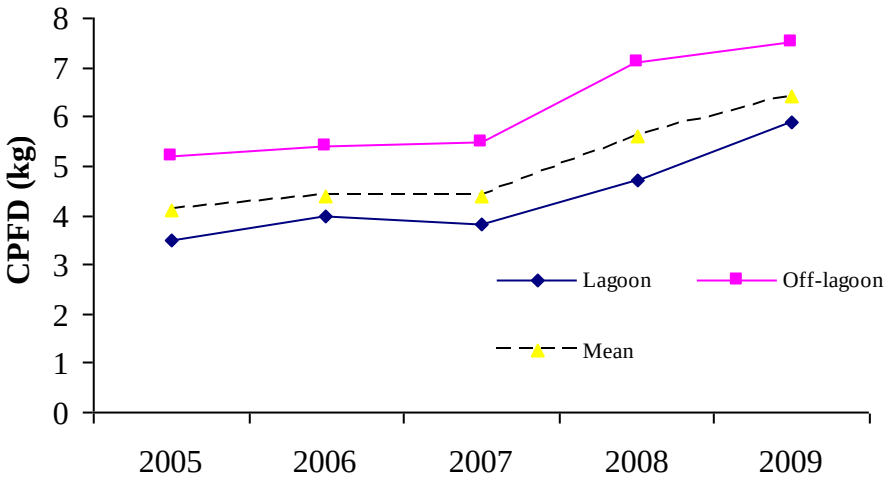


Figure 1.2: Catch per fisherman-day

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 May with a catch of 146 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	18	45	64	10.7	8 850	4.8	9.0	7.2
February	15	14	30	4.3	4 770	4.9	8.8	6.2
March	65	18	83	13.4	12 442	6.9	5.9	6.6
April	41	33	75	12.4	12 737	7.0	7.8	7.3
May	98	48	146	21.8	14 132	10.7	9.7	10.3
June	45	39	84	13.0	14 628	4.9	7.2	5.8
July	33	23	56	8.8	11 124	4.5	6.2	5.1
August	36	21	58	9.3	10 565	5.4	5.6	5.5
September	57	16	73	11.6	11 450	6.2	7.1	6.4
October	44	18	62	9.7	11 237	5.5	5.5	5.5
November	18	29	47	7.9	7 306	4.5	8.7	6.4
December	24	21	45	7.5	8 102	4.7	7.0	5.5
Total	**496**	**325**	**820**	**130.4**	127 343	**5.9**	**7.5**	**6.4**

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

1.1.3 Catch by gear

Fifteen large nets and five gill nets were in operation during the year. Catch were recorded according to the following: basket traps, hooks and lines, harpoons, basket traps/lines and on foot. A decrease in catch was observed for basket trap, while increase in catch was observed for all other types of fishing. The catch by fishing gear is presented in table 1.3.

Table 1.3: Annual catch (kg) by gear

Year	Line	BT	BTL	LN	GN	H/OF	Total
2005	288 818	433 832	16 786	121 521	8 196	78 165	**947 318**
2006	303 675	343 794	19 608	201 122	11 298	70 501	**949 998**
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**

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

1.1.4 Fishermen

A total of 2 303 fishermen were involved in fishing activities. The number of fishermen by gear type for the past five years is presented in table 1.4.

Table 1.4: Number of fishermen by gear type

Year	BT	L/H/OF	BT/L	LN	GN	Total
2005	493	789	689	189	14	**2 174**
2006	275	764	1 111	149	13	**2 312**
2007	283	770	876	137	12	**2 078**
2008	275	795	807	138	13	**2 028**
2009	279	733	862	133	13	**2 303**

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

Table 1.5 shows the yearly average price of fresh fish.

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

Fish	2005	2006	2007	2008	2009
Homard	515	550	600	680	690
Crabe & crevette	290	275	320	320	355
Vieille rouge	215	230	255	275	290
Vacoas, sacréchien	160	175	175	210	245
Capitaine	170	170	180	200	220
Dame berri	150	170	170	190	210
Octopus	125	130	135	150	160
Carangue	115	120	130	150	155
Cordonnier	105	115	120	140	145
Rouget	95	110	115	135	150
Tuna	95	110	115	135	150
Mullet voilé	95	100	105	130	140
Bordemar	95	90	110	135	140
Licorne	115	115	125	150	160
Cateau	70	85	90	105	110
Shark	45	50	50	50	60
Other fish	65	65	75	80	90

1.2 Banks fishery

Ten vessels were engaged in fishing activities on the shallow water banks of the Saya de Malha, Nazareth, Albatross and Chagos Archipelagos and carried out twenty fishing trips. Particulars of the fleet are given in table 1.6.

Table 1.6: Particulars of the fishing fleet

Vessel	LOA (m)	GRT (t)	Hold (t)	Crew	Fishermen	Joined in	Flag
Talbot IV	44	317	176	28	57	1989	Comoros
Silver Star 2	51	300	200	18	54	1992	Mauritius
Shandrani	55	398	300	35	60	1994	Mauritius
Shandrani 2	42	449	130	30	45	2002	Mauritius
Bethu	55	391	196	17	54	2005	Madagascar
Diego Star (*ex-Hoi Siong 2*)	54	388	190	16	50	2005	Madagascar
Shandrani 3	49	652	239	12	83	2009	Mauritius
Hoi Siong 8	35	315	145	19	26	2009	Mauritius
Etelis	34	349	104	10	9	2009	Mauritius
Glory No. 1	51	299	154	16	58	2009	Mauritius

LOA: Length overall; GRT: Gross registered tonnage

1.2.1 Production of frozen fish

A total of 2 233 tonnes of frozen fish was landed which comprised lethrinids (87.1%), snappers/groupers (12.8%) and tuna/others. Compared to 2008, the total catch increased by 31.8% due to an increase in fishing effort. During the year, no fishing trip was carried out on the Albatross fishing bank. 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	
2005	7	1 028	578	0	36	**1 642**
2006	10	1 645	777	136	54	**2 612**
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**

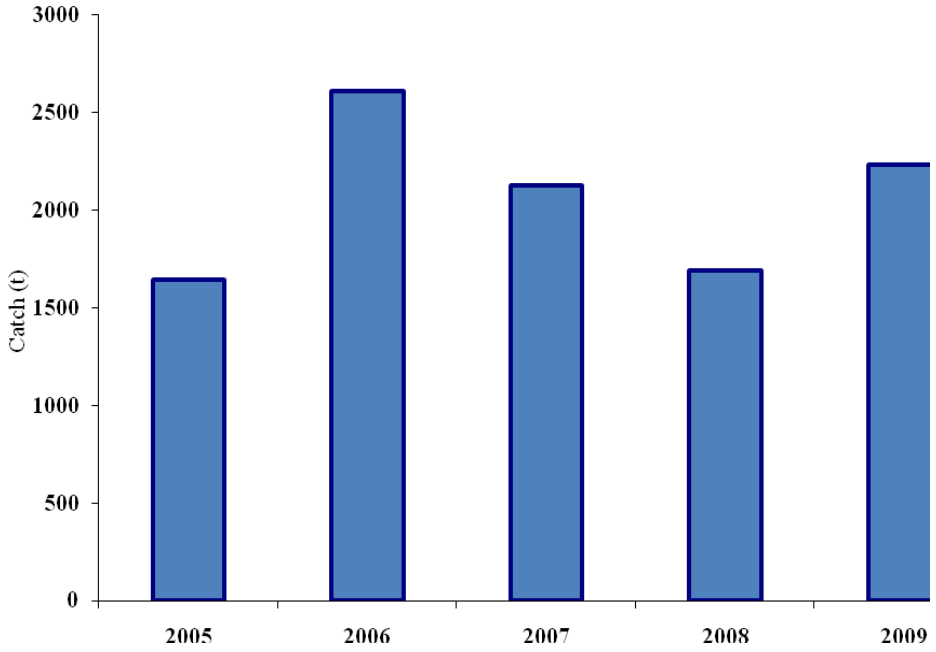


Figure 1.3: Trend in catch for the banks fishery

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	427	185	22 625	1 835	81.1	82.2
Nazareth bank	73	11	3 367	237	70.4	10.6
Chagos Archipelago	72	9	1 872	161	86.0	7.2
Total	**572**	**205**	**27 864**	**2 233**	**-**	**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 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
2005	7 675	578	75.2	12 663	1 028	81.2
2006	9 627	777	80.7	23 233	1 645	70.8
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

The CPFD on the Nazareth bank showed a decrease as compared to the last five years, whereas the CPFD on the Saya de Malha bank has increased. The trend in CPFD from the two banks is shown in figure 1.4.

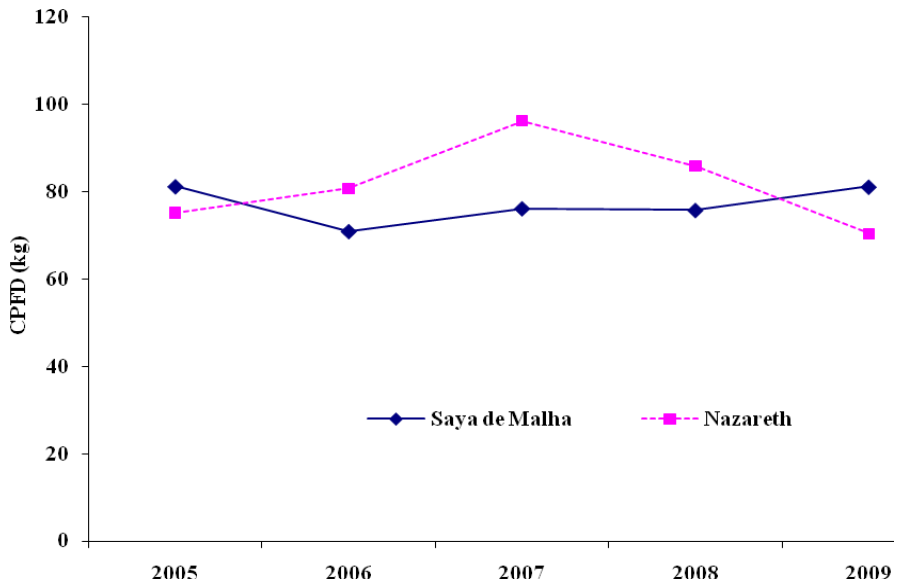


Figure 1.4: Trends in CPFD for the Nazareth and the Saya de Malha banks 2005-2009

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 420 and the length ranged from 260 to 480 mm. 82 % of the fish sampled had length greater or equal to 300 mm. The length frequency distributions are shown in figure 1.5.

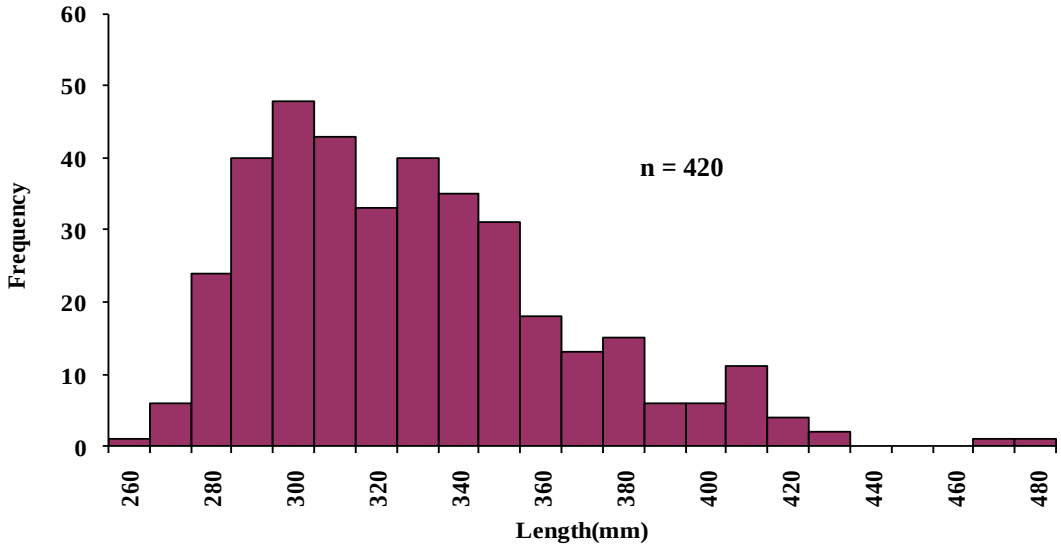


Figure 1.5 Length frequency of *Lethrinus mahsena* from the Saya de Malha bank

1.2.4 Fishing in the waters of the Chagos Archipelago

Fishing vessels *Talbot IV* and *Etelis* made three trips to the Chagos Archipelago. FV *Etelis* fished exclusively for deepwater snappers and groupers while FV *Talbot IV* caught mainly white fish (lethrinids) in the shallow waters. 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)
2005	nil	nil	nil	nil	nil	nil	nil
2006	1	1	34	10	136	1 802	75.5
2007	1	1	44	6	130	2 376	54.5
2008	nil	nil	nil	nil	nil	nil	nil
2009	3	2	72	9	161	1 872	85.8

1.3 St. Brandon inshore fishery

About 30 contractual fishermen and 20 fibreglass boats were active in the St. Brandon fishery. A total amount of 389.9 tonnes of fish including octopus and lobster was landed. Fish were caught

using hand lines, octopus using harpoon and lobster were handpicked. The catch was frozen or chilled and some salted. Nine carrier boats, namely *Etretat*, *Marie Charlotte*, *Vimaya*, *La Derive*, *Albacore*, *Makaira*, *Ouvea*, *Sea Quest* and *Vivano* were active in that fishery. The different products landed from the St. Brandon fishery from 2005 to 2009 are given in table 1.11.

Table 1.11: St. Brandon inshore fishery production (t)

Year	Trips	Frozen fish	Chilled fish	Salted fish	Frozen octopus	Frozen lobster	Total
2005	49	171.0	132.6	35.4	4.6	0.0	**343.6**
2006	29	116.8	59.2	45.2	2.1	1.1	**224.5**
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**

The catch consisted mainly of white fish (lethrinids) and other species, namely *Plectropomus maculatus* ('babonne'), *Variola spp*. ('croissants'), *Siganus sutor* ('cordonnier'), *Naso unicornis* ('licorne') and *Scarus spp.* ('cateau').

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 1 530 specimens were collected. The lengths varied between 250 and 560mm while the weight ranged from 420 to 3 320g. 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.

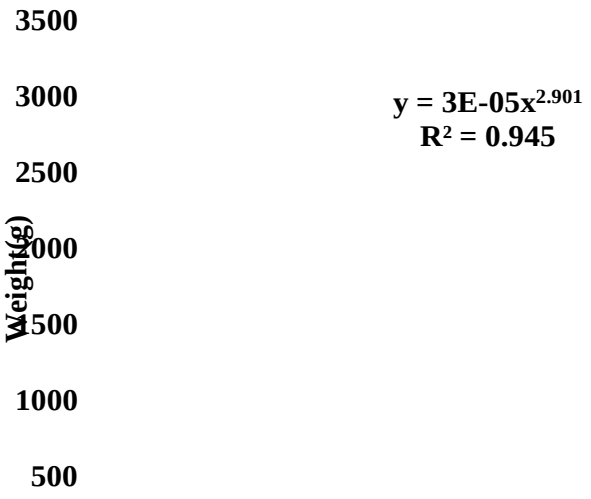


Figure 1.6: Length/weight relationship of *Lethrinus mahsena* from St. Brandon

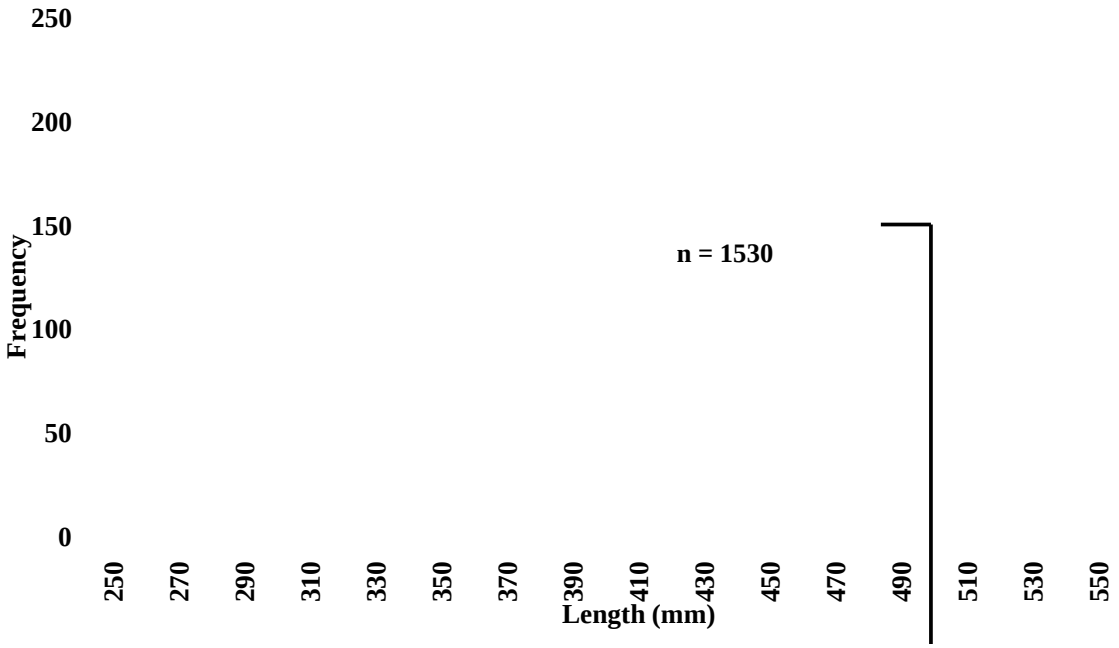


Figure 1.7: Length frequency distribution of *Lethrinus mahsena* from St. Brandon

1.4 The semi-industrial fishery

Ten fishing boats and nine fishing carrier boats operated on the Soudan, Albatross, Nazareth and Saya de Malha banks undertaking 145 trips with an average duration of 12 days each. A total of 120.4 tonnes of chilled fish (including 10.3 tonnes caught by basket traps) and 4.5 tonnes of frozen fish were landed. Table 1.12 gives 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
La Derive*	17.0	58.4	9.0	12	-	1995
Makaira*	17.0	14.5	5.5	2	10	1996
Coryphaena	12.0	8.5	2.5	2	4	1999
Vimaya*	22.0	49.0	15.0	2	10	2000
Mahi-Mahi	15.0	24.0	6.0	2	4	2002
Dai Fah1	17.0	14.0	14.0	2	4	2002
Quo Vadis 1	12.0	26.9	4.0	2	4	2003
Sea Quest*	20.0	59.0	20.0	8	7	2004
Vivano*	13.1	11.0	3.5	2	3	2005
Sainte Rita	34.0	222.0	100.0	7	9	2006
Albacore*	16.3	49.5	30.0	4	8	2007
Sea Treasure	19.9	75.0	35.0	4	14	2007
Etelis	33.6	394.0	100.0	8	5	2007
Marie Charlotte*	22.8	66.5	15.0	2	4	2008
Etretat*	22.0	99.4	80.0	1	6	2008
Snapper	16.3	14.0	10.0	3	10	2008
Sea Tiger	23.9	77.8	25.0	5	18	2008
Sea Bird	46.9	629.0	285.0	-	-	2009
Ouvea*	20.3	97.4	25.0	2	6	2009

***Carrier boat/vessel**

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

Fishing area	Catch chilled			Total chilled
	Lethrinids	Snapper/grouper	Tuna and others	
Albatross bank	57 134	8 176	0	65 310
Nazareth bank	10 646	33 600	19	44 265
Saya de Malha bank	3 647	5 932	0	9 579
Soudan bank	1 047	153	0	1 200
Total	**72 474**	**47 861**	**19**	**120 354**

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	65 310	218	1 270	51.0
Nazareth bank	44 265	110	661	66.9
Saya de Malha bank	9 579	18	370	26.0
Soudan bank	1 200	3	15	80.0
Total	**120 354**	**349**	**2 316**	

Sampling of 422 specimens of *Lethrinus mahsena* was carried out upon arrival of the fishing boats and vessels. The length ranged from 270 to 560mm while the weight from 330 to 3 100g. Figures 1.8 and 1.9 illustrate the length-frequency distribution and the length-weight relationship of the fish landed.

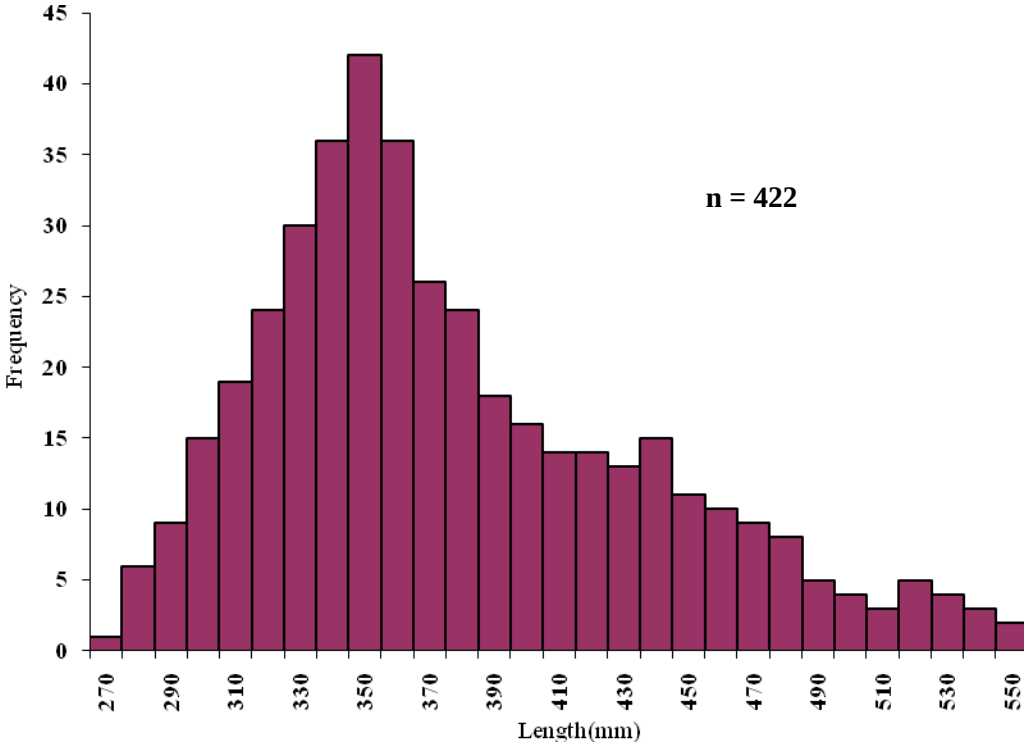


Figure 1.8: Length frequency of *Lethrinus mahsena* from the Albatross bank

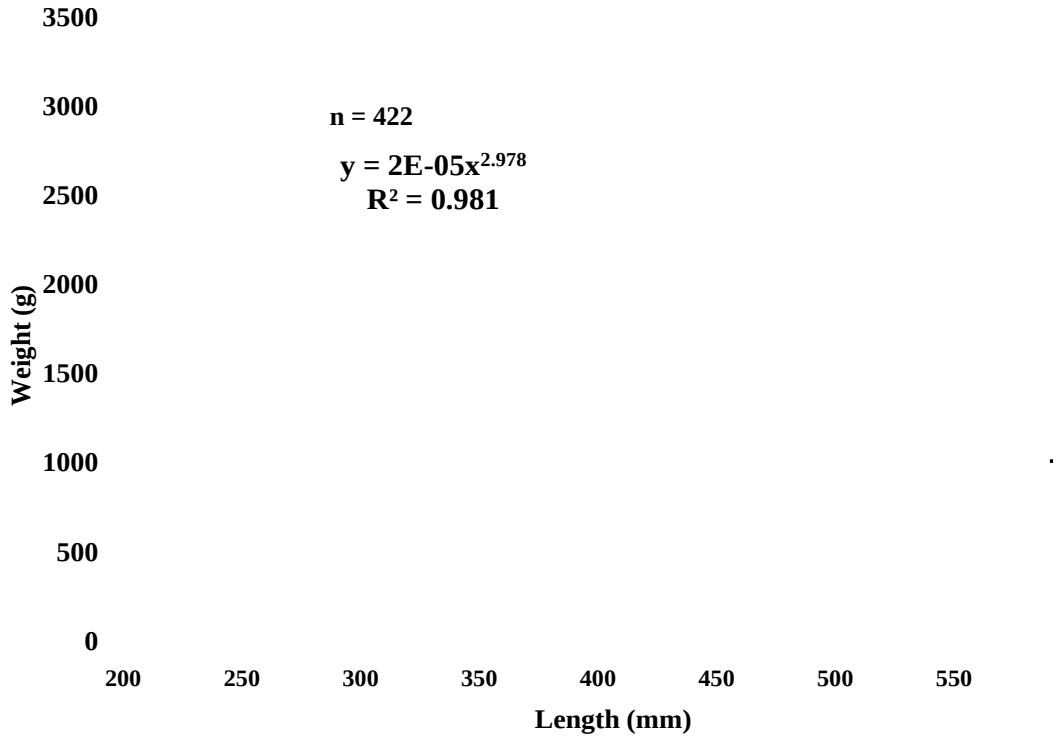


Figure 1.9: Length-weight relationship of *Lethrinus mahsena* from Albatross bank

1.5 The fishery on the drop-off of banks

Ten fishing vessels were active in the fishery on the drop-off of the St. Brandon, Albatross, Nazareth and the Saya de Malha banks targeting snappers and groupers. A total of 487.1 tonnes of frozen fish and 42.3 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

Fishing area	Catch chilled (kg)			Total chilled	Catch frozen (kg)			Total frozen
	SCH*	GPD*	VLB*		SCH*	GPD*	VLB*	
Nazareth bank	13 092	15 559	3 638	**32 289**	94 741	290 147	24596	**409 484**
Saya de Malha bank	2 636	1 999	615	**5 250**	40 615	1 507	409	**42 531**
St. Brandon bank	0	0	0	**0**	8 296	20 413	6 391	**35 100**
Albatross bank	1 923	2 142	696	**4 761**	0	0	0	**0**
Total	**17 651**	**19 700**	**4 949**	**42 300**	**143 652**	**312 067**	**31 396**	**487 115**

***SCH-sacre-chien, *GPD-guele pave doree, *VLB- vieille laboue**

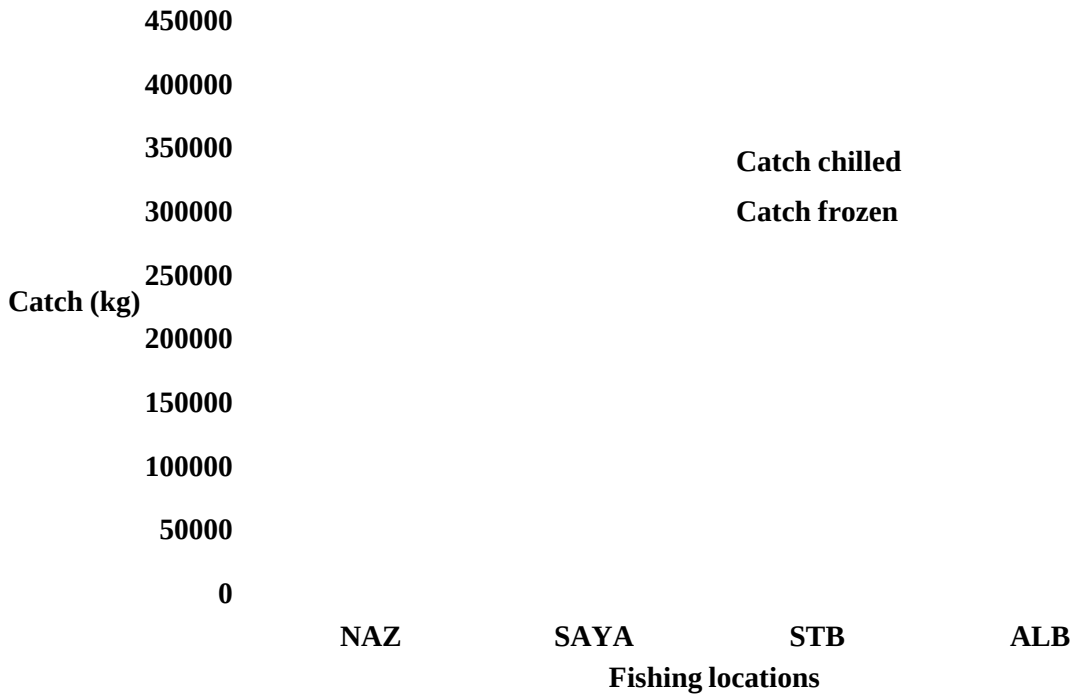


Figure 1.10: Breakdown of frozen and chilled catches by fishing locations on the drop-offs of Nazareth (NAZ), Saya de Malha (SAYA), St. Brandon (STB) and Albatross (ALB)

Most of the catch was from the Nazareth bank (83%) followed by the Saya de Malha bank (9%), St. Brandon (7%) and Albatross (1%). The breakdown of the catch of the snapper/ grouper consisting of sacré-chien (30%), gueule pavée doré (63%) and vieille laboue (7%) is given in figures 1.11 and 1.12, respectively.

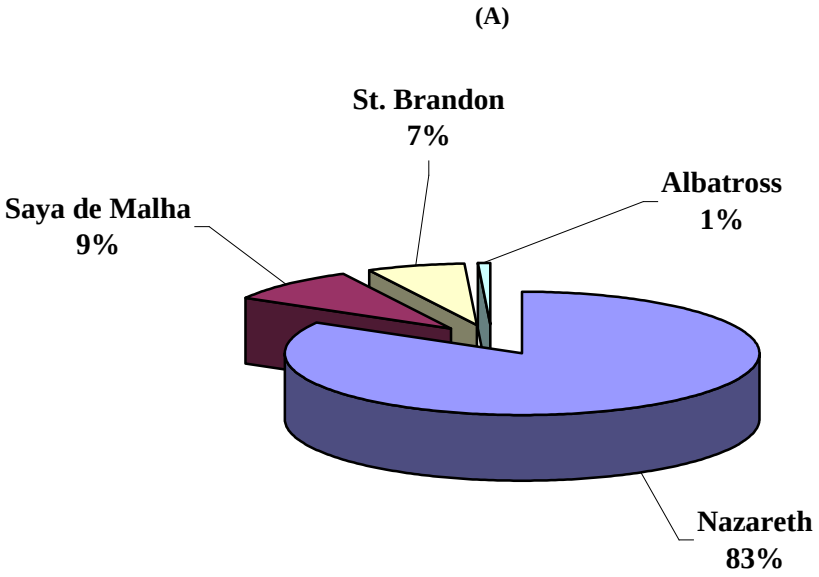


Figure 1.11: Percentage representation of catch by bank

Figure 1.12: Percentage representation of the deep-water snapper and grouper fishery by species (SCH-sacre-chien, GPD-guele pave doree, VLB- vieille laboue)

A total of 554 specimens of *Polysteganus baissaci* (gueule pavée doré) were sampled for length frequency distribution. The length frequency distribution of *Polysteganus baissaci* (gueule pavée doré) showed two prominent peaks at length range 360-380 mm and another one at length range 630-710 mm. The highest frequency was observed at 380 mm. Results are shown in figure 1.13.

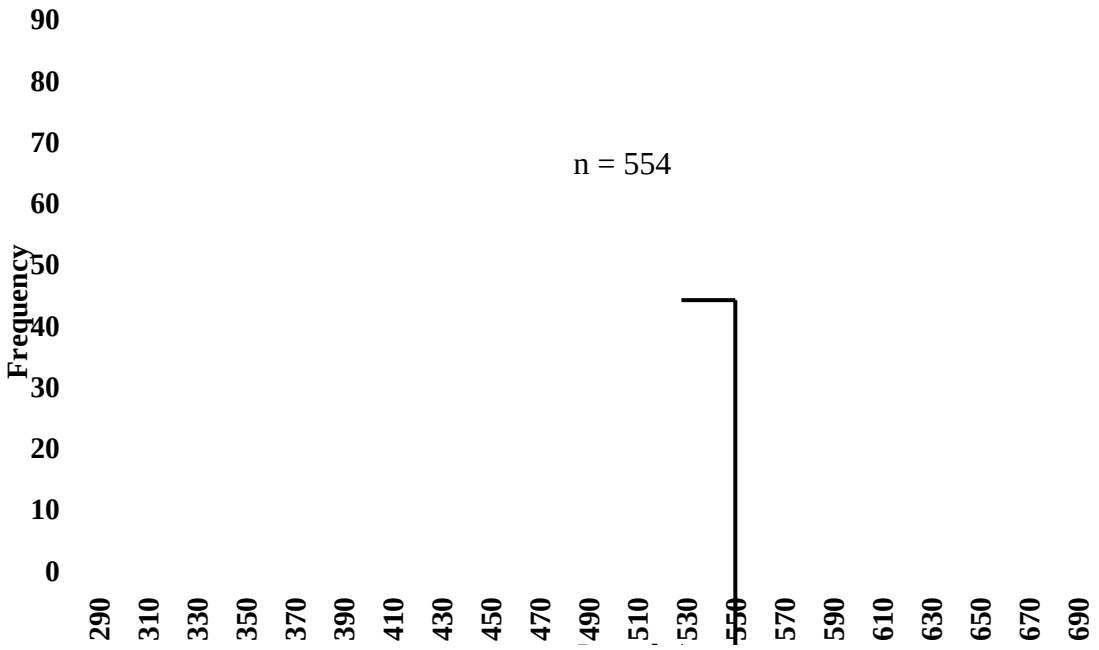


Figure 1.13: Length frequency of *Polysteganus baissaci* (gueule pavée doré) from the Nazareth Bank

1.6 Ecotoxicology

1.6.1 Fish toxicity tests

Two fish fillet samples were tested through the mongoose bioassay method for the presence of ciguatoxin. Both fish samples were found not to be toxic. Another two fish samples comprising a fish fillet and salted fish were tested for the presence of ciguatoxin using the mouse bioassay. Two sets of three mice, each mouse weighing between 20 and 22g were used. Test results are shown in table 1.17.

Table 1.17: Results of tests by mouse bioassay

Genus/Species	Mouse bioassay	
	Test 1	Test 2
Fish fillet *Pangasius* spp	not toxic	not toxic
Salted fish fillet	highly toxic	highly toxic

1.6.2 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. The sites were sampled on a quarterly basis for the presence and density of harmful marine microalgae. Seawater and macroalgae samples

were collected at three different sampling stations. The main species of dinoflagellates observed were *Prorocentrum* spp. and *Ostreopsis*. Diatoms were also present in larger numbers at all the sites. The total number of dinoflagellates recorded at the four sampling sites is shown in table 1.18.

Table 1.18: Total number of dinoflagellates recorded (cell count)

Species	Blue Bay	Trou aux Biches	Albion	Le Morne
***Gambierdiscus* sp.**	nil	nil	nil	nil
***Ostreopsis* sp.**	13	6	9	4
***Prorocentrum* spp**	15	2	4	5
***Amphidinium* sp.**	nil	nil	1	1
***Synophysis* sp.**	nil	nil	nil	nil
***Coolia* sp.**	nil	2	nil	2

1.7 Identification of fish specimens

Fifty-eight fishes, six sea cucumbers, two marine shrimps and one crab were identified from specimens brought in by officers of the Fisheries Protection Service, National Coast Guard, Police and Ministry of Health and Quality of Life.

1.8 Sea cucumber fishery

Ten operators were authorised to collect, process and export sea cucumbers on a quota basis for the period 1st April to 31st July. Among the 10 operators authorised, only 5 undertook the collection and export of sea cucumbers which mainly comprised *Holothuria atra* (76%), *Actinopyga mauritianna* (9%), *Holothuria leucospilota* (6%), *Bohadscia argus* (5%) and *Holothuria edulis* (4%). The total wet weight of sea cucumbers collected stood at 114 tonnes. A two-year moratorium period was adopted since 1st October 2009 for the conservation of sea cucumbers.

1.9 South West Indian Ocean Fisheries Project (SWIOFP) – Components 1 and 3

Mauritius participated in SWIOFP training workshops under the Component-1, *Data atlas and information technology* and Component-3 *Assessment and sustainable use of demersal fishes*. Under Component-1, three workshops were organized for fisheries data management (StatBase) and for Geonetwork and one workshop for Component-3.

The inventory of datasets and statistical tables by countries were updated. A total of 25 datasets for 25 different fisheries were identified. These datasets incorporated 67 statistical tables including vessel registries, catch and effort. The inventory comprised statistics relating to artisanal fisheries, some industrial fisheries and one semi-industrial fishery.

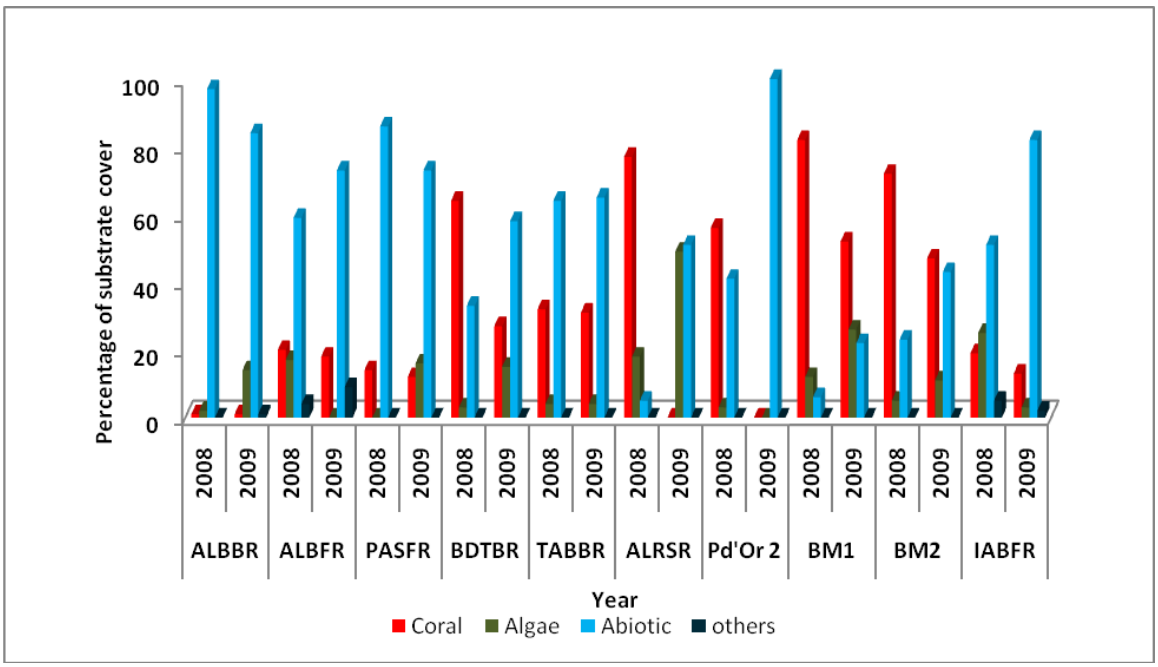
Mauritius presented 3 datasets on the Fish Aggregating Devices fishery, Coastal Fishery and Semi-industrial Bank Fishery which comprised 11 tables. The datasets were being finalized in the StatBase format.

2. MARINE SCIENCE

2.1 Coastal ecosystem research

2.1.1 Long-term monitoring of the coral reef ecosystem

The long-term monitoring of the coral reefs was continued at the established sites *viz*: Albion, Pointe aux Sables, Baie du Tombeau, Le Goulet, Trou aux Biches, Anse la Raie, Poudre d'Or, Belle Mare, Trou d'Eau Douce, Bambous Virieux, Bel Ombre and Ile aux Benitiers. Data on substrate cover were collected using the Line Intercept Transect (LIT) method. Data on coral cover were recorded up to the species level. The data were processed by the COREMO II software and the average percentage cover of substrate is shown in figure 2.1 and table 2.1. The abundance of fish, sea urchins and sea cucumbers is given in table 2.2.



ALBBR – Albion back reef, ALBFR – Albion fore reef, PASFR- Pte aux Sables fore reef, BDTBR- Baie du Tombeau back reef, TABBR – Trou aux Biches back reef, ALRSR – Anse La Raie shore reef, Pd'Or 2- Poudre d'Or Site 2, BM1- Belle Mare site 1, BM2 – Belle Mare site2, IABFR– Ile aux Benitiers Fore reef.

Figure 2.1: Percentage of substrate cover at monitoring stations

Table 2.1: Average percentage cover of substrate at monitoring stations

Site	Stations	Year	Coral	Algae	Abiotic	Others
Albion	fore reef	2008	20	17	59	4
		2009	18	< 1	73	9
	back reef	2008	1	2	97	*
		2009	1	14	84	2
Le Goulet	fore reef	2008	41	7	45	7
		2009	29	5	60	6
Pointe aux Sables	fore reef	2008	14	< 1	86	*
		2009	12	16	73	*
	back reef	2008	8	3	89	*
		2009	2	< 1	93	5
Baie du Tombeau	back reef	2008	64	3	33	*
		2009	27	15	58	*
Trou aux Biches	fore reef	2008	26	27	46	1
		2009	NM	NM	NM	NM
	back reef	2008	32	4	64	*
		2009	31	4	65	*
Anse la Raie	back reef	2008	30	45	25	*
		2009	20	42	39	*
	shore reef	2008	77	18	5	*
		2009	< 1	49	51	*
Poudre d'Or	site 1	2008	8	49	40	3
		2009	7	50	43	*
	site 2	2008	56	3	41	*
		2009	< 1	< 1	100	*
Belle Mare	site 1	2008	82	12	6	*
		2009	52	26	22	*
	site 2	2008	72	5	23	*
		2009	47	11	43	*
Trou d'Eau Douce	back reef	2008	38	32	29	1
		2009	10	40	48	1
	shore reef	2008	52	6	39	3
		2009	30	16	52	1
Bambous Virieux	back reef	2008	65	11	24	*
		2009	55	22	22	1
	shore reef	2008	37	51	10	2
		2009	26	36	37	1
Bel Ombre	back reef	2008	39	35	25	1
		2009	22	57	22	*
	shore reef	2008	42	7	51	*

		2009	41	2	57	*
Ile aux Benitiers	fore reef	2008	19	25	51	5
		2009	13	3	82	2
	back reef	2008	7	18	75	*
		2009	3	12	85	*
	shore reef	2008	< 1	32	68	*
		2009	< 1	46	54	*

Others: sponges, crown of thorns, soft corals, giant clams, * - Not observed, NM - Not monitored

Monitoring of the three reef zones namely the back reef, shore reef and fore reef was continued at the above sites. Coral cover at the back reef station of Albion was 22% in 2004 while in 2009 it was 1%. This may be attributed to coral bleaching events which occurred in 2004 and 2009 and increased sedimentation and runoffs from land sources which exacerbated the situation. The back reef station had branching corals which bleach easily but take a long time to recover. The Albion fore reef station had a coral cover of 30% in 2004 and 18% in 2009. Coral bleaching also affected the fore reef where encrusting corals are abundant and the recovery was faster than for the branching corals.

2.1.2 Survey on algal bloom and coral bleaching

In January, high sea surface temperatures (SST) were recorded in the lagoons in the north of Mauritius (31°C). This contributed to a micro algal bloom which led to the depletion of dissolved oxygen resulting in fish mortality and the smothering of live corals in the lagoons of Poudre d'Or and Anse La Raie. Live coral cover at Poudre d'Or – site 2 and the back reef of Anse La Raie showed a marked decline as given in table 2.1. Figure 2.2 shows dead millepora (fire coral) corals following the algal bloom at Poudre d'Or.

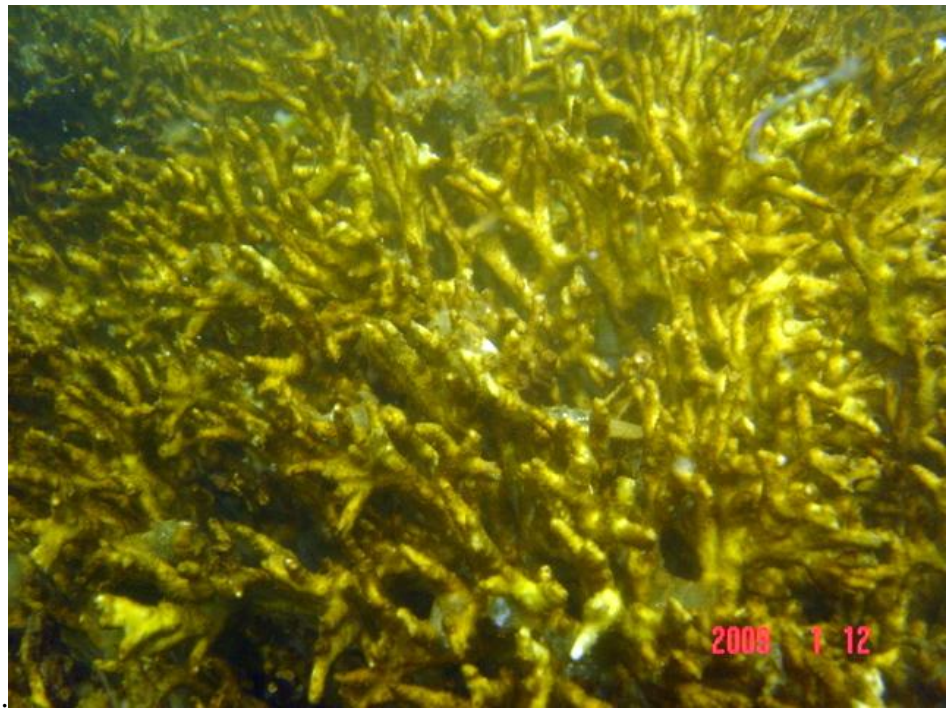


Figure 2.2: Dead millepora (fire coral) corals due to the algal bloom at Poudre d'Or

To assess coral bleaching around the island, surveys were carried out at four representative sites namely at the back reefs of Belle Mare, Anse la Raie and Bel Ombre, and at the fore reef of Ile aux Benitiers. At the time of the surveys, the sea surface temperature (SST) recorded in the lagoon was above 30°C. Figure 2.3 shows heavily bleached corals at Belle Mare which normally harbour beautiful tabular and branching corals. Follow-up surveys were carried out in August and September at the same sites and it was observed that 85% of the bleached corals at Belle Mare had recovered.

Figure 2.3: Tabular corals totally bleached at Belle Mare

Table 2.2: Abundance of fish, sea urchins and sea cucumber

SITE	Type of reef	Year	Pomacentridae & Chaetodontidae	Acanthuridae	Labridae	Scaridae	Sea cucumber	Sea urchins
Albion	fore reef	2008	XX	XX	X	X	*	XXXX
		2009	X	XX	XX	X	*	XXXX
	back reef	2008	XXX	*	XXX	XX	XX	XXX
		2009	*	*	X	X	X	XXXX
Le Goulet	fore reef	2008	XXXX	XX	X	XX	*	*
		2009	XXX	XX	X	XX	X	*
Pointe aux Sables	back reef	2008	XXX	XX	X	XX	*	XXXX
		2009	*	*	*	X	*	XXXX
	fore reef	2009	X	X	XX	X	*	XXXX
Baie du Tombeau	back reef	2008	XXXX	X	X	*	*	*
		2009	XXXX	*	*	*	*	XX
Trou aux Biches	fore reef	2008	X	*	X	*	*	*
		2009	NM	NM	NM	NM	NM	NM
	back reef	2008	XXXX	XX	*	X	*	*
		2009	XXXX	XXX	X	XX	*	*
Anse La Raie	back reef	2008	XXXX	XX	X	X	*	*
		2009	XXXX	XX	X	XX	*	*
	shore reef	2008	XXXX	*	*	*	*	*
		2009	XXXX	*	*	*	*	*
Belle Mare (Site I)	back reef	2008	XXXX	XX	*	*	*	*
		2009	XXXX	XX	*	X	*	XX
Belle Mare (Site II)	back reef	2008	XXXX	XXXX	*	X	*	*
		2009	XXXX	XX	*	X	*	XX
Trou d'Eau Douce	back reef	2008	XXXX	*	*	*	*	*

		2009	XXXX	XX	X	X	*	X
	shore reef	2008	XX	XX	X	*	*	*
		2009	XXXX	XX	X	XX	X	*
Bambous Virieux	back reef	2008	XXXX	XX	X	X	*	*
		2009	XXXX	*	*	X	X	XXXX
	shore reef	2008	XXXX	XX	X	*	*	*
		2009	XXX	XX	X	X	*	X
Bel Ombre	back reef	2008	XXXX	*	X	*	*	*
		2009	XXXX	*	X	X	X	XX
	shore reef	2008	XXX	XX	X	XX	*	*
		2009	XX	*	X	X	*	X
Ile aux Benitiers	back reef	2008	XXXX	XX	X	X	*	*
		2009	XXXX	XXX	X	XX	*	*
	shore reef	2008	XX	XX	X	XX	*	*
		2009	X	X	*	*	*	*
	fore reef	2008	X	XX	X	XX	*	XXXX
		2009	XX	XX	X	X	*	XXXX

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

Table 2.2 shows the abundance of fish, sea urchins and sea cucumber at the monitoring stations. The pomacentridae (damsel fish) and acanthuridae (surgeon fish) were dominant at most of the monitoring stations. The most common species of damsel fish recorded were *Stegastes lividus, Stegastes limbatus, Dascyllus aruanus, Chrysiptera unimaculata* and *Chromis viridis*. However, a decrease in the population of butterfly fish (family chaetodontidae), which are bio- indicators of a healthy reef has been noted. This may be due to the loss of habitat and overfishing. Other species observed were from the families labridae and scaridae. The balistidae (trigger fish) was very rarely found in the fore reef. Predators from the families serranidae and lethrinidae were not observed at the monitoring sites. In areas with degraded reefs, sea urchins were in large numbers and in sandy areas a few sea cucumbers were also observed.

2.1.3 Other ecological surveys

In addition to the regular long-term monitoring surveys, other ecological surveys were also carried out during the year.

Table 2.3: Other ecological surveys

Date	Site	Observations
February	Grand Gaube and Poudre d'Or	During monitoring of ex-sand mining sites it was observed that the seabed was colonised by seagrass and new coral recruits were encountered and an increase in fish abundance was noted.
January and September	Baie du Tombeau, Palmar, Belle Mare, Poste Lafayette and Grand Gaube.	On the request of Mauritius Resaerch Council (MRC), Five species of seaweeds, namely *Ulva lactuca, Enteromorpha sp., Padina sp., Gracilaria sp.* and *Sargassum sp*. were collected from the lagoon for nutrient analysis by Mauritius Sugar Industry Research Institute (MSIRI) and the University of Mauritius.
June	Black River Bay	Under the WIO Lab Project, a survey was carried out to observe siltation and no sedimentation was observed.
June	Petit barachois and Bassin Humbert, Poudre d'Or	The sea bottom was mainly composed of silt in the deeper parts and of pebbles and cobbles in the shallower parts of the barachois. Visibility was poor due to suspended particles in the water column. No corals, seagrass or macroalgal beds were encountered in the area of survey.
August	Le Goulet	Following complaints from fishermen in connection with a blocked boat passage, a survey was carried out and it was observed that the boat passage was filled with coral rubble. The fishermen were given authorisation to dredge the boat passage for better navigation.
September	Mahebourg	Following requests from fishermen of the region for dredging of boat passage at Remy Ollier, a survey was carried out in the region. The seabed comprised mainly of sand, rubble and silt. Due to sparse marine biota distribution in the area, the dredging of the boat passage was recommended.

2.1.4 Coral farming

The five basal plates with coral fragments which were deployed at a depth of about 2m in lagoon-based nurseries at Albion in 2008 were monitored. Results indicated 57% successful growth of the coral fragments, while 25% were lost and 18% died. The percentage of success rate of the different farmed coral species is given in figure 2.4.

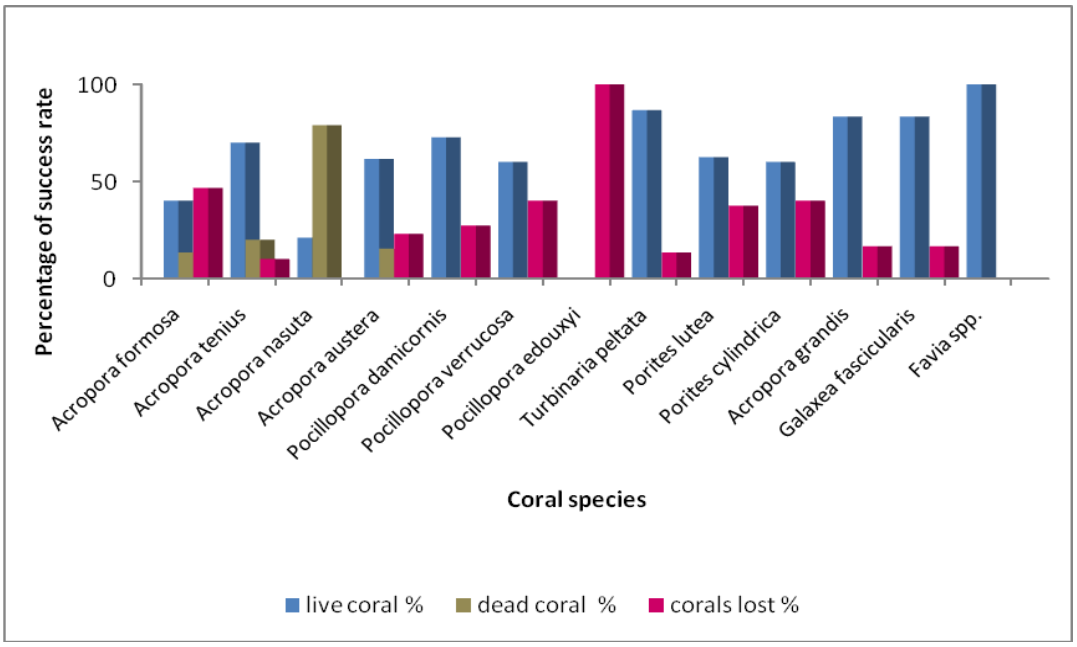


Figure 2.4: Success rate of farmed coral species (%)

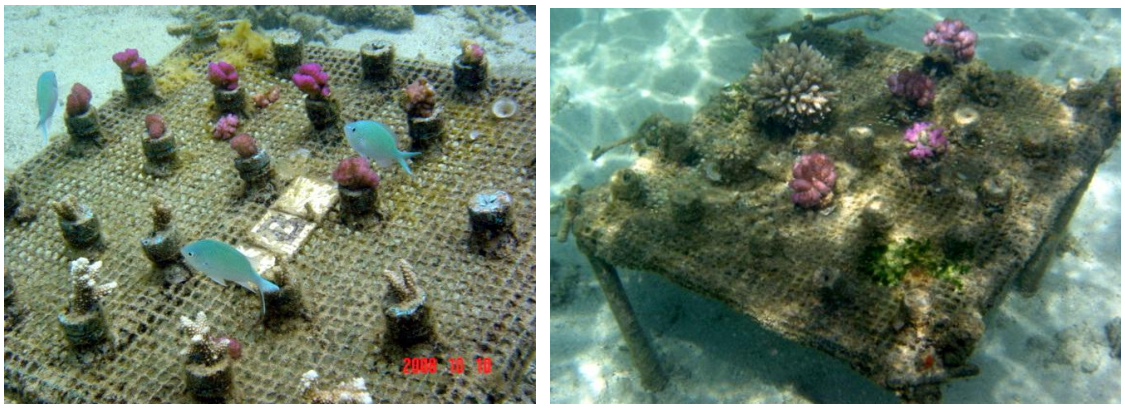


Figure 2.5: Comparison of a plate in November 2008 and December 2009

The coral fragments of all the farmed species showed considerable growth from the time of placement. *Acropora sp.* had the fastest growth rate and was less resistant to coral bleaching. *Galaxea fascicularis, Pocillopora damicornis* and *Porites sp.* had a good growth and were resistant

to bleaching. Growth was both linear and lateral for all species. Bleaching due to high SST (> 29^{o} C) affected the *Acropora sp.* from February to April and the corals recuperated with the advent of winter. All the water quality parameters (salinity, pH, DO, COD, nitrate and phosphate) were within the limits of the CWQG at the coral farming site. The tables supporting the fragments were very resistant to any type of weather conditions and acted as an artificial reef, causing an aggregation of fish in the area of farming. The farmed coral species would be utilised to rehabilitate degraded reefs.

2.1.5 Mangrove propagation

Mangrove seedlings were propagated at Bassin Léon, Le Morne, within the context of the mangrove propagation programme. The activity was conducted by the NGO, "Association Pour le Développement Durable" with technical assistance provided by the Fisheries Division. Some 9 500 mangrove seedlings were successfully propagated over an extent of 5 000m^2.

2.1.6 Stranded marine mammals/ turtles

During the year, many strandings were observed. The details are listed in table 2.4.

Table 2.4: Stranded marine mammals/ turtles

Species	Region/ month	Observations
Chelonia mydas (green turtle)	GRSE, June	Dead turtle (decomposed)
Chelonia mydas (green turtle)	Blue Bay, July	Dead turtle
Chelonia mydas (green turtle)	Balaclava, September	Death due to spear gun fishing. The turtle has been stuffed and is an exhibit for educational purposes at AFRC (Marine Science Division).
*Eretmochelys imbricata (*Hawksbill turtle)	Port Louis NCG September	Carcass collected at sea near harbour
Globicephala macrorynchus (Short finned pilot whale)	Belle Mare, September	3 tons, 4.2m long, pectoral fins missing. (Figure 2.6)
Chelonia mydas (green turtle)	Rivière Noire, November	Death due to propeller hit.

Figure 2.5: Dead pilot whale in Belle Mare (September)

2.2 Coastal water quality

2.2.1 Monitoring of chemical parameters

Long-term monitoring of water quality was continued at the 86 established stations of the twenty sites around the island. 327 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 range of values for results of the analyses over the last three years is shown in table 2.5. Another site at Rivière Noire was included as part of the Western Indian Ocean Land-based Activities (WIOlab) project in collaboration with the National Parks and Conservation Services of the Ministry of Agro Industry, Food Production and Security.

Table 2.5: Range of values for results of water analyses (2007-2009)

SITE	YEAR	NITRATE-NITROGEN	PHOSPHATE	CHEMICAL OXYGEN DEMAND
		(mg/l)	(mg/l)	(mg/l)
Albion	2007	<0.1	<0.01 - 0.05	<0.1 - 0.1
	2008	<0.1	0.01- 0.07	0.1 - 2.1
	2009	<0.1 - 1.8	0.03 - 0.06	0.1-1.2
Pointe aux Sables	2007	<0.1	0.01 - 0.06	0.1 - 0.5
	2008	<0.1	<0.01 - 0.07	0.1 - 1.1
	2009	<0.1	0.02 - 0.07	0.1 - 1.4
Bain des Dames	2007	<0.1	0.01 - 0.05	0.3 - 1.0
	2008	<0.1	0.01 - 0.07	0.2 - 1.0
	2009	<0.1	0.03 - 0.05	0.1 - 1.4
Harbour	2007	<0.1	0.03 - 0.09	<0.1 - 1.3
	2008	<0.1	0.01 - 0.13	0.1 - 1.7
	2009	<0.1	0.04 - 0.08	0.1 - 0.7
Bird Sanctuary	2007	<0.1	0.03 - 0.12	0.8 - 3.8
	2008	<0.1	0.04 - 0.13	0.6 - 2.1
	2009	<0.1	0.01 - 0.19	<0.1 - 1.3
Baie du Tombeau	2007	<0.1	<0.01 - 0.08	<0.1 - 1.5
	2008	<0.1	0.01 - 0.08	0.1 - 1.7
	2009	<0.1	0.01 - 0.19	0.1 - 1.3
Balaclava	2007	<0.1	0.01 - 0.06	0.4 - 1.2
	2008	<0.1 - 0.9	0.01 - 0.15	0.4 - 1.8
	2009	<0.1	0.02 - 0.05	<0.1 - 0.3
Trou aux Biches	2007	<0.1	<0.01 - 0.04	0.1 - 1.2
	2008	<0.1	0.01 - 0.07	0.2 - 2.1
	2009	<0.1	0.01 - 0.05	<0.1 - 1.2
Grand Baie	2007	<0.1	<0.01 - 0.05	0.1 - 2.7
	2008	<0.1	0.01 - 0.06	<0.1 - 1.4
	2009	<0.1	0.01 - 0.08	0.1 - 2.2
Anse la Raie	2007	<0.1	0.01 - 0.04	0.4 - 0.8
	2008	<0.1	0.02 - 0.08	0.1 - 1.5
	2009	<0.1	0.01 - 0.06	<0.1 - 0.6
Poudre d'Or	2007	<0.1	<0.01 - 0.12	<0.1 - 2.2
	2008	<0.1 - 0.8	0.01 - 0.17	<0.1 - 3.8
	2009	<0.1 - 0.2	0.01 - 0.27	<0.1 - 3.7
Belle Mare	2007	<0.1	<0.01 - 0.01	0.2 - 1.3
	2008	<0.1	0.01 - 0.06	<0.1- 0.6
	2009	<0.1	0.01 - 0.07	0.2 - 1.5
Palmar	2007	<0.1	0.01 - 0.08	0.9 - 2.6
	2008	<0.1	0.01 - 0.08	0.1 - 0.9
	2009	<0.1	0.01 - 0.08	0.1 - 1.0
Trou d'Eau Douce	2007	<0.1	0.01 - 0.02	0.3 - 0.6
	2008	<0.1	<0.01 - 0.05	0.1 - 0.8
	2009	<0.1	0.01 - 0.06	0.1 - 1.9
Bambous Virieux	2007	<0.1	<0.01 - 0.01	0.1 - 1.0

	2008	<0.1	0.02 - 0.08	<0.1 - 0.5
	2009	<0.1	0.01 - 0.04	0.3 - 0.5
Blue Bay	2007	<0.1 - 0.3	0.01 - 0.18	<0.1- 0.9
	2008	<0.1	0.01 - 0.02	<0.1- 0.3
	2009	<0.1 - 1.8	<0.01 - 0.09	0.2 - 0.7
Bel Ombre	2007	<0.1	<0.01 - 0.06	0.2 - 0.7
	2008	<0.1	0.01 - 0.06	0.1 - 0.5
	2009	<0.1	0.01 - 0.08	0.1 - 0.7
Ile aux Benitiers	2007	<0.1	0.01 - 0.03	<0.1 - 1.4
	2008	<0.1	<0.01 - 0.02	0.1 - 0.6
	2009	<0.1	0.01 - 0.05	0.3 - 0.6
Rivière Noire	2008	<0.1	0.06 - 0.11	0.2 - 1.9
	2009	<0.1	0.04 - 0.15	0.2 - 1.9
Flic en Flac	2007	<0.1	<0.01 - 0.02	<0.1 - 0.1
	2008	<0.1	0.1 - 0.07	<0.1 - 0.5
	2009	<0.1	0.02 - 0.06	0.1 - 0.8

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 - 3mg/l

Coastal Water Quality Guideline limits (Recreation): Nitrate – nitrogen - 0.8mg/l, phosphate - 0.08mg/l and COD - 5mg/l

The levels of nitrate were less than 0.1 mg/l while those of phosphate ranged from less than 0.01 to 0.19 mg/l and COD from less than 0.1 to 3.8 mg/l. The results of the water quality analyses were within the *Guidelines for Coastal Water Quality Requirements for various categories Govt. Notice No. 620 of 1999 (CWQG)* except at one station at Balaclava, Poudre d'Or and Rivière Noire and at two stations at Terre Rouge Bird Sanctuary where higher levels of phosphate were recorded. The COD level was exceeded at one station at Poudre d'Or while nitrate level was exceeded at one station at Blue Bay and at one station at Albion. The high levels of nitrate and phosphate recorded at these stations could be attributed to influx of freshwater from the nearby rivers.

2.2.2 Monitoring of the levels of trace metals

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 continued on a bi-annual basis. The levels of these two trace metals recorded were below their detection limits in all of the samples analysed.

Note: Detection limit for lead – 0.013 mg/l

Detection limit for cadmium – 0.0028 mg/l

2.2.3 Fish mortality and alleged pollution

Site surveys and analyses of seawater were carried out in relation to cases of alleged pollution and fish mortality. Details are given in table 2.6.

Table 2.6: Sites of alleged pollution and fish mortality

Date	Site	Event
6 January	Poudre d'Or	Fish mortality
6 January	Cap Malheureux	Fish mortality
7 January	Anse la Raie	Fish mortality
13 January	Poudre d'Or	Fish mortality
16 January	Poudre d'Or	Fish mortality
11 February	La Preneuse	Alleged pollution
18 February	Blue Bay	Fish mortality
11 May	Canal Dayot	Alleged pollution
24 July	Terre Rouge Bird Sanctuary	Fish mortality
2 August	Ile aux Cerfs	Fish mortality in pond
6 October	Bain des Négresses	Alleged pollution
22 October	Batelage, Souillac	Alleged fish mortality and pollution
26 October	Terre Rouge Bird Sanctuary	Fish mortality
13 November	Bel Ombre	Shrimp mortality
16 December	Pointe des Lascars	Pollution of Rivière du Rempart

2.2.4 Independent Environmental Audit on Wastewater Projects

The monitoring of seawater quality at Pointe Moyenne, Montagne Jacquot and Baie du Tombeau outfalls was on-going. Results of analyses of water samples were within the limits of the *Regulations for Effluent Discharge into the Ocean as per Govt. Notice No. 45 of 2003 of the Environment Protection Act 2002* as shown in table 2.7.

Table 2.7: Water quality at the three outfalls (2007 – 2009)

Site	Year	Nitrate-Nitrogen (mg/l)	Phosphate (mg/l)	Chemical Oxygen Demand (mg/l)
Pointe Moyenne	2007	<0.1	<0.01 - 0.09	0.1 - 1.0
	2008	<0.1	0.06 - 0.13	0.2 - 0.5
	2009	<0.1	0.02 - 0.08	0.1 - 1.0
Montagne Jacquot	2007	<0.1	<0.01 - 0.04	0.1 - 1.3
	2008	<0.1	0.01 - 0.08	<0.1 - 0.6
	2009	<0.1	0.01 - 0.08	0.1 - 4.6
Baie du Tombeau	2007	<0.1	<0.01 - 0.05	0.2 - 2.1
	2008	<0.1	0.01 - 0.08	0.2 - 1.7
	2009	<0.1	0.01 - 0.07	0.1 - 0.5
CWQG limit (Industrial)		**1.0**	**0.10**	**5.0**
Standards for Effluent Discharge into the Ocean		**-**	**-**	**750.0**

A report on the Independent Environment Audit on Wastewater Projects from September 2008 to September 2009 was prepared in collaboration with the Ministry of Environment and National Development Unit, Ministry of Renewable Energy and Public Utilities and Ministry of Health and Quality of Life (Environmental Health Engineering Unit). The report included the findings of the monitoring exercises during the period October 2008 to September 2009. Water quality for physico-chemical parameters generally complied with the *CWQG* and the *Regulations for Effluent Discharge into the Ocean.*

2.2.5 Monitoring of the level of mercury

The level of mercury in estuaries was monitored at eight sites namely, Rivière Lataniers, Grand River North West, Tamarin, Baie du Cap, l'Escalier, Mahebourg, Grand River South East and Pointe Roches Noires. Results of analyses indicated that levels of mercury in the water samples were below the detection limit of 0.03µ/l. Data were submitted twice yearly to the technical committee set up by the Ministry of Environment and National Development Unit for the UNEP Global Mercury Assessment Programme.

Note: Detection limit for mercury – 0.03µg/l

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 continued on a monthly basis at 10 sites namely, Flic en Flac, Albion, Pointe aux Sables, Trou aux Biches, Mon Choisy, Le Goulet, Grand Baie, Blue Bay, Pereybere and Belle Mare. 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 2.8 shows level of TC and FC at the various sites for the last three years.

Table 2.8: Results of coliform analysis at the monitoring sites

Beach	Station No.	Average colony count per 100ml					
		2007		2008		2009	
		TC	FC	TC	FC	TC	FC
Albion	1	29	9	39	10	39	10
	2	83	24	172	36	71	36
Pointe aux Sables	1	763	148	624	117	853	172
	2	740	146	541	114	675	147
	3	25	7	101	24	67	20
	4	384	80	154	42	196	54
Le Goulet	1	21	7	25	6	26	9
	2	ND	ND	16	3	4	ND
Balaclava Marine Park	3	ND	ND	10	3	16	3
	4	ND	ND	4	1	5	1
	6	ND	ND	ND	ND	ND	ND
Trou aux Biches	1	33	10	36	7	42	13
	2	30	11	61	13	51	18
Mon Choisy	1	35	11	47	12	47	13
	2	27	7	26	7	44	16
	3	24	6	27	6	45	13
	4	32	8	39	10	53	15
Grand Baie	1	21	5	55	20	45	12
	2	32	10	70	21	48	14
	3	14	4	54	14	50	14
	4	138	37	309	69	234	49
	5	298	67	332	72	189	38
Pereybere	1	27	8	26	7	47	13
	2	43	15	7	7	48	12
	3	126	29	55	12	60	18

	4	164	34	63	14	97	24
Belle Mare	1	34	8	35	10	75	18
	2	26	7	58	13	86	22
	3	21	6	50	12	77	22
	4	24	6	58	12	57	14
	5	16	4	65	15	122	32
Blue Bay	1	14	3	16	4	26	8
	2	20	6	27	6	29	8
	3	34	8	42	10	51	14
Blue Bay Marine Park	1	ND	ND	4	ND	6	
	2	ND	ND	ND	ND	ND	ND
	4	ND	ND	2	ND	8	2
Flic en Flac	1	23	9	39	9	36	10
	2	36	8	55	15	48	13
	3	20	3	32	7	69	18
	4	42	14	71	21	76	20
	5	62	14	93	23	83	19
Coastal Water Quality Guideline limits (CWQG)	**TC:** 1000 CFU/100ml **FC:** 200 CFU/100ml						

ND: Not Detected

The data collected on the total and faecal coliforms are provided to the Committee on Lagoonal Pollution in Port Louis Region (Ministry of Environment and NDU) and to the Beach Authority for the assessment of coastal development projects and for public health aspects.

2.4 Accreditation of laboratories

Designs and layout for the renovation/upgrading of the Fish Toxicity, Chemistry and Bacteriology laboratories as well as the animal house were prepared and tenders launched. The renovation works of the laboratories and animal house started in April and were completed in September.

3. AQUACULTURE

Seed production of berri rouge, *Oreochromis* sp. of the Malaysian variety and the giant freshwater prawn (*Macrobrachium rosenbergii)* was pursued. Trials for asexual reproduction of the sea cucumbers *Holothuria leucospilota*, *Holothuria atra* and *Stichopus chloronotus* and induced sexual reproduction of *Holothuria leucospilota* were carried out. Fingerlings of berri rouge and juveniles of freshwater prawn were supplied to fish farmers. Breeding and culture of the freshwater ornamental fish, gold fish *(Carassius auratus)*, platy (*Xiphophorus maculatus*) and molly (*Poecilia latipinna*) were carried out.

3.1 Plankton culture

The culture of the phytoplankton species, *Nannochloropsis* sp and *Tetraselmis* sp, were maintained in the phytoplankton room. The zooplankton, *Brachionus rotundiformis*, a rotifer, was maintained in one polycarbonate tank and was fed on *Nannochloropsis* sp.

3.2 Freshwater prawn culture

3.2.1 Broodstock

A broodstock of 449 prawn spawners of body weight ranging between 15 and 25g was acquired from Medine Sugar Estate (SODIA), Riche en Eau Sugar Estate, Val Farms and a farm at Long Mountain for the production cycle. Berried females were conditioned and maintained in black circular polycarbonate tanks in the dark at a water temperature ranging between 24 and 28°C. They were fed once daily on chopped frozen mussels and shrimps at 10% body weight.

3.2.2 Seed production

The seed production cycle was undertaken from January to April and from October to December when the water temperatures were between 27°C and 29°C. Three larval rearing cycles were carried out and a total of 159 105 juveniles was produced.

Larvae obtained were stocked in fibreglass and polycarbonate tanks in green water at a salinity of 12 ppt. The larvae were fed daily on brine shrimp nauplii, *Artemia* sp. and "egg cake". The larval stage index was closely monitored. Post-larvae (> stage 12) were obtained after a culture period ranging between 35 and 50 days, when the salinity of the water was gradually brought down to 0 ppt.

3.2.3 Sale of freshwater prawn seed

The juveniles were sold to 17 farmers at the rate of Rs. 1.25/unit. Proceeds of sales amounted to Rs.198 881.25.

3.3 Berri rouge culture

3.3.1 Broodstock and fingerlings production

The broodstock of berri rouge was maintained in five concrete nursery and two broodstock ponds. The fish were fed on extruded red snapper pellets. Reproduction occurred naturally in the ponds. A total of 25 580 fingerlings was collected out of which 1 620 were distributed free of charge to 125 small-scale farmers and 23 960 were sold to 15 large-scale farmers at Rs. 1.25/unit for a total of Rs. 29 950.

3.4 Training on breeding and seed production of freshwater ornamental fish

Breeding and seed production of three species of freshwater ornamental fish, sailfin molly (*Poecilia latipinna*), platy (*Xiphophorus maculates)* and goldfish (*Carassius auratus)* was continued. Two training sessions sponsored by the National Women Entrepreneur Council on breeding and culture of freshwater ornamental fish were held in August. A total of 26 persons attended the training course which consisted of brood-stock management, collection of eggs and fry, daily management of water quality, feeding and rearing of fry. Mentoring of the trainees was carried out jointly with officers of the Human Resource Development Council (HRDC) and Small Enterprises and Handicraft Development Authority (SEHDA). All the trainees have successfully undertaken the culture of ornamental fish.

3.5 Sea cucumber culture

3.5.1 Maintenance of brood stock

The brood stock of the three species of sea cucumber namely *Holothuria leucospilota , H. atra* and *Stichopus chloronotus* were maintained separately in three outdoor tanks fitted with a continuous flow of sea water and having a sandy bottom (20cm). Seagrasses were placed in the tanks to create a natural environment. Other sea cucumber species namely *Actinopyga mauritiana, Stichopus variegates, Actinopyga echinites, Holuthuria nobilis, Bohadchia argus, Stichopus chloronotus, Holothuria scabra* were acquired from Pointe aux Piments and Pointe aux Sables and kept in one outdoor tank. The sea cucumbers were fed on freshly ground algal paste comprising mainly *Gracillaria* sp, *Ulva* sp and *Hypnea* sp.

3.5.2 Culture trial of *Holothuria leucospilota*

Thirty two specimens of *Holothuria leucospilota* collected from the lagoon at Albion with average weight 264g and length 19.2cm were induced to spawn. The method involved allowing the specimen to dry in air followed by spraying with a powerful jet of seawater. After one hour the sea cucumbers showed swaying movements resulting into release of milt by the males inducing the females to release their eggs. The temperature of the water was 26ºC at spawning. An estimated 5.7 million eggs underwent development to reach pentactula stage (larvae) in seventeen days. However, metamorphosis from pentactula to settling of baby sea cucumbers could not be achieved as was the case with previous trials with *H. atra* and *Bohadchia marmorata*.

3.5.3 Asexual reproduction

Seventeen specimens of *Stichopus chloronotus* of average length 10.3cm and average weight 66.2g, eleven *H. leucospilota* of average length 21.4cm and average weight 427.3g and ten *H. atra* of average length 14.9cm and average weight 207.5g were cut at about 45% from their anterior side for asexual reproduction. The cut pieces were stocked in a five ton capacity outdoor tank under a continuous flow of seawater. The mean water temperature was 21°C. After two days, only 9 pieces of sea cucumbers comprising 7 pieces of *H. atra* and 2 pieces *H. leucospilota* had regenerated but survived for only five days. Further trials are underway.

3.6 Aquaculture extension service

Technical advice was provided to ninety two persons in freshwater aquaculture. Thirty-four site visits were undertaken to assist potential fish farmers. Five aquaculture projects received from potential promoters were examined and appropriate recommendations made.

3.7 Commercial aquaculture production

A total of 330 tonnes of marine fish was cultured in floating cages. 140.5 tonnes of red drum, silver sea bream and rabbit fish were produced for the local market whilst 189.6 tonnes of chilled red drum was exported to France, South Africa, USA, Portugal, Spain and Italy. One tonne of fish, 1.2 tonnes of mud crab and 85 000 units of oysters were harvested from different barachois. The production of freshwater fish (berri rouge) and freshwater prawn was 98.6 and 4 tonnes, respectively. The production details are shown in table 3.1.

Table 3.1: Aquaculture production

Fish	Quantity (tonnes)
Marine fish (barachois)	1.0
Mangrove crab (barachois)	1.2
Red drum, sea bream and rabbit fish (floating cages)	330.1
Berri rouge	98.6
Freshwater prawn	4.0
Total	**434.9**
Oyster	85 000 units

3.8 Assistance from Overseas Fisheries Cooperation Foundation (OFCF)

Two freshwater pumps and one air compressor were donated under assistance for rehabilitation of fisheries facilities for fisheries development in Mauritius by the OFCF (Japan).

4. MARINE CONSERVATION

The Marine Conservation Division is involved in the management of the two Marine Parks, in the assessment of coastal development projects and tourism related activities and projects. The Division participates in the evaluation of Environmental Impact Assessment (EIA) reports and Preliminary Environmental Reports (PER) submitted under the Environment Protection Act to the Ministry of Environment and National Development Unit, and in post EIA monitoring related to coastal development projects.

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 therein. The permissible activities were amongst others, glass bottom boating, snorkelling, diving, fishing, water skiing, swimming and non-motorised boating. Seventeen picked up cases of illegal fishing implements were recorded, comprising prohibited fishing gear such as basket traps (4), underwater fishing equipment (11) and fishing nets (2). Eleven contraventions were established, which included access to the park without a permit (5), discharging polluting substances into the park (2), engaging in commercial activities in the park without a permit (2) and illegal fishing (2).

The Steering Committee for the management of the BBMP met on four occasions.

Maintenance work was carried out to ensure that the mooring structures and buoys used to demarcate the different zones were in good condition. The missing and damaged conical demarcation buoys of the traffic lane, the ski lane, the mooring, swimming, conservation and strict conservation zones were ordered for replacement. Some of the missing and damaged buoys were replaced by 40 new buoys while others were replaced by the existing buoys which were cleaned and repaired.

4.1.2 Permits fees

A total sum of Rs. 909 900 was collected against the delivery of 367 permits of which 81 were new and 286 were renewed permits. Registered artisanal fishermen are exempted of charges for permits. Details on the charge for each permit, monthly permits issued with revenue collected, new and renewed permits are given in table 4.1.

Table 4.1: Return of Permits for year 2009

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	33	69 *Out of the 69* *1 (renewed for 2 weeks)* *2 (renewed for 2 weeks) &* *1 (renewed for 1 week)*	17	119	**490 700**
Commercial (COM)	Rs. 5000 Yearly/Renewal	14	38	Nil	52	**260 000**
Line Fishing (L/F)	Rs. 200 Yearly/Renewal No charge for registered fishermen	29	92	16	137	**24 200**
Recreational (REC)	Rs. 1000 Yearly/renewal	4	81	Nil	85	**85 000**
Temporary Interference (T/INT)	Rs 7 000 per month or part thereof	1	Nil	Nil	1	**7 000**
Permanent Interference (INT)	Rs 75 000 one time off and Rs 7 000 yearly for renewal	Nil	6	Nil	Nil	**42 000**
Basket trap (BTR)	Rs. 1000 Yearly/renewal for non-registered fishermen No charge for registered fishermen	Nil	1	12	13	**1000**
TOTAL		**81**	**287**	**45**	**413**	**909 900**

*: No charge for registered fishermen

4.1.3 Coral reef ecosystem monitoring at 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 comprised mainly those of families acanthuridae, labridae, scaridae, chaetodontidae and pomacentridae (Table 4.3).

Table 4.2: Percentage substrate cover at Blue Bay Marine Park

Life form categories	**Station 1**		**Station 2**		**Station 3**		**Station 4**		**Station 5**	
	2008	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**
Acropora branching	4.9	5.2	14.7	16.2	25.9	26.4	<0.1	<0.1	<0.1	<0.1
Acropora digitate	2.3	2.0	<0.1	2.3	<0.1	0.6	<0.1	<0.1	<0.1	<0.1
Acropora tabular	<0.1	0.1	39.9	42.6	2.3	3.0	<0.1	<0.1	<0.1	<0.1
Coral foliose	<0.1	<0.1	18.6	19.2	<0.1	2.2	<0.1	<0.1	<0.1	<0.1
Coral massive	0.3	0.3	6.9	5.3	1.6	0.9	<0.1	<0.1	<0.1	<0.1
Coral submassive	0.2	0.2	11.8	11	0.2	0.1	<0.1	<0.1	<0.1	<0.1
Mushroom coral	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Coral encrusting	<0.1	<0.1	<0.1	<0.1	1.2	2.6	<0.1	<0.1	<0.1	<0.1
Total live coral cover	**7.7**	**7.8**	**91.9**	**96.8**	**31.2**	**35.8**	<0.1	<0.1	<0.1	<0.1
Sand	14.9	13.5	2.1	0.9	0.9	3.5	97.3	97.3	10.7	22.5
Rock	26.7	27.0	<0.1	<0.1	6.8	5.2	2.7	2.7	39.3	38.0
Rubble	30.4	29.9	<0.1	<0.1	3.9	2.1	<0.1	<0.1	13.0	12.5
Dead coral	18.8	18.5	6.0	2.1	43.2	34.0	<0.1	<0.1	<0.1	<0.1
Macroalgae	1.3	2.9	<0.1	<0.1	8.9	9.8	<0.1	<0.1	37.0	27.0
Coralline algae	0.2	0.2	<0.1	0.2	5.1	9.6	<0.1	<0.1	<0.1	<0.1
Sea grass	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zoanthid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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

Family	Station 1	Station 2	Station 3	Station 4	Station 5
Fast fish					
Acanthuridae	21	35	19	n.o.	16
Aulostomidae	n.o.	n.o.	2	n.o.	n.o.
Balistidae	n.o.	n.o.	n.o.	n.o.	n.o.
Blenniidae	n.o.	n.o.	n.o.	n.o.	n.o.
Chaetodontidae	10	5	15	n.o.	11
Gobidae	n.o.	n.o.	n.o.	n.o.	n.o.
Labridae	42	26	26	n.o.	10
Lethrinidae	n.o.	n.o.	15	n.o.	n.o.
Monacanthidae	n.o.	n.o.	n.o.	n.o.	n.o.
Mugilidae	9	22	n.o.	n.o.	3
Mullidae	n.o.	n.o.	n.o.	n.o.	n.o.
Scaridae	39	35	42	n.o.	21
Serranidae	n.o.	n.o.	n.o.	n.o.	n.o.
Siganidae	n.o.	n.o.	32	n.o.	12
Sparidae	n.o.	n.o.	n.o.	n.o.	9
Zanclidae	n.o.	n.o.	20	n.o.	n.o.
Total	**121**	**123**	**171**	**-**	**82**
Sedentary fish					
Plotosidae	n.o.	n.o.	n.o.	36	n.o.
Pomacentridae	33	53	306	n.o.	36
Total	**33**	**53**	**306**	**36**	**36**

n.o.: Not observed

4.2 World Environment Day 2009 celebration - BBMP

The World Environment Day 2009 organized by the Ministry of Environment and NDU in collaboration with the Ministry of Agro Industry, Food Production and Security (Fisheries Division) was celebrated on 7th and 14th June at the BBMP. To mark this event, free guided tours of the BBMP in glass bottom boats were offered to the public. A total number of 3 512 persons visited the park. Other activities included display of information boards, clean-up of Blue Bay lagoon and distribution of pamphlets on climate change.

4.3 Balaclava Marine Park (BMP)

4.3.1 Management

Information on the MPA Regulations and the conservation of the marine ecosystems were disseminated to fishers, boat operators and the public by the enforcement staff posted at the BMP. 103 boats of all categories operated in the park. Seven (7) boathouses were engaged in recreational

activities using glass-bottom boats (7), parasails (2), pedalos (26), kayaks (52), lasers (19), hobbie cats (6), windsurfs (34) and snorkelling (146 sets).

4.3.2 Construction of the BMP Centre

Clearances on the architectural plans for the BMP Centre on a plot of land at Balaclava allotted to the Fisheries Division were obtained from the relevant authorities and the project was approved by the Building Plans Committee. As this plot of land was designated for hotel development, a new plot of land bordering the lagoon of the BMP at Pointe aux Piments was identified for the construction of the centre.

4.3.3 Demarcation of the BMP

The Indian Ocean Commission (IOC) Project "Network of Marine Protected Areas of the IOC Countries – (NMPA-IOC)" funded the manufacture of 20 buoys to demarcate the conservation and mooring zones of the BMP. The works were contracted out by the Ministry.

4.3.4 Biological Inventory of the BMP

The NMPA-IOC project also funded the inventory of the BMP to the tune of EUR 34 300. The inventory was carried out from 21 to 28 January by experts of PARETO-ARVAM, a French/Reunion Consultancy firm in collaboration with officers of AFRC. A preliminary report on the inventory was submitted to the Ministry in April. During the inventory, over 17 stations were surveyed; 275 species of fish, 118 species of hard corals and 219 species of molluscs were identified. The experts were still working on the final report at the end of December.

4.3.5 Coral reef ecosystem monitoring at the BMP

Long-term monitoring was carried out at all the seven (7) established stations. Data were collected by the LIT (Line Intrercept Transect) methodology on the sea-bottom substrate, coral cover, macro-algae, marine invertebrates and fish. Details of results in terms of percentage of substrate cover are given in table 4.6.

Table 4.6: Percentage of substrate cover at the BMP

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7	
Lifeform categories	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**
Acropora branching	25.9	29.0	<0.1	0.3	16.8	19.5	51.0	50.0	nm	<0.1	nm	1.5	nm	3.2
Acropora digitate	<0.1	3.5	12.0	15.5	4.0	4.0	<0.1	<0.1	nm	<0.1	nm	<0.1	nm	<0.1
Acropora tabular	3.3	3.9	<0.1	0.2	0.5	1.7	5.6	5.2	nm	<0.1	nm	<0.1	nm	<0.1
Coral encrusting	3.2	4.2	5.8	6.8	2.2	3.6	0.4	0.2	nm	3.5	nm	<0.1	nm	8.3
Coral foliose	<0.1	1.1	<0.1	0.3	<0.1	0.6	4.7	8.3	nm	<0.1	nm	<0.1	nm	<0.1
Coral massive	2.6	5.2	22.2	22.0	14.7	12.8	0.6	0.1	nm	24.5	nm	<0.1	nm	16.8
Coral submassive	0.2	1.1	13.8	14.6	1.4	3.2	1.5	2.5	nm	1.8	nm	4.0	nm	<0.1
Mushroom Coral (solitary coral)	<0.1	1.5	0.2	0.5	0.0	1.1	1.8	1.4	nm	<0.1	nm	<0.1	nm	<0.1
Millepora (fire coral)	<0.1	<0.1	<0.1	<0.1	0.2	0.7	0.3	1.2	nm	<0.1	nm	<0.1	nm	<0.1
Soft coral	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nm	<0.1	nm	<0.1	nm	<0.1
Total live coral cover	**35.1**	**49.5**	**54.0**	**60.1**	**39.4**	**47.2**	**65.9**	**68.9**	**nm**	**29.8**	**nm**	**5.5**	**nm**	**28.3**
Rubble	3.9	2.2	6.6	5.3	3.0	6.4	0.7	0.7	nm	6.5	nm	9.5	nm	14.5
Rock	6.8	5.3	13.2	9.8	7.4	8.5	<0.1	<0.1	nm	19.0	nm	<0.1	nm	47.8
Sand	2.9	3.6	5.2	5.2	3.0	5.5	<0.1	<0.1	nm	8.3	nm	<0.1	nm	2.3
Turf algae	<0.1	1.1	0.9	0.8	<0.1	0.1	9.9	7.3	nm	<0.1	nm	<0.1	nm	<0.1
Macroalgae	<0.1	1.2	4.3	3.3	4.0	3.6	1.3	0.2	nm	32.5	nm	<0.1	nm	5.5
Coralline algae	5.0	4.7	<0.1	<0.1	5.3	3.3	<0.1	5.9	nm	4.0	nm	<0.1	nm	1.8
Dead coral	46.2	32.3	15.9	16.0	38.0	26.0	22.2	17.0	nm	<0.1	nm	85.0	nm	<0.1

nm: Not monitored

Branching *Acropora* corals were the dominant species in the park especially within the stations located in the lagoon while at the stations of the fore-reef, the massive corals were more dominant. Station 3 had the highest diversity of corals within the park. Stations 5, 6 and 7 were last monitored in 2007. A significant decrease in live coral cover from 25.3% in 2007 to 5.5% in 2009 was observed at station 6, which is located within the narrow strip of the lagoon facing the Pointe aux Piments Public Beach.

The fish counts show that the families Acanthuridae, and Pomacentridae were more abundant as compared to the families Labridae, Chaetodontidae and Scaridae. The fish count per family at the different stations is presented in table 4.7.

Table 4.7: Number of fish/100m^2 at Balaclava

n.o: Not observed

Family	**Station 1**	**Station 2**	**Station 3**	**Station 4**	**Station 5**	**Station 6**	**Station 7**
Fast fish							
Acanthuridae	310	28	39	228	79	342	84
Chaetodontidae	15	18	28	16	3	28	38
Labridae	42	32	24	49	32	67	18
Scaridae	21	23	11	35	12	11	20
Serranidae	13	29	19	6	15	28	15
Siganidae	11	5	15	9	3	18	10
Total	**412**	**135**	**136**	**343**	**144**	**494**	**185**
Sedentary fish							
Holocentridae	n.o	n.o	n.o	n.o	n.o	n.o	n.o
Pomacentridae	315	281	80	347	28	91	27
Pomacanthidae	n.o	n.o	27	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	7	n.o	n.o	n.o	n.o	n.o
Zanclidae	n.o	n.o	n.o	n.o	n.o	n.o	n.o
Total	**315**	**288**	**107**	**347**	**28**	**91**	**27**

4.3.6 Monitoring of coral bleaching at the BBMP and BMP

Surveys were conducted in February to monitor coral bleaching in the two marine parks at the established monitoring stations. Results showed that at the established stations of the BBMP, 32% of corals were partially bleached and 11% totally bleached while at the BMP, 38% were bleached partially and 3% were totally bleached.

4.4 Permits/Clearances

4.4.1 Firework displays

Sixty-one (61) authorisations were granted, with a list of conditions for firework displays at fifteen (15) sites in the lagoon around the island. Underwater surveys were carried out at these sites, prior to the displays, to identify suitable locations for the placing of barges from which fireworks were shot.

4.4.2 Interference Permits within MPAs

Out of the above sixty-one (61) authorisations, thirteen (13) temporary interference permits were issued against payment of Rs 91 000 as overall fees for firework displays in MPAs in the lagoon around the island, while two (2) permanent interference permits were issued for the construction of a rock revetment and the dredging of an access channel in the lagoon of the Black River Fishing Reserve against payment of a sum of Rs 150 000.

4.5 Environmental Impact Assessment (EIA)

Forty-one (41) EIA applications were assessed and recommendations were made to the Ministry of Environment and National Development Unit. 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 at appendix 8**.**

4.6 Underwater surveys in connection with coastal development projects

Nineteen underwater ecological surveys were carried out in the lagoon at various sites around Mauritius in connection with coastal development projects (Appendix 9).

4.7 Undersea walk sites

Underwater ecological surveys were carried out at two sites in the lagoons of Poste de Flacq and Grand Gaube to assess the status of the marine ecosystem for the proposed sites for undersea walk activities. The percentage of live coral cover, the fish species and their abundance, GPS positions of the platform, characteristics of the bottom substrate and visibility at each site were recorded. Clearances were issued for the activities.

4.8 Monitoring of ex-sand mining sites

Underwater surveys were carried out in the lagoon at two ex-sand mining sites to monitor changes on substrate cover and assess the status of the marine environment at two established stations, namely at Mahebourg and Grand River South East. Observations showed that the overall marine ecosystem at the sites have significantly recuperated with thriving coral colonies, sea grass beds and associated fish fauna.

Figure 4.1: Sea cucumber (*Holothuria atra*) in seagrass bed (*Halophila* sp.)

4.9 Partnerships for Marine Protected Areas in Mauritius and Rodrigues

The Project "Partnerships for Marine Protected Areas in Mauritius and Rodrigues", which started in 2005 was in its fifth year of implementation. The log-frame for objective 1 of the Project "Develop an enabling policy and institutional framework for the effective participation in and the sustainable co-management of MPAs in the Republic of Mauritius" was reviewed jointly with UNDP and the Chief Technical Adviser for the Project. Objective 1 of the Project would be undertaken by the Ministry from 2010 for 2012.

4.10 Marine Protected Areas Network of the Indian Ocean Commission Countries (MPA-IOC)

The fourth steering committee for the project "Marine Protected Areas Network of the Indian Ocean Commission Countries" was held in Madagascar in June. The workshop on "Prioritisation and Strategy for the Western Indian Ocean Marine Eco-Region (WIOMER)" was held in Madagascar in November. Fifty-one (51) priority sites of special significance were identified as potential sites for MPAs in the Western Indian Ocean region, six (6) being within the jurisdiction of the Republic of Mauritius (4 in Mauritius and 2 in Rodrigues).

5. FISHERIES TRAINING, DEVELOPMENT AND EXTENSION

5.1 Training

5.1.1 Training of fishermen

Two batches, comprising twenty-four fishermen each, followed the 6-week "General Course for Fisher". They were awarded an attendance certificate and issued with the fisherman registration card.

A total of 1 297 fishermen have benefited from the various training courses since 1986, as shown in table 5.1.

Table 5.1: Summary of training courses and number of fishermen trained from 1986 to 2009

Training course	Dispensed by	Year	No. trained
Training of artisanal fishermen	AFRC (Formation Itinérante de Pêche)	1986-1990	150
Deepwater shrimp fishing	AFRC	1988-1991	15
Demersal fishing	AFRC	1992-1994	66
Swordfish fishing	AFRC	1996-1998	26
FAD fishery	AFRC	1994-2003	553
	FITEC	2004-2007	220
General Course for Fisher	FITEC	2004-2009	267
Total			**1 297**

5.1.2 Training in fish handling, preservation and marketing for fishmongers

FITEC organised a training course in fish handling, preservation and marketing for fishmongers dealing in fresh fish. The objectives of the training course were to provide them with the necessary knowledge and skills to offer quality fish to consumers. 269 fishmongers attended the 5 half-day training course in 9 batches following which they were awarded an attendance certificate.

5.2 FAD fishery

The Fish Aggregating Devices (FADs) fishery continued to attract more fishermen where catch rates are relatively higher compared to those from the lagoon. Following requests from fishermen and as provided for in the Programme Based Budget, the number of FADs set around Mauritius was increased from 20 to 22. The two new ones were set off Grand River North West and Mon Choisy.

Table 5.2 gives the particulars of the FADs around the island and figure 5.1 illustrates their locations.

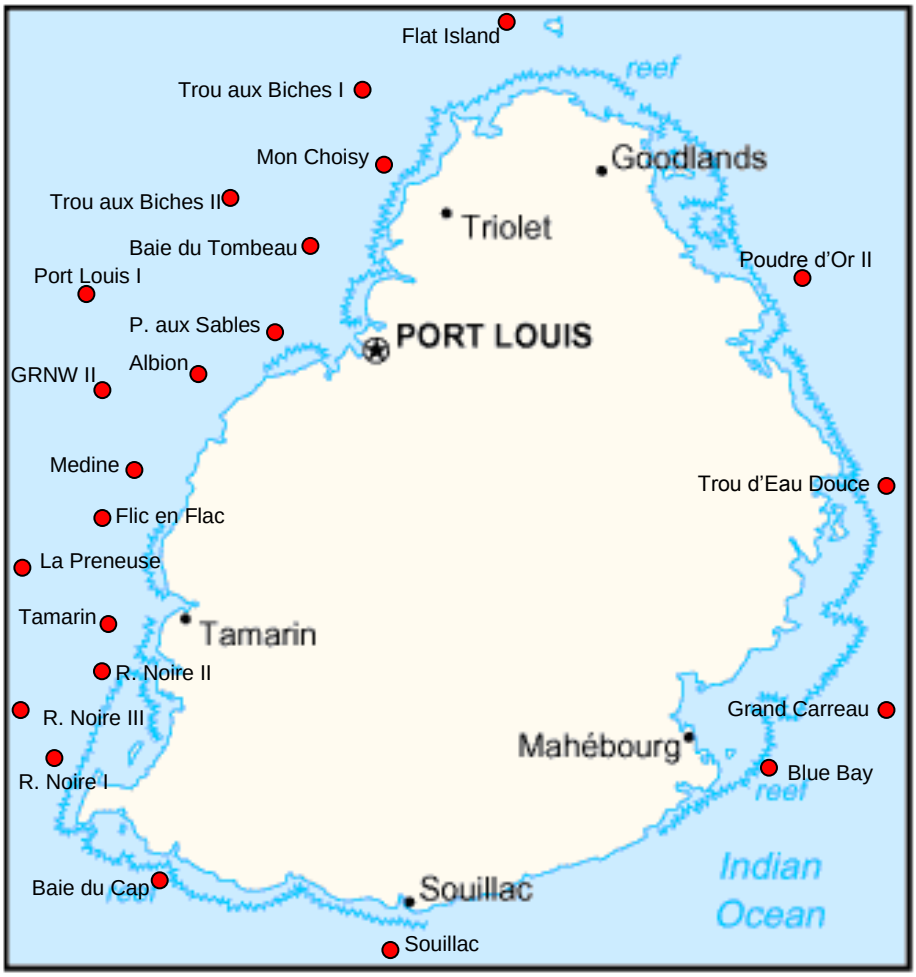


Figure 5.1: FADs around Mauritius

Table 5.2: Location of FADs

SN	Name	Mooring depth (m)	Distance from coast (nm)	Latitude°S	Longitude°E
1	Pointe aux Sables	300	1.2	20° 09' 562	57° 25' 086
2	Albion	1 350	2.4	20° 09' 412	57° 23' 251
3	Port Louis I	3 560	12.1	20° 03' 080	57° 15' 409
4	Baie du Tombeau	1 050	2.6	20° 04' 413	057° 27' 890
5	Trou aux Biches I	2 020	4.6	19° 59' 670	57° 27' 950
6	Trou aux Biches II	2 686	6.7	20° 01' 330	57° 24' 487
7	Flat Island	750	9.6	19° 49' 434	57° 34' 373
8	Poudre d'Or II	240	4.2	20° 02' 327	57° 46' 035
9	Trou d'Eau Douce	992	2.9	20° 13' 884	57° 51' 561
10	Grand Carreau	260	8.2	20° 21' 622	57° 55' 339
11	Souillac	1 001	2.1	20° 33' 676	57° 31' 058
12	Baie du Cap	855	2.7	20° 33' 073	57° 23' 283
13	Rivière Noire I	914	4.5	20° 23' 596	57° 16' 771
14	Rivière Noire II	480	2.2	20° 21' 614	57° 19' 297
15	Rivière Noire III	3 090	9.0	20° 17' 849	57° 12' 118
16	Tamarin	450	2.2	20° 19' 519	57° 19' 575
17	Flic-en-Flac	1 200	2.5	20° 15' 99	57° 19' 39
18	Medine	2 510	5.2	20° 12' 765	57° 17' 627
19	La Preneuse	2 500	5.2	20° 17' 786	57° 16' 379
20	Blue Bay	968	2.4	20° 29' 110	57° 43' 540
21	GRNW II	3 000	8.4	20° 08' 403	57° 16' 088
22	Mon Choisy	600	1.7	20° 01' 422	57° 30' 348

5.2.1 FAD fishery monitoring

Daily catches and related information on the FAD fishery, using the random based data collection system, were collected at selected fish landing stations. In 2008, landings from the FAD fishery amounted to 391 tonnes and the catch per fisherman day (CPFD) was 27.7kg. The data for 2009 were verified, coded and compiled for analysis.

5.2.2 FAD fishery development sub-programme under the International Fund for Agricultural Development (IFAD) Rural Diversification Programme

The FAD Fishery Development Sub-programme, under the IFAD Loan 504: MU-Rural Diversification Programme (RDP) came to an end in June. However, the loan closing date scheduled for 31 December was extended to facilitate the transition from the RDP to the Marine and Agricultural Resources Support programme (MARS). An assessment of the FAD programme and value chain analysis would be undertaken under the MARS programme.

Two IFAD supervision missions were held in January and July respectively to review the progress achieved in the FAD fishery to facilitate the final year completion activities and to assist in the transition from RDP to the MARS programme implementation.

Two workshops were held under the programme in January and March respectively: a one-day workshop for the preparation of the RDP project completion report and a one-day workshop in relation to the institutional review and planning for the Rural Diversification Programme.

5.2.3 Research/Training Boats

The research/training boats, Sphyrna II and Maustral, attached to the training centre carried out 70 sea trips for the deployment and maintenance of FADs and training of fishermen.

5.2.4 Consolidation of control measures

The draft FAD regulations to control and monitor fishing activities around FADs were prepared in consultation with associations of fishermen and other stakeholders. Procedures for its proclamation were underway.

The draft regulations “The Safety and Security Measures for Fishermen at Sea” were also being finalised.

5.2.5 Assistance from the Government of Japan

Under the project for the rehabilitation of fisheries facilities by the Overseas Fisheries Cooperation Foundation (OFCF) of Japan, the boats Sphyrna II, Maustral, FPS I, FPS II and FITEC 3 were either repaired or rehabilitated. In addition, staff of FITEC and the Fisheries Protection Service were trained in the servicing and maintenance of outboard and inboard engines.

5.2.6 Cooperation with Norway

Under the Mauritius-Norway bilateral cooperation in fisheries management and development, a fishing trial for octopus using pots was carried out on the Nazareth bank and St. Brandon waters in November and December. Four different pot models (PVC pipes and clay) were constructed in this context. However, due to rough sea conditions the trials could not be done as scheduled. Fishing trials would be undertaken in 2010.

5.2.7 ISO Quality Management System Project

FITEC embarked on a programme to establish a Quality Management System (QMS) in accordance with the MS ISO 9001:2008 to ensure that training dispensed to fishermen and other stakeholders met their expectations. A lead facilitator and a facilitator were appointed to help in the implementation of the project. A quality management representative was designated and a core team was constituted. The staff of FITEC was given training on QMS for the successful implementation of the project. Twelve working sessions were held on the ISO-QMS project and a Quality Policy Manual was prepared. The Mauritius Standards Bureau would carry out audit exercises and FITEC would be accordingly certified ISO 9001: 2008.

6. FISHERIES MANAGEMENT

6.1 Licensing of fishing vessels

6.1.1 Licences issued to foreign vessels under fishing agreements

Licences are issued to foreign fishing vessels under Fishing Agreements between Mauritius and the Government of Seychelles and the Federation of Japan Tuna Fisheries Co-operative Associations (FJTFCA). Forty-nine licences were issued to tuna fishing vessels and extensions were granted to 9 vessels. Table 6.1 shows the number of licences issued by gear.

Table 6.1: Licences issued to foreign fishing vessels under fishing agreements

Fishing agreement	Purse seine licences	Longline licences
Seychelles	19	6
FJTFCA	-	24

6.1.2 Fishing licences issued to other foreign vessels

143 fishing licences were issued to individual foreign fishing vessels of various nationalities and 41 licences were extended. Out of the 143 licences, 89 were issued to longliners, 42 to purse seiners, 9 to foreign bank fishing vessels, 2 to a vessel fishing for sea cucumber and one to a bottom longliner. Table 6.2 shows the number of licences issued by category and nationality.

Table 6.2: Licences issued to foreign fishing vessels not falling under fishing agreement

Nationality	Longline	Purse seine	Banks fishing	Bottom Longline (demersal species)	Sea cucumber
Belize	4	-	-	-	-
China	2	-	-	-	-
Indonesia	3	-	-	-	-
Malaysia	10	-	-	-	-
Philippines	1	-	-	-	-
Oman	2	-	-	-	-
Taiwan (Province of China)	67	-	-	-	-
France	-	15	-	-	-
Mayotte	-	5	-	-	-
Spain	-	20	-	-	-
Italy	-	2	-	-	-
Madagascar	-	-	5	-	-
Comoros	-	-	4	-	-
Cambodia	-	-	-	1	-
Kiribati	-	-	-	-	2
Total	**89**	**42**	**9**	**1**	**2**

6.1.3 Licence fees from foreign fishing vessels

Licence fees obtained from foreign fishing vessels amounted to US$ 1 388 500 and MUR 45 000.

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

Table 6.3 shows the total number of licences issued to foreign fishing vessels over the last five years.

Table 6.3: Licences issued to foreign vessels by gear type

Year	Surface Longliner	Purse seiner	Trawler	Banks (handline)	Bottom longliner	Sea cucumber	Total
2005	175	39	0	3	0	0	**217**
2006	183	43	2	3	0	0	**231**
2007	141	59	0	3	0	0	**203**
2008	81	16	0	3	1	1	**102**
2009	119	61	0	9	1	2	**192**

An increase in the number of foreign licences issued in 2009 is noted as compared to 2008 as a result of the resumption of licensing of European Community fishing vessels.

6.1.5 Licensing of Mauritian fishing vessels

20 Mauritian boats/vessels operated in the semi-industrial chilled fish fishery targeting mainly the shallow-water and deep-water demersal species on the Albatross-Nazareth bank and on the slopes of the St. Brandon-Nazareth banks. Two boats from Port Mathurin, Rodrigues, were engaged in the shallow-water demersal fishery off the East bank of Rodrigues. Four vessels operated in the banks fishery for shallow-water demersal species on the Nazareth and Saya de Malha banks.

6.2 Port State Control

6.2.1 Monitoring of local fishing boats/vessels

The movement of local fishing boats/vessels is monitored for fishery management purposes. All licensed fishing boats/vessels leaving for fishing campaigns have to obtain a departure clearance from the Fisheries Division. Prior to departure, an inspection is carried out to ensure that the boat/vessel has obtained its seaworthiness certificate and has its insurance cover, safety equipment onboard and the required fishing licence.

86 clearances were issued to fishing boats/vessels involved in the demersal chilled/frozen fish fisheries, 64 to carrier vessels from St Brandon, and 8 to banks fishing vessels**.** On return of the boat/vessel from a fishing campaign boarding is carried out by enforcement officers to collect the logbook, to check the quality of the fish and to ensure that no toxic fish is on board prior to granting authorisation for unloading of the catch.

6.2.2 Monitoring of foreign fishing vessels

604 foreign fishing vessels called at Port Louis for loading/unloading of fish and fish products, transshipment, bunkering, change of crew, provisions, repairs and other ancillary activities. Their different types and nationalities are shown in tables 6.4 and 6.5.

Table 6.4: Details of calls of foreign fishing vessels

Type of vessel	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Reefers	8	3	3	3	9	12	4	6	6	3	7	8	**72**
Squid vessels	10	0	0	1	6	1	0	0	0	0	1	1	**19**
Trawlers	2	1	0	0	1	0	1	2	2	0	2	1	**12**
Purse seiners	2	2	2	4	8	5	1	1	0	1	3	1	**30**
Tuna longliners	40	61	27	23	30	21	22	26	88	25	40	42	**446**
Longliners for patagonian toothfish	0	1	6	1	2	0	3	4	0	0	1	3	**21**
Longliners used for the collection of sea cucumber	0	0	0	0	1	1	1	0	0	0	1	0	**4**
Total	**62**	**68**	**38**	**32**	**57**	**40**	**31**	**40**	**96**	**29**	**54**	**57**	**604**

Table 6.5: Details of fishing vessels calling at Port Louis

Type of vessel	Flag country	Number of calls
Reefer	Bahamas	2
	Indonesia	7
	Kiribati	1
	Malaysia	20
	Mauritius	5
	Netherland Antilles	2
	Panama	20
	Spain	3
	Taiwan (Province of China)	11
	Thailand	1
Squids	Taiwan (Province of China)	18
	China	1
Trawler	Australia	1
	Cooks Islands	6
	China	1
	Japan	4
Purse seiners	France	25
	Italy	2
	Seychelles	1
	Spain	2
Tuna longliners	Australia	2
	Bahamas	1
	Belize	13

	Britain	6
	Cambodia	2
	China	8
	French	36
	Indonesia	36
	Japan	32
	Korea	3
	Kiribati	1
	Malaysia	12
	Mauritius	2
	Oman	4
	Philippines	3
	Portugal	3
	Seychelles	8
	Spain	17
	Taiwan (Province of China)	250
	Vanuatu	7
Longliners for patagonian toothfish	France	18
	Australia	3
Longliners used for the collection of sea cucumber	Kiribati	4
TOTAL		**604**
Banks fishing vessels (Mauritian owned vessels with foreign flag)	Madagascar	9

The number of calls at Port Louis by month for the past five years is given in table 6.6.

Table 6.6: Calls of foreign fishing vessels at Port Louis

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2005	61	69	55	36	45	68	54	44	83	75	50	66	**706**
2006	78	86	36	41	59	66	79	59	109	68	44	76	**801**
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**

6.2.3 Monitoring of patagonian toothfish fishing vessels

A total of 21 calls of patagonian toothfish fishing vessels were recorded at Port Louis out of which five were for transshipment. The amount of toothfish transshipped was 1 276 tonnes. The quantity of toothfish transhipped (t) during the past five years is presented in table 6.7.

Table 6.7: Transshipment of patagonian toothfish

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2005	0	0	0	0	0	0	410	0	0	580	0	0	**990**
2006	0	46	0	0	18	0	177	0	0	0	0	0	**241**
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**

6.2.4 Calls and transshipment of deep-sea trawlers

There were 12 calls by trawlers in the port and they included 10 calls for transshipment. 3 931 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 at table 6.8.

Table 6.8: Transshipment by trawlers (tonnes)

Year	Amount transshipped
2005	4 395
2006	3 883
2007	1 826
2008	1 901
2009	3 931

6.3 Tuna fisheries

Tuna fisheries are monitored through the collection, processing and analysis of fishing and biological data obtained from local and foreign licensed fishing vessels.

6.3.1 Sampling of catch from licensed purse seiners

Length frequency data were obtained from the catches of licensed purse seiners. A total of 2 413 tuna comprising 1 554 skipjack, 575 yellowfin and 244 bigeye were sampled.

6.3.1.1 Length frequency distribution of skipjack tuna (*Katsuwonus pelamis*)

The length frequency distribution of skipjack tuna is shown in figure 6.1. The length of the fish ranged from 39 to 71cm with the mode at around 48cm.

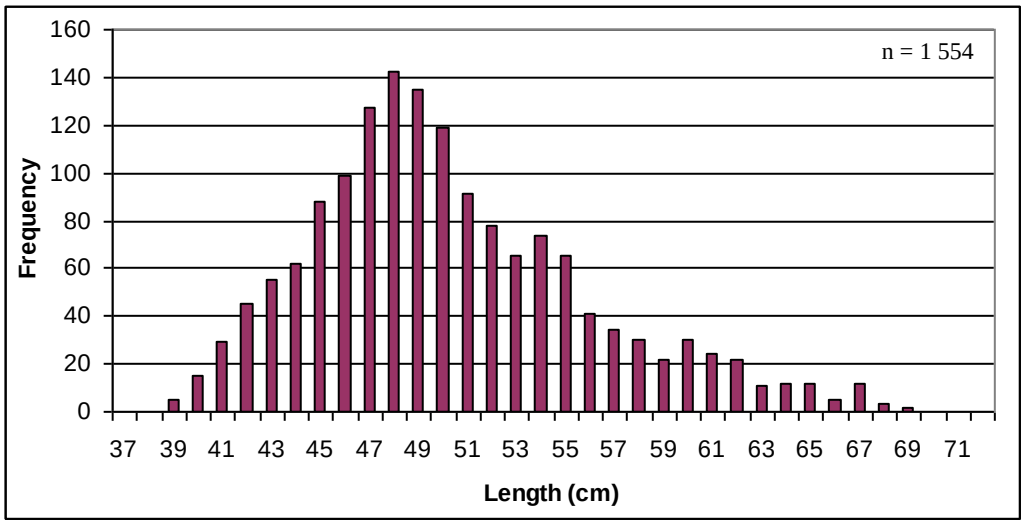


Figure 6.1: Length frequency distribution of skipjack tuna

6.3.1.2 Length frequency distribution of yellowfin tuna (*Thunnus albacares*)

The length frequency distribution of yellowfin tuna is presented in figure 6.2. The fish had a length range between 49 and 173cm. Out of 615 yellowfin tuna sampled, 404 fish were below 102cm representing fish which had not reached sexual maturity. This could be explained by the fact that most of the purse seiners use the associated school fishing technique. The length frequency distribution showed that the majority of matured fish was centred between 135 and 140cm.

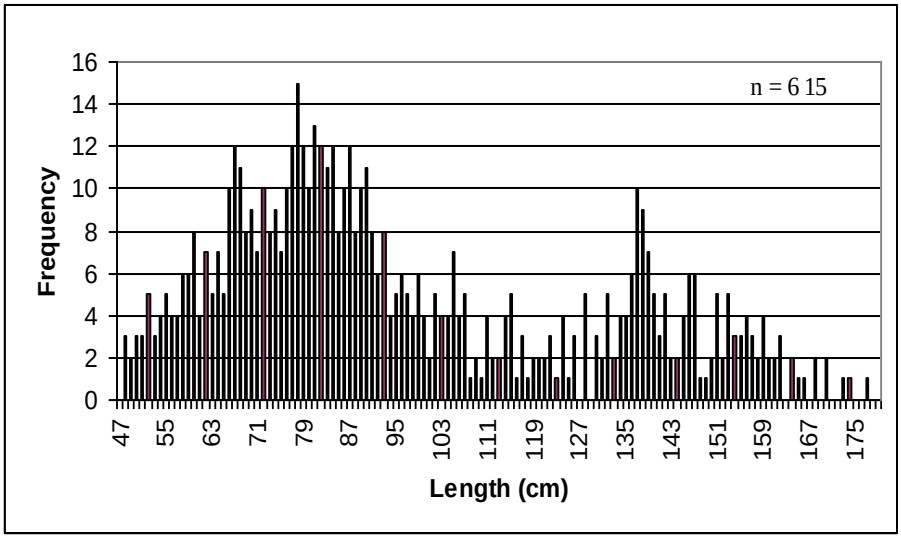


Figure 6.2: Length frequency distribution of yellowfin tuna

6.3.1.3 Length frequency distribution of bigeye tuna (*Thunnus obesus*)

The length of the bigeye tuna ranged between 48 and 168cm and the length frequency distribution is presented in figure 6.3. The bigeye tuna caught by the purse seiners were mostly juvenile fish measuring less than 1m.

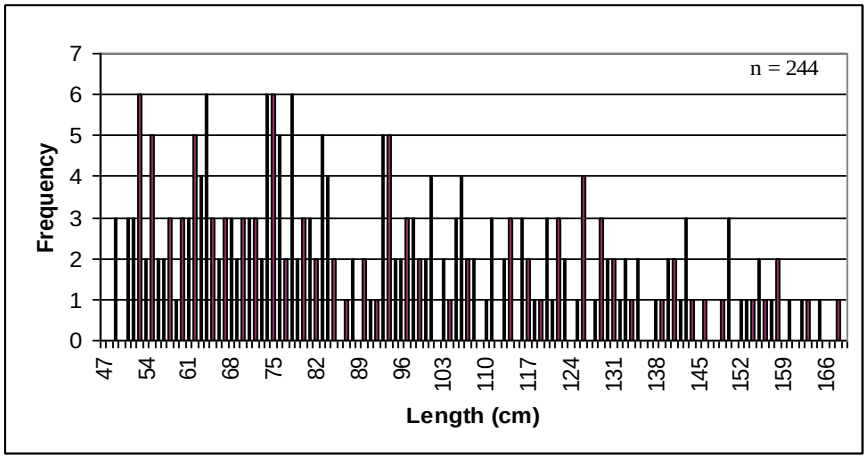


Figure 6.3: Length frequency distribution of bigeye tuna

6.3.2 Species composition

The species composition of the purse seine catches unloaded in Mauritius for the past five years is presented in table 6.9. The catch was composed of 56% skipjack, 35% yellowfin, 8.5% bigeye and 0.5% miscellaneous fish.

Table 6.9: Species composition of purse seine catches (%)

Year	Species			
	Skipjack	**Yellowfin**	**Bigeye**	**Miscellaneous**
2005	55	38	5	2
2006	63	33	3.5	0.5
2007	74	21	4	1
2008	54	38	7	1
2009	56	35	8.5	0.5

6.3.3 Monitoring of the catch of licensed longliners

Logbook returns were collected from licensed fishing vessels. These vessels transhipped 7 779 tonnes of fish. The catch included 246 tonnes caught by one Mauritian flagged vessel. A total of 121 logbooks was received, of which 110 were considered for processing and the remaining contained inconsistencies. The catch from the Mauritian EEZ based on the returns amounted to 5 254 tonnes of fish.

6.3.3.1 Species composition of the catch of licensed longliners

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

Species	Scientific name	Catch (t)	%
Albacore	*Thunnus alalunga*	4 293	55
Yellowfin	*Thunnus albacares*	1 330	17
Others		705	9
Bigeye	*Thunnus obesus*	588	8
Swordfish	*Xyphias gladius*	335	4
Other billfishes		239	3
Sharks		167	2
Sailfish	*Istiophorus albicans*	122	2
	Total	**7 779**	**100**

The major part of the catch was composed of albacore tuna which was the target species of most of the Asian longliners. The volume of swordfish landed was low as no catch was unloaded from licensed European surface longliners which target mainly this species.

6.3.3.2 Spatial distribution of the catch of licensed longliners

The fishing area of the licensed longliners was spread widely in the Western Indian Ocean between 08º N and 37º S and 42º E and 86º E as depicted in figure 6.4.

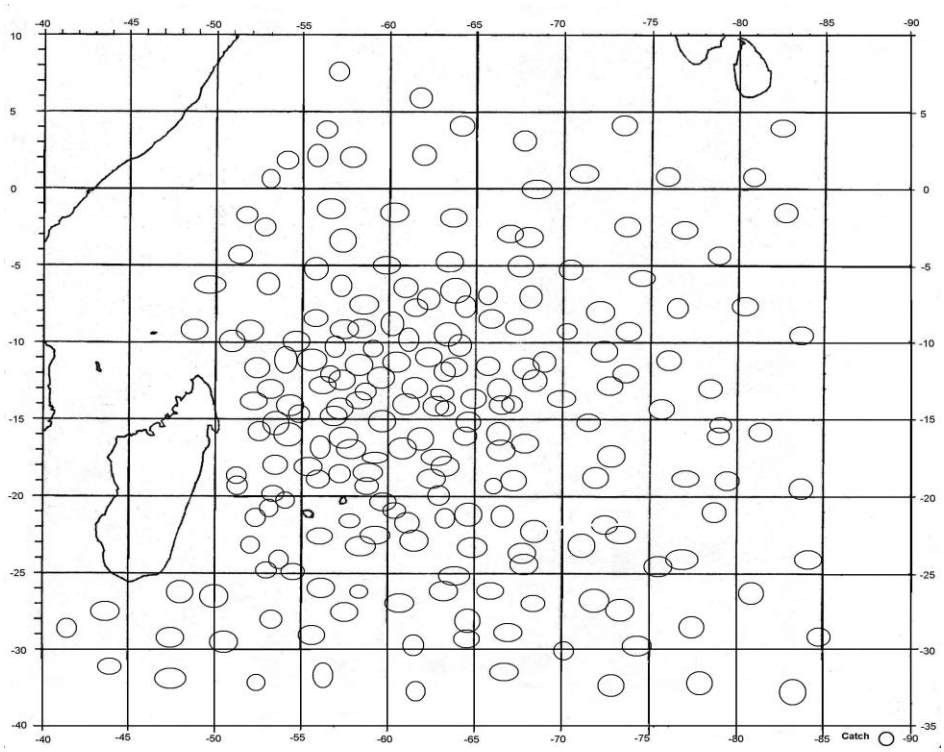


Figure 6.4: Catch distribution of licensed longliners

6.3.3.3 Sampling of catch of licensed longliners

Length frequency data of the albacore tuna were obtained during the sampling of the catch of licensed longliners. A total of 2 892 albacore tuna was sampled. The length frequency distribution is shown in figure 6.5. The length ranged from 69 to 128cm. 45 % of the catch consisted of fish in the length range of 95 to 106 cm.

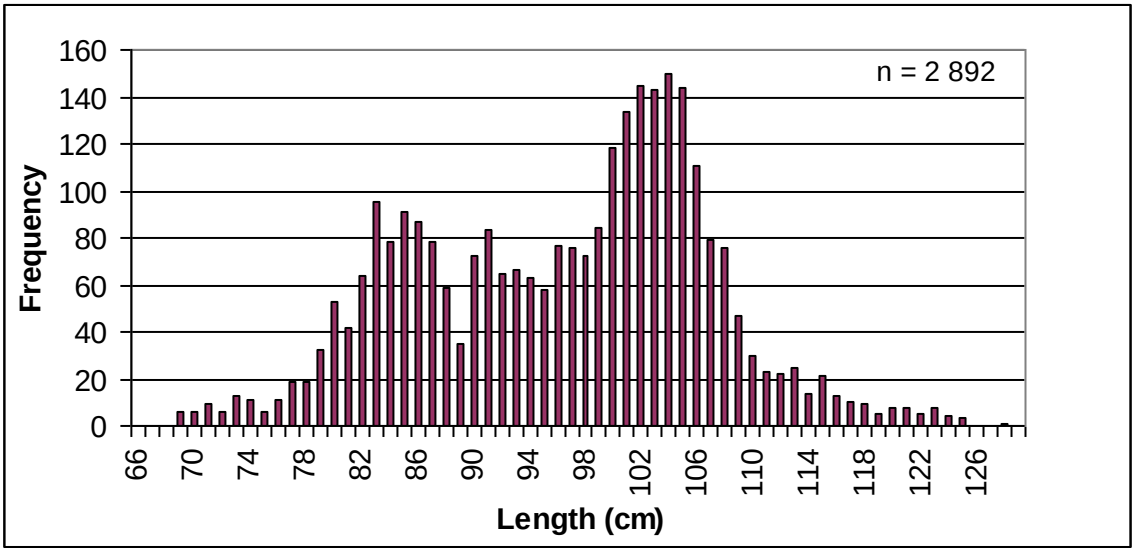


Figure 6.5: Length frequency distribution of albacore tuna

6.3.4 The local longline fishery

One Mauritian longliner, which targets swordfish, undertook two trips of 99 fishing days and 24 fishing days for the period of September 2008 to January 2009 and February 2009 respectively. The total catch unloaded amounted to 246 tonnes. The species composition of the landings is shown in figure 6.6. 74% of the catch was composed of swordfish. The catch per unit effort was 1.5kg per hook. The fishing area was spread between latitudes 21º S and 30º S and longitudes 58º E and 88º E.

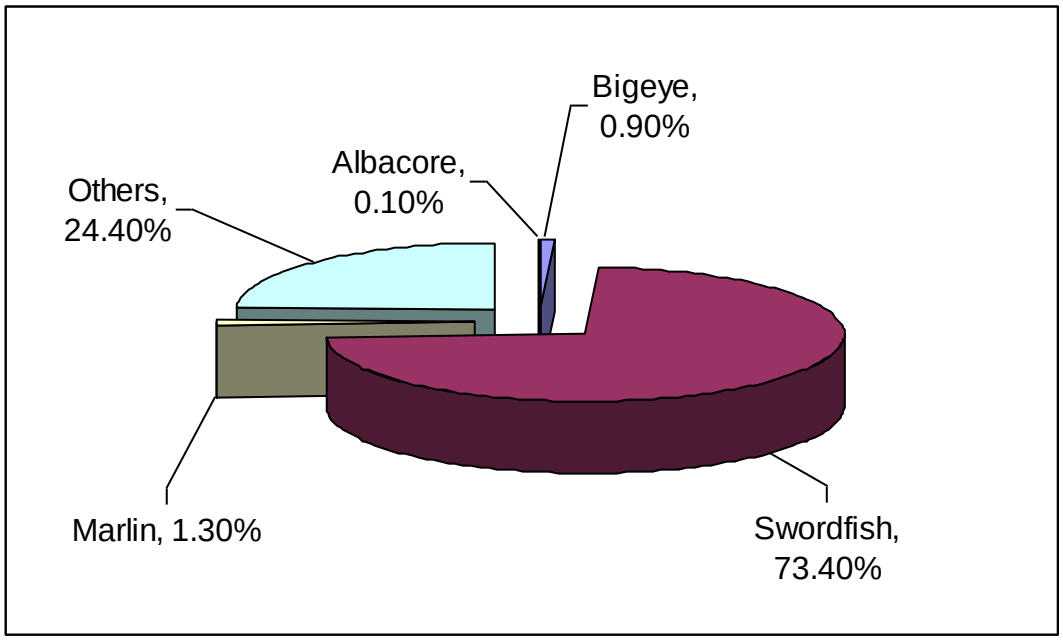


Figure 6.6: Catch composition of the Mauritian longliner

6.3.5 Transshipment by tuna longliners and carriers

A total of 35 863 tonnes of tuna and tuna-like species was transhipped at Port Louis by tuna fishing vessels and carriers which effected 351 and 29 calls respectively. The volume of fish transhipped by carriers amounted to 12 034 tonnes. The species composition of the fish transhipped is shown in table 6.11. Albacore tuna constituted 62% of the total catch. A sharp increase in the volume of yellowfin and skipjack tuna transhipped was observed and this was due to transhipment effected by some European purse seiners which target mostly these species. A considerable rise in the total volume of fish transhipped could also be noted and this could be explained mainly by an increase in the number of calls of carriers at Port Louis.

Table 6.11: Species composition of fish transhipped (t)

Year	Albacore	Yellowfin	Bigeye	Skipjack	Swordfish	Bluefin	Marlin	Sailfish	Shark	Misc.	Total
2005	4 947	3 887	1 413	-	3 357	-	318	35	2 473	1 237	**17 667**
2006	20307	1995	359	127	1935	230	243	131	1890	2017	**29 234**
2007	12 182	3 281	494	134	2 305	8	67	486	1881	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**

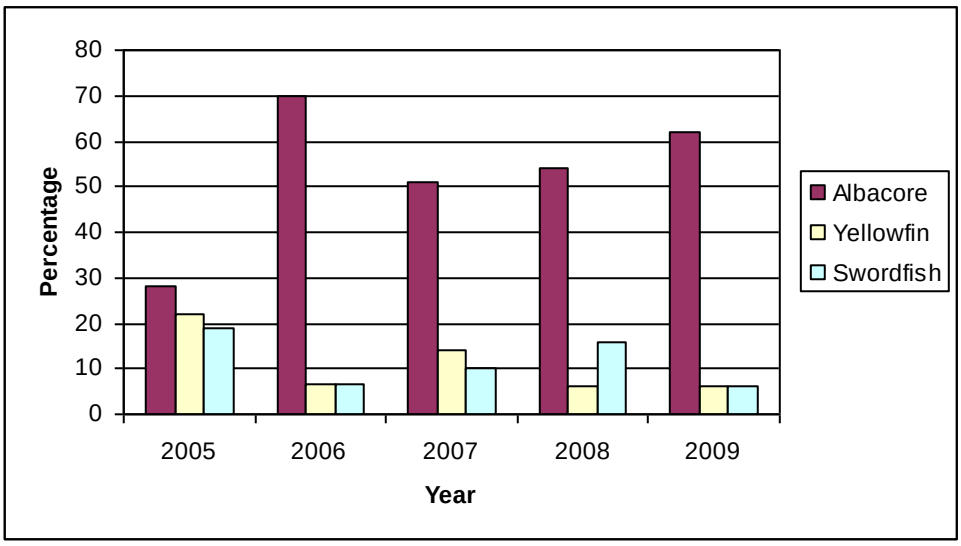


Figure 6.7: Percentage of the three main species transshipped by longliners

6.4 Vessel Monitoring System

A total of 264 fishing vessels reported to the Fisheries Monitoring Centre (FMC) which comprised 32 local and 232 foreign vessels. Table 6.12 shows a breakdown of the fishing vessels by nationality and transponder type.

Table 6.12: Vessels reporting to FMC

Vessel	Inmarsat	Argos	Total
Local	**27**	**5**	**32**
Foreign			
Taiwanese	47	49	96
Japanese	0	24	24
Malaysian	15	1	16
Indonesian	4	2	6
Malagasy	1	1	2
Belize	4	2	6
Seychelles	0	6	6
China	2	3	5
Cambodia	0	1	1
Kiribati	1	0	1
Comores	2	1	3
Philippines	1	1	2
Oman	0	2	2
Sub Total	**77**	**93**	**170**
Total	**104**	**98**	**202**
EU *			
French			39
Spanish			21
Portuguese			1
Italian			1
Total			**62**
Grand Total			**264**

** Information available through the flag state FMC but not directly available through the service provider***.**

Table 6.13 shows the number of data reports received by the FMC from fishing vessels using Inmarsat transponders on board. 925 842 reports were received since its setting up in March 2005.

Table 6.13: Number of data reports received by the FMC from fishing vessels using Inmarsat transponders for the past five years.

Year	No of data reports received
2005	29 934
2006	119 375
2007	239 512
2008	258 502
2009	278 519

6.4.1 Logbooks verification

A total of 227 logbooks comprising 138 local and 89 foreign fishing vessels were verified against data reports received by the FMC.

6.5 Import and export of fish and fish products and fish processing

6.5.1 Import of fish and fish products

A total of 1 989 permits were issued for the import of fish and fish products, including 15 permits for the import of fish samples and fish bait. Proceeds from permits amounted to Rs. 3 955 500.

The import of fish and fish products for direct consumption amounted to 11 258 tonnes representing about 11.5% of the total imports for the year. The tuna processing plants imported 85 111 tonnes of raw material. 776 tonnes of frozen barracouta were imported from New Zealand and Namibia for the production of salted snoek while tuna for the processing plants was obtained from fishing vessels transshipping in Seychelles.

6.5.1.1 Imports for direct consumption

Fish and fish products imported for direct consumption have been classified into four categories, namely fish, crustacean, cephalopod and shellfish. Crustaceans consisted of prawns, shrimps, crabs and lobsters and cephalopods of octopii, squids and cuttlefish; and shellfish of mussels, oysters, clams and scallop. Details are given in figure 6.8.

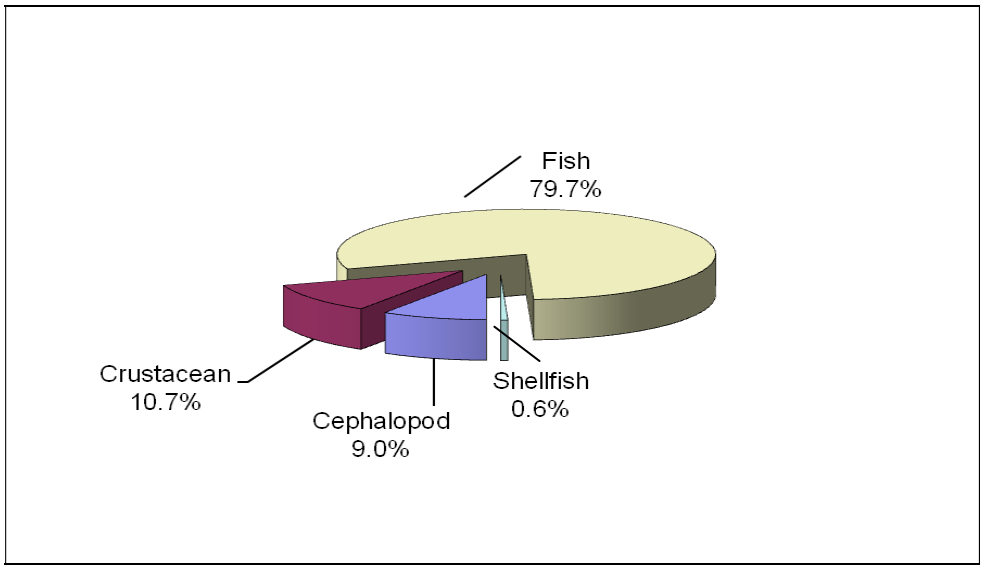


Figure 6.8: Imports per category

Fish and fish products were imported in different forms of preservation, namely frozen, chilled, canned, dried, smoked and live crustaceans. Frozen and canned products constituted the main imports with 7 630 and 3 314 tonnes, respectively as shown in figure 6.9.

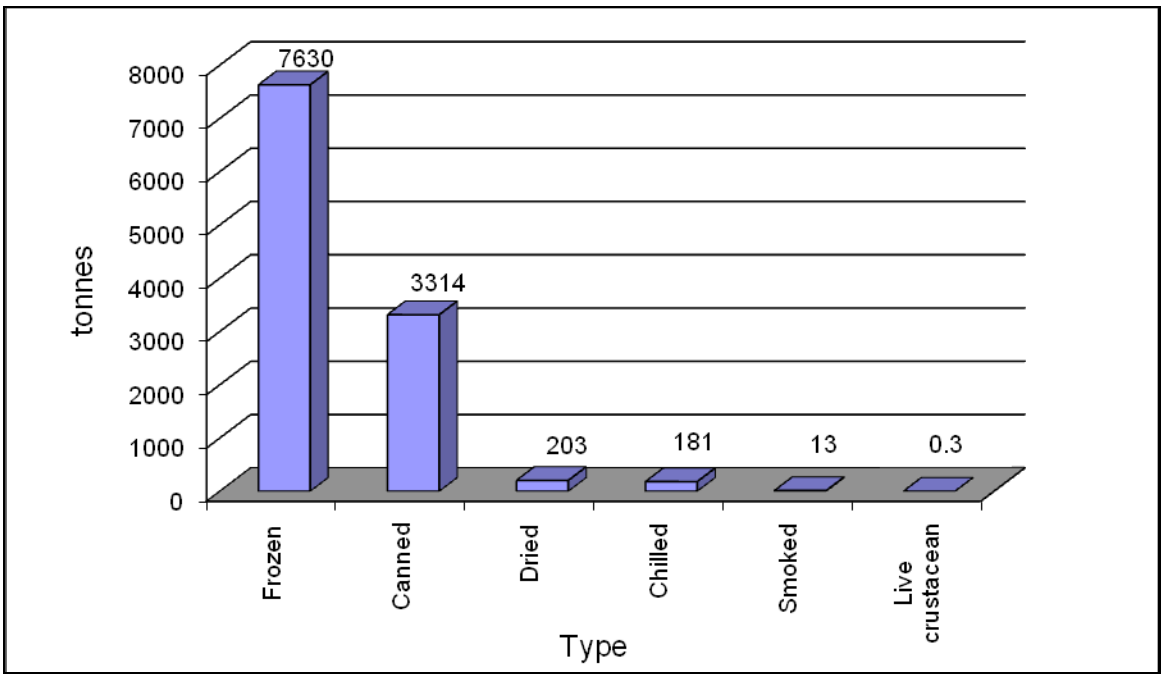


Figure 6.9: Categories of fish and fish products for direct consumption

Imports of frozen fish and fish products were mainly from India, China, South Africa, Madagascar, Thailand and Indonesia. Imports also included frozen fish from foreign fishing vessels operating in the high seas and calling at the Freeport. Import of canned fish was mainly from Morocco and Chile. Dried bombay-duck and dried prawn were imported mainly from India. Details on import of fish and fish products by country of origin for direct consumption are presented in figure 6.10.

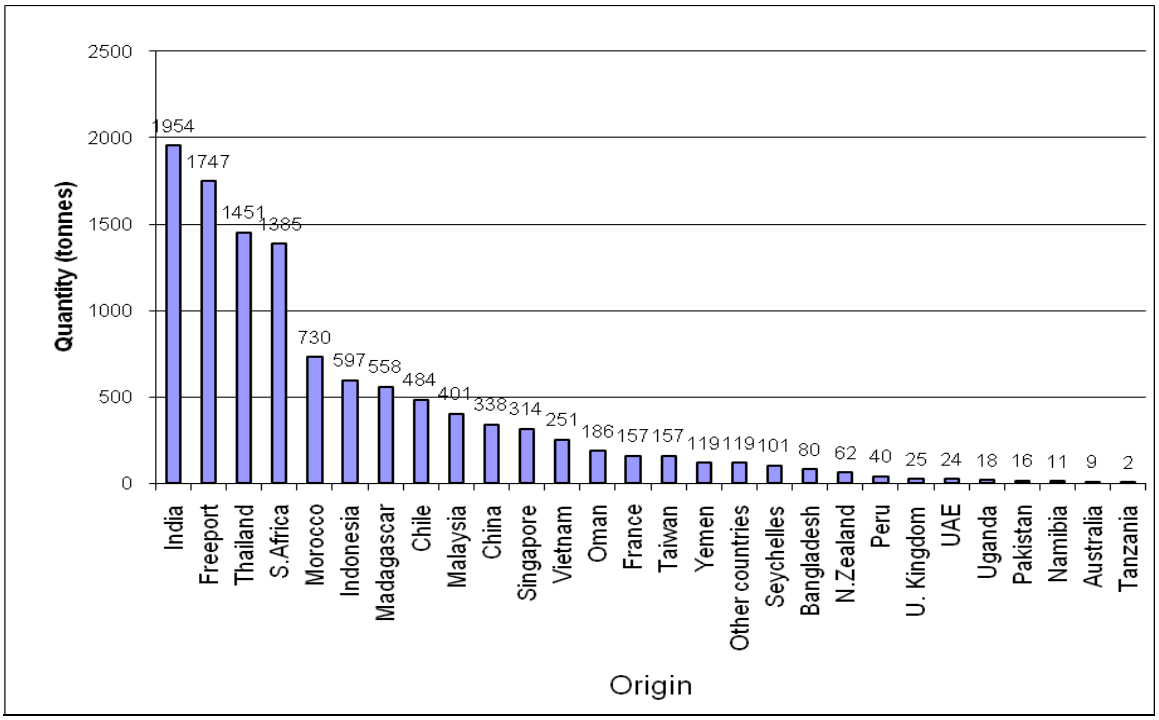


Figure 6.10: Import of fish and fish products by country of origin

6.5.1.2 Chilled fish and fish products

Chilled fish and fish products, amounting to 181 tonnes, were mainly imported from Seychelles, India and France. A total of 50 tonnes of fish was imported from Seychelles, mostly comprising 'capitaine', 'sacréchien', 'vacoas' and 'bourgeois'. 'Bourgeois' fish was imported for sale to hotels only. The main imports from India amounting to 5 tonnes were lobsters, prawns and crab meat. The imports from France amounting to 121 tonnes consisted of 19 tonnes of salmon, 1 tonne of processed shrimp, 248kg of tarama, 6 tonnes of oysters, mussels and 'noix St. Jacques', 360kg of fish egg in the form of 'oeuf de lompe', 'oeuf de cabillaud' and salmon egg. The other species were trout, turbot, sardine, 'dorade', 'bar', rollmops (herring), sole, 'encre de seiche', anchovy, 'miettes de crabe', mackerel and 'morue'. Details of the imports of chilled fish and fish products as per categories are shown in table 6.14.

Table 6.14: Import of chilled fish and fish products (tonnes)

Year	Fish	Crustacean	Shellfish	Total
2005	95	10	15	**120**
2006	110	22	5	**137**
2007	79	11	8	**98**
2008	123	10	10	**143**
2009	166	8	7	**181**

6.5.1.3 Frozen fish and fish products

Imported frozen fish and fish products amounted to 7 630 tonnes. These products were imported mainly from India, South Africa, Madagascar, Thailand, Malaysia, Oman, France, Taiwan, China, Freeport and fishing vessels calling at Port-Louis. Details of import for the past five years are presented in table 6.15.

Table 6.15: Import of frozen fish and fish products (tonnes)

Year	Fish	Crustacean	Cephalopod	Shellfish	Total
2005	4 721	1 326	1 174	55	**7 276**
2006	4 848	1 061	696	49	**6 654**
2007	4 473	1 298	907	42	**6 720**
2008	4 937	1 486	878	44	**7 345**
2009	5 428	1 131	1 008	63	**7 630**

The species composition of frozen fish imported is shown in figure 6.11. Fish commonly imported were 'capitaine', 'cateau', 'vacoas', 'vieille', catfish, marlin, sailfish and tuna. By-catch from tuna longliners, purchased by the Agricultural Marketing Board and sold to fishermen cooperatives, amounted to 370 tonnes and comprised non-targeted tuna species, oil fish, sailfish, moonfish, marlin, becune, angelfish, shark and 'dorade'. Fish products mainly in the form of fish fingers, fish cakes and fish balls amounted to around 846 tonnes.

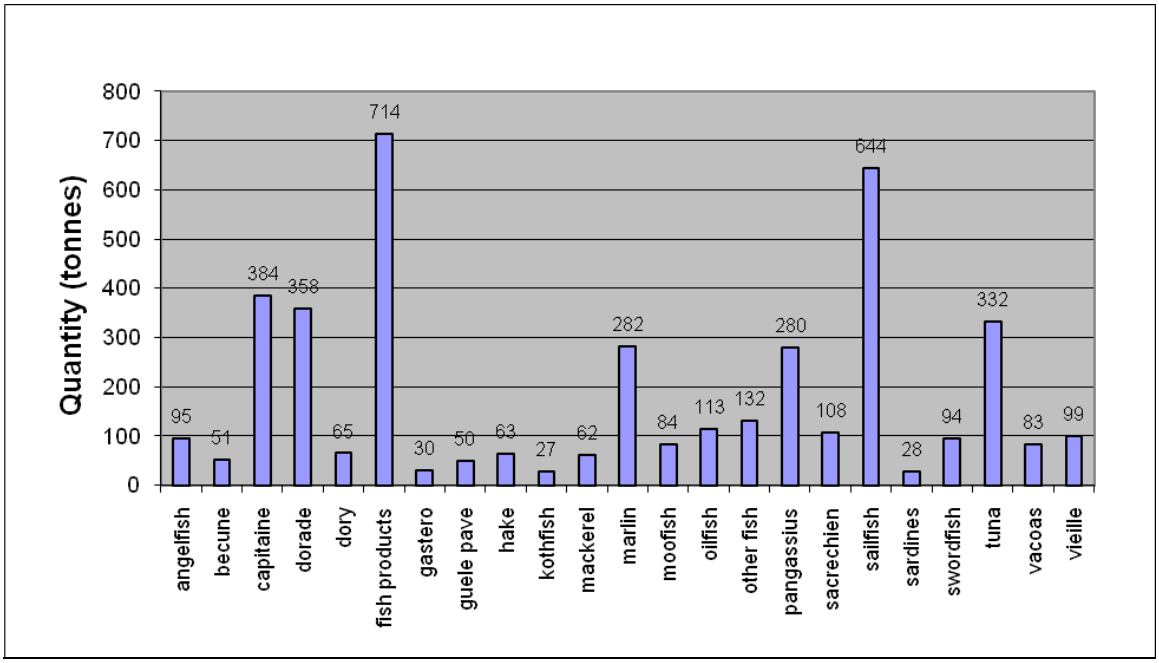


Figure 6.11: Import of frozen fish

6.5.1.4 Dried fish and fish products

Dried fish and fish products were imported from India, China, Malaysia, Indonesia, Pakistan and Singapore. The total import amounted to 203 tonnes. Details are presented in table 6.16.

Table 6.16: Import of dried fish and fish products (tonnes)

Year	Fish	Bombay-duck	Squid, cuttlefish	Prawn	Others	Total
2005	23	136	1	97	0	**257**
2006	2	175	0	109	0	**286**
2007	2	104	0	93	0	**199**
2008	0	171	0	87	3	**261**
2009	0	106	1	95	1	**203**

6.5.1.5 Smoked fish and fish products

Smoked fish and fish products were imported from France, Denmark, Singapore and the United Kingdom for the supermarkets, hotels and restaurants. They amounted to 12 tonnes and comprised mainly herring, trout, salmon, haddock and mackerel.

6.5.1.6 Canned fish and fish products

Canned fish and fish products such as sardines, mackerels, anchovy, salmon, tuna, crabmeat and mussels were imported from Morocco, Chile, Peru, South Africa, Thailand, Madagascar, Singapore, India, Malaysia, China, France and the United Kingdom. The main country for the supply of sardines and mackerel were Morocco, South Africa and Chile A total of 3 314 tonnes of canned fish and fish products were imported during the year and details are presented in table 6.17.

Table 6.17: Import of canned fish (tonnes)

Year	Sardines	Pilchards	Mackerel	Tuna	Others	Total
2005	804	624	1 015	118	63	**2 624**
2006	900	889	838	230	40	**2 897**
2007	630	967	1 166	171	12	**2 946**
2008	1 015	1 342	641	185	17	**3 200**
2009	726	1 216	1 171	178	23	**3 314**

6.5.1.7 Live crustaceans

Some 330 kg of live crab were imported from Madagascar.

6.5.1.8 Live ornamental fish

A total of 931 767 units of live fresh water ornamental fishes were imported from Singapore and Malaysia. Common aquarium fish authorised for import included gold fish, tetra, guppies, mollies, cichlids, arrowana and fresh water turtles.

6.5.1.9 Fishmeal

A total of 102 tonnes of dried fishmeal and 410 tonnes of fish-waste were imported from France and the Freeport. These products were used in the manufacture of animal feed.

6.5.1.10 Pet food

A total of 169 tonnes of pet food was imported from Thailand, Chile, Singapore and France for sale on the local market.

6.5.1.11 Dried seashells

A total of 81 812 units of dried seashells were imported from Philippines and Madagascar.

6.5.2 Export of fish and fish products

6.5.2.1 Export of chilled fish

Two companies exported a total of 22 644kg of chilled fish to Reunion Island. 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*).

6.5.2.2 Export of marine ornamental fish

Three companies exported live ornamental marine fish to USA, Hong Kong, United Kingdom, Germany, Israel, France, Japan, Singapore, Africa and Spain. A total of 2 753 units were exported.

6.5.3 Fish processing

6.5.3.1 Canned tuna

The local cannery imported 48 429 tonnes of raw tuna from European vessels for processing. 32 511 tonnes of canned tuna were exported to European countries and 983 tonnes were put on sale on the local market. Export and local sale of the produce for the past five years is presented in table 6.18. Since 2007, pet food has not been produced.

Table 6.18: Export and local sale of canned tuna and pet food (tonnes)

Product / Year	2005		2006		2007		2008		2009	
	Local	**Export**	**Local**	**Export**	**Local**	**Export**	**Local**	**Export**	**Local**	**Export**
Canned tuna	1 142	31 674	1 278	34 463	1 131	32 575	935	32 977	983	32 511
Pet food	195	2 394	201	4 470	0	0	0	0	0	0
Total	**1 236**	**33 625**	**1 479**	**38 933**	**1 131**	**32 575**	**935**	**32 977**	**983**	**32 511**

6.5.3.2 Tuna loin production

One processing plant, engaged in the production of tuna loins for export, imported 56 723 tonnes of raw frozen tuna. A total of 48 881 tonnes of tuna loins/chunks/flakes were produced out of which 38 382 tonnes were exported to Spain, Italy, France, Greece , Portugal, Belgium, Israel, Denmark, Germany, Netherlands, South Africa, United Kingdom and USA.

6.5.3.3 Salted fish

Two companies are engaged in the production of salted snoek, (*Thyrsites atun*), from imported frozen raw material. A total of 543 tonnes of salted snoek were sold on the local market while 102 tonnes were exported. Details of the import of raw materials, production of snoek and their sale for the past five years are presented in table 6.19.

Table 6.19: Import, production and sale of salted fish (tonnes)

Year	2005	2006	2007	2008	2009
Import of frozen snoek	1 126	962	1 066	956	776
Production of salted snoek	772	644	651	613	645
Local sale of salted snoek	570	486	491	516	543

6.5.3.4 Fish meal production

One company was involved in fishmeal production. The raw materials (tuna offal) were obtained from the local fish processing factories. A total of 11 119 tonnes of fishmeal was produced; out of which 8 745 tonnes were sold on the local market and 2 374 tonnes were exported to South Africa, Australia and Madagascar. The production for the last five years is given in table 6.20.

Table 6.20: Production of fish meal (tonnes)

Year	2005	2006	2007	2008	2009
Production	6 584	10 265	10 393	9 198	11 119

6.5.3.5 Re-export of canned products

Two companies were involved in the import and re-export of canned products namely sardines, pilchards, mackerel and tuna meat. These products were imported from Morocco and Chile and re-exported mainly to Madagascar but also to Seychelles and Comoros. The total re-export for the year amounted to 83 tonnes.

6.5.3.6 Export of fish oil

One company was engaged in the production and export of fish oil (oil extracted from fish). The company exported some 330 tonnes to China.

6.6 Fish production, consumption and trade balance

6.6.1 Total fish production

The total annual production by the different fisheries is given in table 6.21.

Table 6.21: Total fish production (tonnes)

Sector	2005	2006	2007	2008	2009
Artisanal fishery					
Mauritius	947	950	640	682	820
Rodrigues	1 040	1 067	1 067	1 758	1 900
Agalega	30	30	30	30	30
Sports fishery	650	650	650	650	650
Amateur fishery	300	300	300	300	300
Barachois	5	4	2	2	0
Ponds (prawn & fish)	23	20	17	62	57
Marine aquaculture (cage)	367	447	550	181	366
FAD Fishery	-	214	164	167	390
Sub-total	**3 362**	**3 682**	**3 420**	**3 832**	**4 513**
Offshore demersal fishery					
Shallow water banks	2 178	3 112	2 848	2 428	2 685
Banks deep water snappers	--	0	0	285	627
St Brandon inshore	414	235	*54	*173	437
Semi-industrial chilled fish	223	311	171	173	459
Tuna fishery	1 402	1 380	803	475	246
Semi-industrial pelagic fish	177	247	184	41	8
Demersal trawlers	2 584	1 112	0	0	0
Sub-total	**6 978**	**6 397**	**4 060**	**3 402**	**4 462**
Grand Total	**10 340**	**10 079**	**7 480**	**7 234**	**8 975**

*=only chilled and salted

6.6.2 Per capita consumption of fish

The per capita consumption of fish is given in table 6.22.

Table 6.22: Per capita consumption of fish (kg)

Year	Quantity
2005	18.8
2006	19.9
2007	18.3
2008	21.5
2009	21.1

Source: Central Statistics Office

6.6.3 Trade balance in relation to total imports and exports

The import of fish and fish products and trade balance are given in table 6.23.

Table 6.23: 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)**
2005	104 830	4 265.7	67 249	4 842.1	580.9
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

Source: Central Statistics Office; MR* – Million rupees

7 FISHERIES PLANNING

7.1 Regional and International Cooperation

7.1.1 Cooperation with the Government of Western Australia

The Memorandum of Understanding signed in August 2006 between the Government of Western Australia (GoWA) and Mauritius has been operationalised through technical assistance for implementation of projects under the International Funds for Agricultural Development (IFAD) - Marine Agricultural Resource Support (MARS) programme.

A consultant from GoWA was on mission in Mauritius from 26th August to 7th September for the project "Assessment of Bad Weather Allowance". The assignment was completed with the draft recommendations and critical features submitted on 30th September. The final report would be submitted to the Ministry in 2010.

Another consultant from GoWA was in Mauritius from 19th to 26th November to start the study on "Assessment of lagoon and off-lagoon fish stocks using existing data". The "Assessment of FAD Programme/off-lagoon species and value chain analysis" would also be undertaken with technical assistance from GoWA.

7.1.2 Cooperation with Norway

The first steering committee meeting, to coordinate and monitor progress and activities for the project "Combating Illegal Fishing, Marine Resources Management and Strengthening Quality of Fish Products" under the Mauritius-Norway bilateral cooperation agreement was held in Mauritius in February. The annual meeting held in Mauritius in March was also attended by Norad and representatives of the Embassy of the Kingdom of Norway based in Maputo. The second steering committee meeting was organised in Norway in October.

The National Plan of Action to prevent, deter and eliminate Illegal Unreported and Unregulated Fishing (NPOA-IUU) has been finalized. Government was apprised of its contents and approved its implementation. The plan responds to the need for a firm commitment in combating IUU fishing and to promote the sustainable utilization of the living marine resources. 300 copies of the NPOA-IUU will be printed in 2010 for its dissemination among stakeholders.

Two Norwegian consultants were in Mauritius from 11th to 16th December to hold working sessions with stakeholders for the drafting of the regulations for safety and certification of boats less than

24m. The goal of the project is to set up a unit with qualified surveyors to certify and register fishing boats less than 24m in length as provided under the Fisheries and Marine Resources Act 2007 with the aim of improving the safety of fishing boats involved in the semi-industrial fishery**.**

Training in stock assessment was undertaken in April. Twelve staff from the Fisheries Division and two officers from National Coast Guard followed the training course on the operation and interpretation of VMS conducted by consultants from the Directorate of Fisheries of Norway in October. An officer was trained in hydro-acoustic survey in Thailand under the bilateral cooperation programme.

The acoustic survey of the deep-water fish stocks on the northern slopes of the Nazareth bank was carried out from 18th November to 2nd December to assess the deep-water resources and train local scientists in hydro-acoustic techniques and surveys. A cruise report was submitted.

A workshop was held in Port Louis at the Competent Authority in May in relation to establishing a surveillance system for aquaculture feeds. The draft of the "Animal (Aquaculture) Feed Regulations" was elaborated and submitted to the State Law Office for vetting.

7.1.3 Cooperation with the European Community

In August, Mauritius signed the Interim Economic Partnership Agreement (EPA) with the European Community in the context of the EC-African Caribbean Pacific (ACP) negotiations. Mauritius along with Seychelles and Madagascar, obtained an automatic derogation to source 8 000 tonnes of preserved tuna and 2 000 tonnes of tuna loins from non-ACP countries or non-EC countries. Discussions are being pursued for the conclusion of a full EPA.

In the meantime, the Council Regulation No 1528/2007 adopted by the EC allows for an advanced application of the market access provisions of the Interim Agreement. On the basis of the application made by Mauritius in 2008 and in accordance to the EC Regulations, the temporary derogation of 3 000 tonnes for preserved tuna and 600 tonnes for tuna loins was limited for one year. In December 2008, the temporary derogation was extended to cover the period ending December 2009. Mauritius has submitted its application for the renewal of the derogation for 2010.

7.1.4 Fish Auction Market

Open tenders for the construction of the Fish Auction Market were floated in August 2009. Bids received were assessed and were found to be non compliant to the requirements of the bid document and were considered to be substantially non responsive. The bidding exercise was therefore cancelled. A selective bidding exercise would be carried out in January 2010.

7.1.5 Cooperation with Japan

The project "Rehabilitation of Fisheries Facilities for Fisheries Development in the Republic of Mauritius (2nd Phase)" executed by the Overseas Fishery Cooperation Foundation (OFCF) of Japan was successfully completed in March. This project involved further rehabilitation of facilities and equipment situated at the Albion Fisheries Research Centre, the Fisheries Training and Extension Centre and the Cold Store of the Agricultural Marketing Board situated at Trou Fanfaron.

The Honourable Minister of Agro Industry, Food Production and Security visited Japan from 19th to 24th July at the invitation of the OFCF. This mission followed the signature of a fishing agreement with the Japan Tuna Fisheries Cooperatives Association (JTFCA) for fishing in the Maritime Zones of Mauritius from 2009 to 2011. This fishing agreement provides for licensing of 50 Japanese fishing vessels to fish for tuna and associated species in the Mauritius EEZ. Consultations were held in relation to the elaboration of a project for the development of the artisanal fisheries through the reorientation of fishing activities of the fishermen from the traditional lagoon fisheries towards the outer lagoon. This project will be funded by the Japanese International Cooperation Agency (JICA).

7.1.6 Cooperation with Pakistan

The 8th Joint Working Group (JWG) meeting was held in October in Mauritius between officials of the Islamic Republic of Pakistan and Mauritius in relation to the Preferential Trade Agreement (PTA) between the two countries. A Memorandum of Understanding for cooperation in fisheries was signed.

7.2 Fisheries Investment Trust

The Fishermen Investment Trust (FIT) signed a Memorandum of Understanding with the Mauritius Export Association (MEXA) with the objective to launch a fishing project to promote the outer lagoon and the Fishing Aggregating Devices (FADs) fishery. A first boat of length 9.15m was donated by the MEXA to the FIT and launched in December.

7.3 Fisheries Project Appraisal

Nine projects for semi-industrial fishing including one for the setting up of a cold room/processing plant were assessed and were found to be technically and financially viable. Letters of intents and authorisation to proceed with the implementation of the projects were issued.

7.4 Projects under the Food Security Fund

Following the Budget 2008/09, a Strategic Plan on Food Security was formulated. Consequently, under the Food Security Fund (FSF) grant scheme, provisions have been made for the funding of 4 projects in the fisheries sector, namely (i) the construction of four fishing boats for off-lagoon fishing, (ii) the construction of one semi-industrial fishing boat, (iii) the setting up of fish cage culture at sea and (iv) the training of skippers/mechanics who will operate fishing boats of less than 24m in length. The projects are expected to benefit some 50 fishermen and 100 skippers/mechanics.

Besides under the FSF special loan scheme, two projects for the purchase of semi-industrial fishing boats for chilled-fish fishery and one project for the setting up of a cold room/processing plant were examined and recommended to the FSF Committee for approval.

7.5 IFAD/MARS Programme

The Marine and Agricultural Resource Support Programme (MARS) was approved by IFAD in March 2008. The Financing Agreement was signed in March 2009 and the programme has been declared effective as from October. The goal of the IFAD/MARS Programme is to support the pro-poor reform agenda of the Government for poverty alleviation amongst the marginal coastal households. The Programme comprises three main components, namely:
(i) Support for pro-poor and institutional change to improve fisheries management and policies for marine resources sustainably; (ii) Marine Resources Management to improve the livelihood of coastal communities by adopting sustainable and more profitable fishing and aquaculture practices, and (iii) Diversification of Rural Incomes and Employment to undertake more profitable farming and non-farming practices so as to increase their employment prospects. The overall cost of the MARS Programme including contingencies (over six years) is estimated at around Rs 615 million (USD $ 17.23 million) covering the fisheries sector and other sectors.

The following studies (i) “Assessment of Bad Weather Allowance”, (ii) “Assessment of lagoon and off-lagoon fish stocks using existing data” and (iii) “Assessment of FAD Programme/off-lagoon

species and value chain analysis" were planned to be carried out from July to December with assistance from the Government of Western Australia (GoWA). The Annual Work Plan and Budget (AWPB) 2009 was worked out and sent to the IFAD/MARS Assistant Programme Coordinator in July. In the context of the project "Assessment of Bad Weather Allowance" a GoWA mission was in Mauritius in August/ September. A marine biologist was recruited by IFAD to assist in the project for assessment of lagoon and off-lagoon fish stocks using existing data and was on assignment as from September.

The AWPB 2010 was prepared and forwarded to the Programme Coordination Unit (PCU) of the IFAD-MARS Programme for the implementation of the following: (i) Development of lagoon and off-lagoon Fisheries Management Plans; (ii) Support for conversion of off-lagoon fishing (purchase of FAD materials); (iii) Assessment of FAD Programme/off-lagoon species and value chain analysis and (iv) Support for training of community marine park rangers.

8. FISHERIES PROTECTION SERVICE

The main function of the Fisheries Protection Service (FPS) is to protect the marine resources and environment through the enforcement of the fisheries and other related legislations. The FPS also provides support to the AFRC, the FITEC, the Marine Parks and the One Stop Shop.

8.1 Artisanal fishermen

As at end of December, 2 303 artisanal fishermen were registered compared to 2 307 in 2008. Fifty one new fishermen were registered and fifty five deregistered. Details of registered fishermen as per gear category are given in table 8.1.

Table 8.1: Details of registered fishermen

Fisheries Post	Net	Basket trap	Line	Basket trap /line/ harpoon	Total
Port Louis	0	1	49	65	**115**
Tombeau Bay	0	12	59	79	**150**
Trou aux Biches	4	1	86	101	**192**
Grand Gaube	28	16	61	190	**295**
Poudre d'Or	0	12	1	133	**146**
Poste la Fayette	16	5	0	73	**94**
Trou d'Eau Douce	18	10	31	63	**122**
G.R.S.E	0	1	4	91	**96**
Bambous Virieux	0	15	18	178	**211**
Mahebourg	30	16	42	249	**337**
Riambel	6	3	4	77	**90**
Baie du Cap	3	7	20	59	**89**
Case Noyale	10	2	5	114	**131**
La Preneuse	18	2	49	77	**146**
Pointe aux Sables	16	3	37	33	**89**
Total	**149**	**106**	**466**	**1 582**	**2 303**

8.2 Registration of boats

Ninety-one new fishing boats were registered in the artisanal fishery, bringing the total to 2 525.

Table 8.2: Registration of boats

Fisheries Post	No of registered fishing boats
Port Louis	214
Tombeau Bay	169
Trou aux Biches	217
Grand Gaube	287
Poudre d'Or	171
Poste Lafayette	110
Trou d'Eau Douce	131
G.R.S.E	153
Bambous Virieux	202
Mahebourg	376
Riambel	31
Baie du Cap	83
Case Noyale	152
La Preneuse	140
Pointe aux Sables	89
Total	**2 525**

8.3 Licences

The number of the different types of licences in the artisanal fishery is given in table 8.3

Table 8.3: Number of licences

Fisheries Post	Large net	Gill net	Bait gear
Port Louis	0	0	37
Tombeau Bay	0	0	39
Trou aux Biches	1	1	24
Grand Gaube	3	0	7
Poudre d'Or	0	0	4
Poste la Fayette	2	0	6
Trou d'Eau Douce	1	1	21
G.R.S.E	0	0	6
Bambous Virieux	0	0	22
Mahebourg	2	2	53
Riambel	1	0	9
Baie du Cap	0	1	10
Case Noyale	1	0	10
La Preneuse	3	0	48
Pointe aux Sables	1	0	15
Total	**15**	**5**	**311**

Records for the last three years for new and renewed fishmonger licences are detailed in table 8.4.

Table 8.4: Details of fishmongers' licences

Year	Local	Import	Total
2007	690	143	833
2008	664	177	841
2009	668	172	840

8.4 Illegal fishing

Details of interventions with respect to illegal fishing are given in table 8.5.

Table 8.5: Number of interventions

Year	Underwater fishing	Net fishing	Others	Length of illegal net seized (m)
2005	21	12	32	6 183
2006	105	146	83	12 033
2007	64	123	49	2 837
2008	154	96	47	6 809
2009	126	134	51	8 184

8.5 Allowances to artisanal fishermen

8.5.1 Bad weather allowance

The number of beneficiaries for bad weather allowance ranged from 2 063 to 2 235 on a monthly basis during the year. The rate for a bad weather day was increased as at 1st July to December from Rs. 200 to Rs. 210. A total of Rs 53 601 880 was paid by the Ministry of Social Security, National Solidarity and Senior Citizens Welfare and Reform Institutions. Details are shown in tables 8.6 and 8.7.

Table 8.6: Payments of bad weather allowance

Year	No. of days	Rate (Rs)	Beneficiaries	Total (Rs)
2005	137	135 - 145	1 978 - 2 247	**41 597 895**
2006	zoning	145 - 155	1 054 - 2 257	**35 890 800**
2007	zoning	155 - 168	1 935 - 2 260	**47 380 770**
2008	zoning	168 - 200	2 048 - 2 208	**56 737 336**
2009	Zoning	200 - 210	2 063 - 2 235	**53 601 880**

Table 8.7: Bad weather days and number of beneficiaries

Year	Region		Total bad weather days	Beneficiaries	Total (Rs)
2006	Lagoon	Zone 1	61	1 054 – 2 257	35 890 800
		Zone 2	66		
		Zone 3	77		
		Zone 4	74		
	Off-lagoon	Area 1	106		
		Area 2	124		
2007	Lagoon	Zone 1	15	1 935 – 2 260	47 380 770
		Zone 2	22		
		Zone 3	50		
		Zone 4	45		
	Off-lagoon	Area	149		
2008	Lagoon	Zone 1	28	2 048 – 2 208	56 737 336
		Zone 2	35		
		Zone 3	48		
		Zone 4	47		
	Off-lagoon	Area	151		
2009	Lagoon	Zone 1	12	2 063 – 2 235	53 601 880
		Zone 2	19		
		Zone 3	27		
		Zone 4	17		
	Off-lagoon	Area	131		

8.5.2 Closed season allowance

During the closed season from 1st October to the last day of February of the following year, a net fisherman was entitled to a daily allowance of Rs. 210. A total of Rs. 3 421 950 was paid and details are shown in table 8.8.

Table 8.8: Payments of closed season allowance

Year	No. of days	Rate (Rs)	Beneficiaries	Total (Rs)
2005	122	135-145	161	**2 763 010**
2006	121	145-155	161-153	**2 852 125**
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**

8.5.3 Sick leave allowance

Under the sickness allowance scheme, a registered artisanal fisherman is eligible to a financial assistance 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. Such allowance paid is shown in table 8.7.

Table 8.7: Sick leave allowance

Year	Rate (Rs)	Total (Rs)
2005	135 - 145	**11 480**
2006	145 - 155	**9 870**
2007	155-168	**10 710**
2008	168 - 200	**8 540**
2009	200 – 210	**4 800**

8.6 Incentives to registered fishermen

8.6.1 Scholarships to children

The Fishermen Welfare Fund disbursed Rs 1 473 000 as scholarship allowances to children of registered fishermen. Details are shown in table 8.10.

Table 8.10: Scholarship allowance

Education Level	Beneficiaries	Amount (Rs)
Post C.P.E (Form I to V)	205	922 500
Post S.C (Lower and upper six)	32	290 250
Post H.S.C (Degree and professional qualifications)	24	258 000
Vocational	1	2 250
Total	**262**	**1 473 000**

8.6.2 Fishermen lost at sea

One Fisherman was lost at sea and the amount paid to his family was Rs. 10 000.

8.7 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 15 large nets and 5 gill nets. Four net fishermen gave up net fishing and were compensated accordingly. Details of payment effected are shown in table 8.11.

Table 8.11: Amounts paid (Rs) under net reduction 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.)	
2006	4	140 000	3	210 000	-	1	133 000	**483 000**
2007	1	35 000	3	210 000	-	-	-	**245 000**
2008	1	35 000	3	210 000	-	-	-	**245 000**
2009	-	-	4	280 000	-	-	-	**280 000**

9. Miscellaneous

9.1 Visits

During the year, 3 901 persons visited the Albion Fisheries Research Centre. The majority of the visitors were students from primary and secondary schools. Table 9.1 shows the number of visitors by type of institutions.

Table 9.1: Visits to AFRC

Institutions	Number of visitors
Primary Schools	1 341
Secondary Schools	1 119
Social organizations/welfare centres	1 085
Pre-primary schools	95
Government/Parastatal organizations	5
Other (tourists, private firms, University of Mauritius students)	121
Pre-vocational institutions	135
Total	**3 901**

9.2 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, stakeholders and the public in general.

9.3 New library holdings

186 publications (local and foreign) and eleven CD-ROMs were received during the year. An acquisition list was produced on a monthly basis for circulation to staff.

9.4 Sales and distribution of publications

Sales of posters, charts, maps and books published by the Ministry amounted to Rs. 74 965.

9.5 Reprints

Five hundred posters on Common Corals of Mauritius and seventy-one Thematic Maps for coastal areas were re-printed.

9.6 Placement

Two final year students of BSc (Hons), Agriculture with Aquaculture of the University of Mauritius, carried out their project works at AFRC from September to December 2009. The projects comprised testing alternative feeds on the growth rates of *Scylla serratta*, (mud crab) and *Oreochromis* sp. (red tilapia hybrid).

9.7 Project ''Plan Régional de Surveillance des Pêches dans le Sud de l'Océan Indien'' - Commission de l'Océan Indien/Monitoring, Control and Surveillance (COI/MCS)

Three joint missions were held in the EEZ of the COI member states in February/March, May/June and November/December for the project 'Plan Régional de Surveillance des Pêches dans le Sud de l'Océan Indien'' - Commission de l'Océan Indien/Monitoring, Control and Surveillance (COI/MCS). The Fisheries Monitoring Centre was the coordination centre providing Vessel Monitoring System (VMS) data to the coordinating team comprising the Operation Controller (Mauritius) and representatives of the National Coast Guard. The representatives from the Centre de Surveillance des Pêches of the COI region attended the first mission. The patrol vessels *Atsantsa* (Madagascar), *Osiris* (Reunion), *Maya Dugong* (Seychelles), *Guardian* (Mauritius) and the *Dornier* aircraft (Mauritius) participated in the missions.