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Bycatch landings in Mauritius for 2009/2010

By

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1. Abstract:

Port Louis is an important port for Longliners operating in the South West Indian Ocean region. Many of them are licensed to fish in the EEZ of Mauritius. One of the conditions of the fishing licence provides that bycatch should be landed and sold on the local market. During landings, bycatch data is collected as these data are important for the ecosystem based management of fishery resources.

This paper presents a summary of by-catch landed by licensed and non-licensed longliners for the last two years, the species composition of the bycatch and the fishing zones.

Analysis of the data collected revealed that oilfish, sharks and sailfish are the dominant bycatch species.

2 Introduction

Mauritius has an Exclusive Economic Zone (EEZ) of 1.9 million km^2 extending from the coasts of the islands of Mauritius, Rodrigues, St Brandon (Cargados Carajos Shoals), Agalega, Tromelin and Chagos Archipelago. The EEZ has a reasonable stock of various fish, including pelagic and demersal species.

Mauritius is an important tuna transshipment base in the South-West Indian Ocean. The temperate tuna fishery based on the albacore tuna is fished mainly by foreign longliners which tranship their catch in Port Louis. In Mauritius, the tuna fishery forms the basis for local fish processing industries and is a valuable contributor to the social and economic development. Tuna transhipment at Port Louis is another important fish related activity

At present there is no Mauritian vessel engaged in the industrial tuna fishery. All tuna fishing vessels operating in the Mauritius EEZ are foreign-flagged vessels which operate under fishing licences. Fishing licences are issued to purse seiners and longliners. Most of tuna fishing activities in the Mauritius EEZ is carried out by longline fishing vessels.

Bycatch data is obtained from logbooks of licensed vessels and from transshipment data at the port. As Port Loius is a port that attracts mainly longliners, most of the data available is from longline fishing vessels.

3 The Mauritian fishery:

The Mauritian fleet consists mainly of an artisanal fleet, a smi-industrial fleet and an industrial fleet. The artisanal fleet consists of boats of 7 to 9 metres in length targeting mainly shallow water demersal species in the laggon and outer lagoon. Some 3,000 fishers are involved in this fishery. The semi-industrial fleet consist mainly of boats less than 24 metres involved mostly in shallow-water demersal fishery on the banks and some boats involved in the pelagic fishery. The industrial fleet consists of some vessels above 24 Metres. These vessels target mainly shallow-water demersal species on the banks. By catch in the banks fishery consists mainly of fishes that are of no commercial value and of fishes that are listed as toxic fishes. The toxic fish are not discarded and are used mainly as baits.

3.1. FAD Fishery

There is an artisanal fishery operated around FADs off the coast of Mauritius. Presently, there are 27 FADs set in the open sea. The most common species caught around FADs is

albacore. The catch in this fishery is about 400 tonnes yearly. Other than the relatively few sharks taken, this fishery is regarded as being "clean", with no turtle, marine mammal or seabirds caught.

3.2 Semi-industrial longline fleet (less than 24M)

Four boats of less than 24 metres in length were involved in the semi-industrial longline fishery targeting mainly swordfish. A gradual decline in the fishing activity in that fishery was noted and there was even a total inactivity in this sector in the year 2009. This is due mainly to the difficulty in marketing of the target species, i.e swordfish on the European market. The length of these vessels ranged from 16.3 to 22.9 metres and the GRT vary between 49.5 and 99.4 tonnes. The gear used by these boats is longline monofilament with about 700 to 1050 hooks. Table 1 summarises the catch of these boats for the last five years.

Table 1: Catch composition of the local semi-industrial pelagic fishing boats (less than 24M) (kg)

Species	**2006**	**2007**	**2008**	**2009**	**2010**
Swordfish	74 157	45 913	8 858	NA	17 070
Yellowfin	102 632	65 924	14 076	NA	7 621
Bigeye	15 444	-	-	NA	410
Albacore	40 480	56 416	14 570	NA	4 998
Marlin	6 508	6 597	2 183	NA	260
Shark	1 212	1 056	67	NA	-
Sailfish	1 590	2 156	163	NA	-
Misc	4 873	6 264	1 462	NA	1 925
Total Catch	247 256	184 326	41 379	NA	32 224
Total No. of Hooks	**522 705**	**443 445**	**201 782**	NA	55 000
CPUE (kg)	**0.47**	**0.42**	**0.21**	NA	**0.59**

Source: Albion Fisheries Research Centre (AFRC)

Figure 1 : Catch of local semi-industrial boats

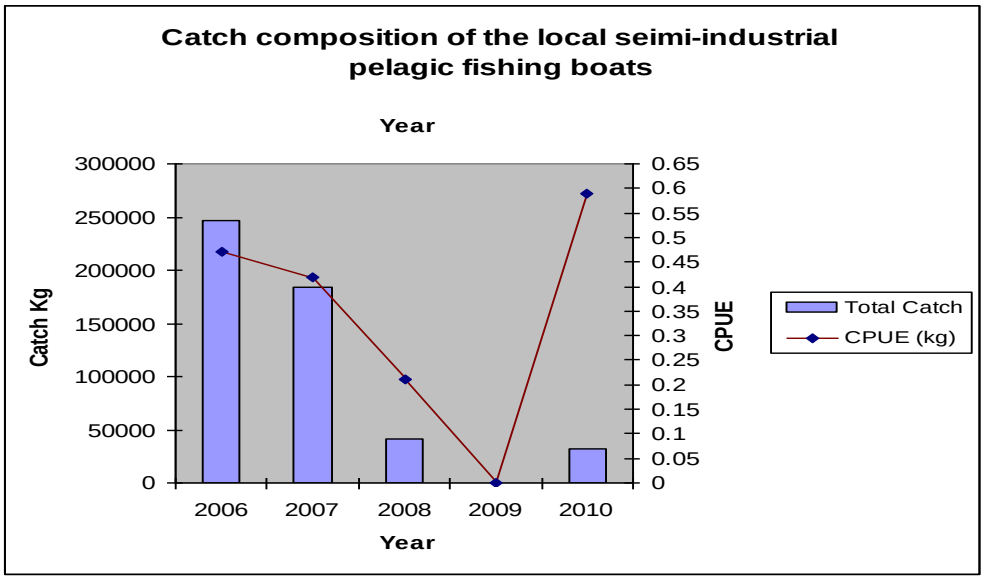
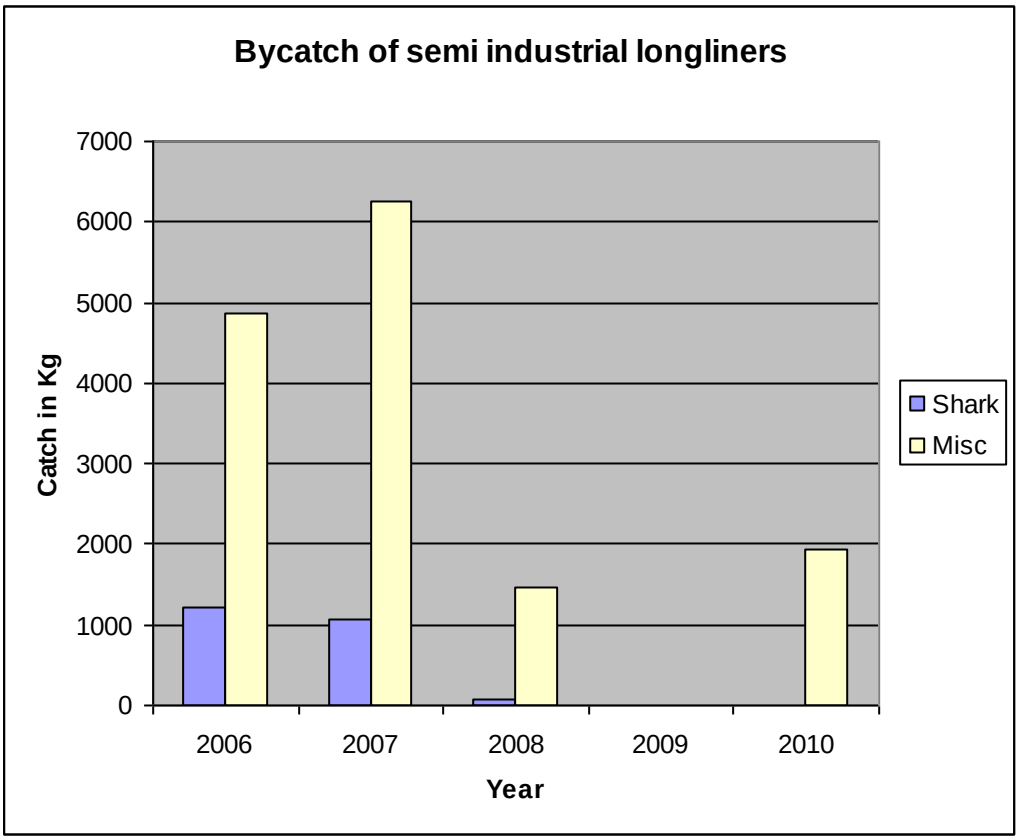


Figure 2: Bycatch of semi-industrial longliners



3.3 Fleet of vessels of more than 24M

Three local vessels above 24 M operated in the longline fishery, out of which two changed flag in 2008 and the third one which is in operation has a GRT OF 577 tons and LOA of 48 m.

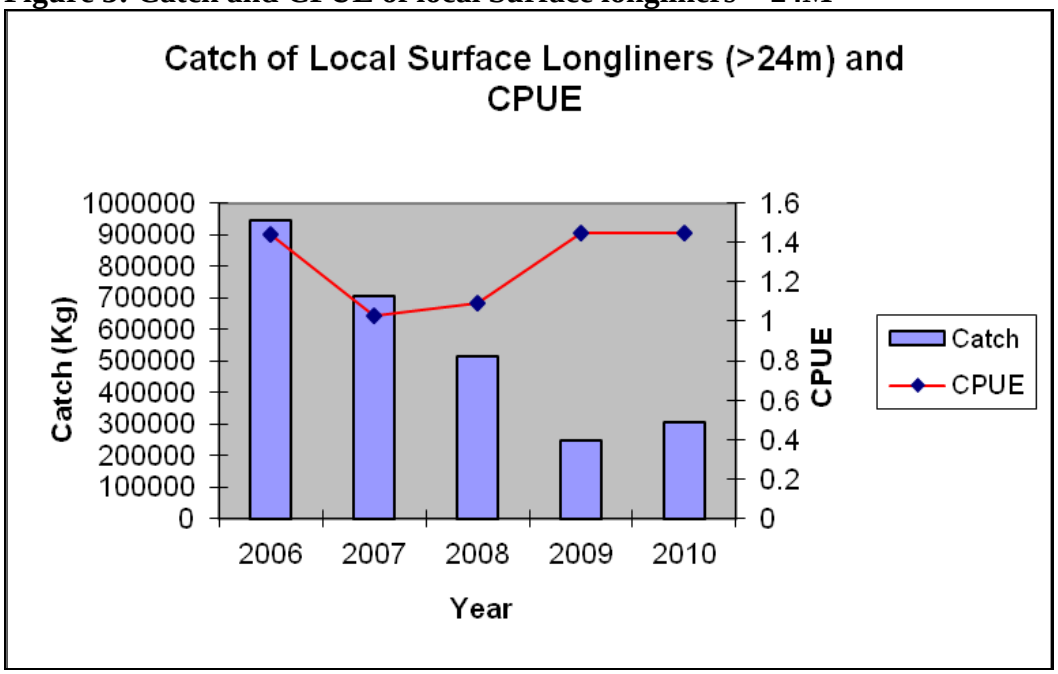
Catch data for local longline vessels above 24M is given in Table 2

Table 2.Catch by species (tonnes) of local surface longliners (>24m) for the year 2006-2009

Species	2006	2007	2008	2009	2010
Yellowfin	9.1	21.5	52.5	0.9	3.63
Bigeye	22.9	9.3	5.5	2.1	4.265
Albacore	10.6	15.7	5	0.3	1.872
Swordfish	583	402	273	180	159.855
Other billfish	7.1	11.3	13	3.2	5.922
Misc	310.4	246	163	39.8	127.843
Total Catch	**943**	**706**	**512**	**246**	**303**
Total no. of hooks	**656 428**	**681 540**	**465 678**	**169 440**	**208563**
CPUE (kg)	**1.44**	**1.04**	**1.09**	**1.45**	**1.46**

Source: AFRC

Figure 3: Catch and CPUE of local Surface longliners > 24M



4. The foreign Tuna fishing vessels

Licences are issued to foreign longliners (mostly Asian) and purse seiners to operate in the Mauritian waters under a set of conditions which include the compliance of the vessels to international conservation and management measures, listing of the vessel in the Positive or Active lists of IOTC and mandatory VMS reporting. The majority of longline vessels tranship their catch at Port Louis. Licensed vessels are required to submit logbooks after each fishing trip.

4.1 The foreign Purse seine fleet

Purse seine licences are issued mainly to European-flagged and Seychelles-flagged vessels only. These vessels operate mostly in outside the EEZ of Mauritius enter the Mauritius EEZ occasionally in pursuit the schools of fish. Data on bycatch of these vessels in Mauritius waters is very less as these vessels call mainly at Seychelles.

Table 3: Licences issued to foreign purse seine fishing vessels for the past five years

	2006	2007	2008	2009	2010
France	15	17	0	20	27
Spain	22	21	0	20	20
Italy	1	1	0	2	0
Mayotte	0	0	0	0	8
Seychelles	5	20	16	19	8
Total licences	43	59	16	61	63

Source: Annual Reports Fisheries Division

4.2 Foreign longline fleet

The longline fleet consists mainly of Taiwanese longliners. Table 4 below shows the number of longline vessels which were licensed to fish in the Mauritius EEZ between the years 2006 to 2010 and their nationalities.

Table 4: Foreign longline vessels licensed to fish for tuna in the Mauritius EEZ

Nationality	**2006**	**2007**	**2008**	**2009**	**2010**
Belize	2	2	5	4	7
China	0	0	3	2	2
EU	38	27	0	0	0
Indonesia	20	1	2	3	8
Japan	37	35	14	24	3
Korea	1	1	0	0	3
Malaysia	11	4	0	10	11
Oman	0	0	0	2	5
Philippines	0	0	0	1	0
Taiwan	77	71	50	67	108
Seychelles	2	0	7	6	14
Total	188	141	81	119	161

5. Calls of Foreign fishing vessels at Port Louis

Port Louis is an important port for tuna longliners in this part of the Indian Ocean. Vessels call at port Louis for various activities such as bunkering, provisions, transshipment, repairs, change of crew, etc.

Table 5: Calls of foreign fishing vessels at Port Louis

Year	Reefers	Squid vessel	Tuna Longliners	Trawlers	Patagonian toothfish vessel	Purse seiners
2006	48	7	701	13	21	9
2007	62	17	544	8	18	13
2008	83	39	389	15	25	14
2009	72	19	446	12	21	30
2010	65	7	469	19	18	20

Source: Port Control Unit

6. Catch of licensed longliners

6.1 Species composition of the catch of foreign licensed longliners

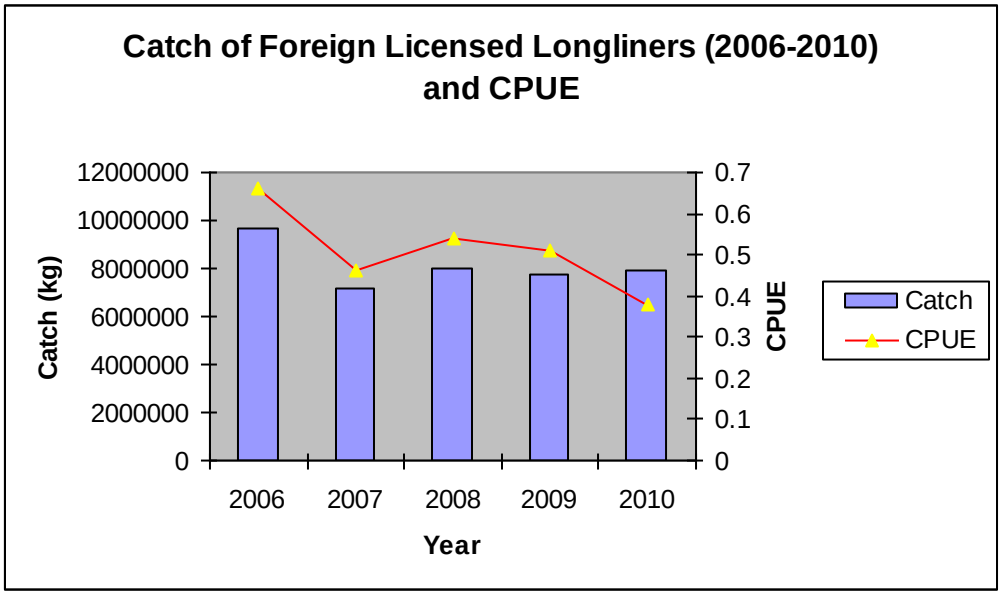
The catch composition by species of the licensed longliners is shown in Table 6
In 2010,volume transshipped by licensed longliners amounted to 7953 t. These vessels had utilised 209 306 799 hooks and the catch per unit effort was 0.38 kg per hook. The catch, species composition and CPUE trend of the licensed foreign longliners from 2006 to 2010 is shown in table 6 and figure 1 below.

Table: 6.Catch by species (tonnes) of licensed longliners for the year 2006-2010

Species	2006	2007	2008	2009	2010
Yellowfin	1712	2181	1735	1330	963
Bigeye	962	1362	1070	588	1020
Albacore	2971	1993	2024	4293	4094
Swordfish	2148	665	1273	335	269
Sailfish	44	-	115	122	192
Marlin	133	290	222	239	365
Skipjack	27	37	77	-	1
Sharks	958	62	669	167	107
Bluefin	7	-	-	-	3
Others	676	576	781	705	940
Total Catch	**9 638**	**7166**	**7 966**	**7 779**	**7 953**
Total no. of hooks	**14 541 569**	**15 592 783**	**14 633 450**	**15 169 608**	**209 306 679**
CPUE (kg)	**0.66**	**0.46**	**0.54**	**0.51**	**0.38**

Source: AFRC

Figure 4 Catch and CPUE of foreign longliners



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.

6.2 Spatial distribution of the catch of licensed longliners during 2010

The fishing area of the licensed longliners was spread widely in the Western Indian Ocean between 06º and 34º S and 44º E and 82º E. However during certain periods of the year namely during October to February the zones between lat 08 Sº and 13 Sº and longitudes 54 Eº and 60 Eº as well as latitudes between 18 Sº and 23 Sº and longitudes between 56 Eº and 62 Eº were more productive than other fishing areas.

The fishing area of the licensed longliners was spread widely in the Western Indian Ocean between 06º and 34º S and 44º E and 82º E

7. Bycatch

Bycatch are landed and transshipped by licensed and unlicensed lonliners at Port Louis. Bycatch data is collected at the port on arrival of the fishing vessels. The master is required to declare the catch (including bycatch) and the species composition of the fish on board.

7.1 Bycatch of non-licensed longliners

From data collected from the non-licenced longliners calling at Port Louis for the last two years, Table 7 and figure 5 give details of the bycatch landed by non-licensed longliners

(excluding sharks) for the last two years it is seen that the main species of bycatch landed are oilfish and sailfish

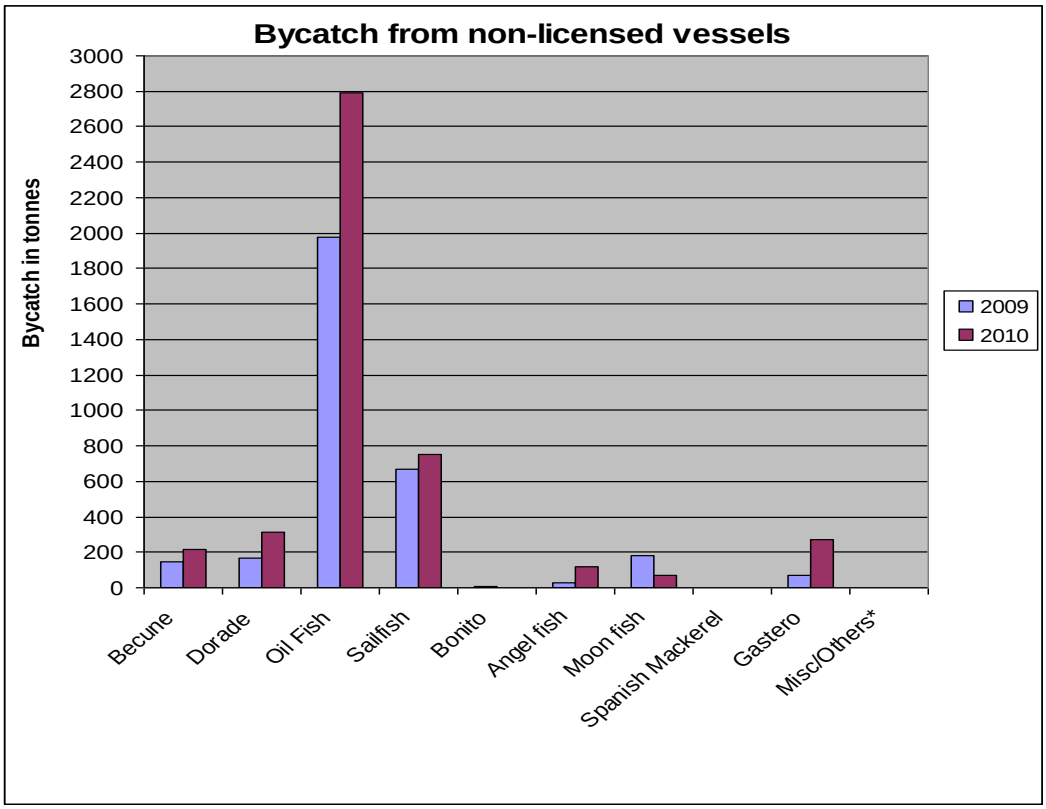
Table7: Bycatch from non-licensed vessels for the last two years (T)

Species	2009		2010	
	Qty(t)	%	Qty(t)	%
Becune (*Acanthocybium solandri*)	149.6	4.6	218.9	4.8
Dorado (*Coryphaeana hippurus)*	166	5.11	310.1	6.8
Oilfish (*Ruvetus pretiosus*)	1975.4	60.8	2792.8	61.6
Sailfish (*Isthiophorus platypterus)*	671.2	20.6	748.7	16.5
Bonito (*Katsuwonus pelamis*)	4.4	0.1	0.3	0.06
Angelfish (*Lepidotus brama*)	25.9	0.8	116.9	2.5
Moon fish (*Lampris guttatus)*	181.3	5.5	68.1	1.5
Spanish Mackerel (*Comberomorus commerson*)	3.3	0.1	1.4	0.03
Gastero (*Gasterochima melanpus*)	68.7	2.11	268.2	5.9
Misc/Others*	0	0	3.4	0.07
Total	3245.8		4528.8	

Source: Port Control Unit

*****Mullet, rudderfish, seabream

Figure 5 Bycatch from non-licensed longliners (2009/2010)



7.2 By catch from licensed vessels for 2009-2010

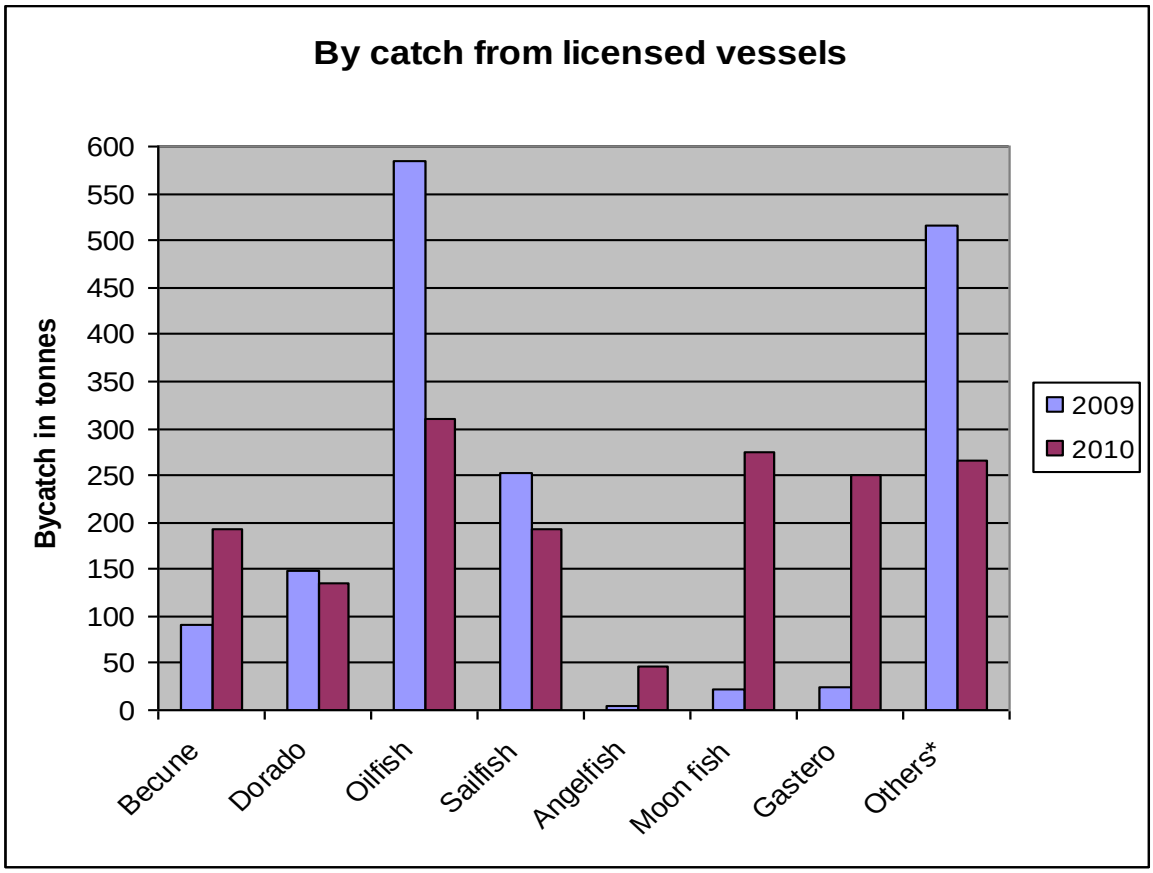
For the two years under review, it is seen that for licensed vessels also the main by catch species landed (apart from sharks) is the oilfish and sailfish. Table 8 shows the % species composition of bycatch landed for the last two years.

Table 8: Bycatch landed by licensed vessels in 2009/2010

Species	2009		2010	
	Qty (t)	%	Qty (t)	%
Becune (*Acanthocybium solandri*)	91.4	5.5	192	11.5
Dorado (*Coryphaeana hippurus)*	149	9	136	8.1
Oilfish (*Ruvetus pretiosus*)	585.6	35.6	310	18.5
Sailfish (*Isthiophorus platypterus)*	252	15.3	192.3	11.5
Angelfish (*Lepidotus brama*)	4.1	0.24	46.9	2.81
Moon fish (*Lampris guttatus)*	21.7	1.31	273.9	16.4
Gastero (*Gasterochima melanpus*)	25.3	1.5	250	14.9
Others*	515	31.2	266	16
Total	1644.1		1667.1	

*Mullet, Rudderfish, Seabream, Spanish Mackerel,Bonito

Figure 6: Bycatch from licensed vessels



7.3 Volume of sharks transhipped

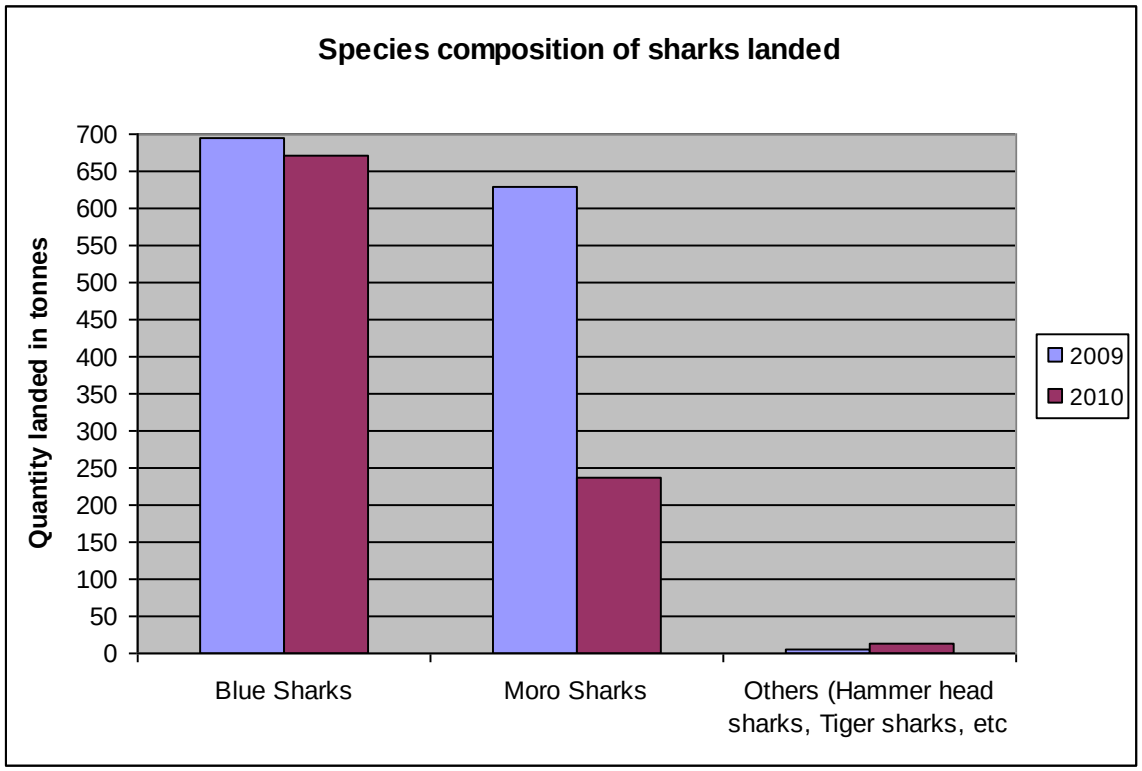
For the years 2009-2010 a total of 2 349 tonnes of sharks was transhipped at Port Louis. The main species of sharks landed from licensed and non licensed vessels calling at Port Louis consisted of Blue shark (58.1%) and Moro shark. (38.9 %) The species composition of sharks landed is shown at table 6.

Table 9: Species composition of sharks landed (tonnes)

Year	Blue Sharks	Moro/Mako Sharks	Others (Hammer head sharks, Tiger sharks, etc	Total
2009	695	628	5	1328
2010	670	337	14	1021
Total	1365	965	19	2349

Source: Port Control Unit

Figure 7: Species composition of shark transshipped



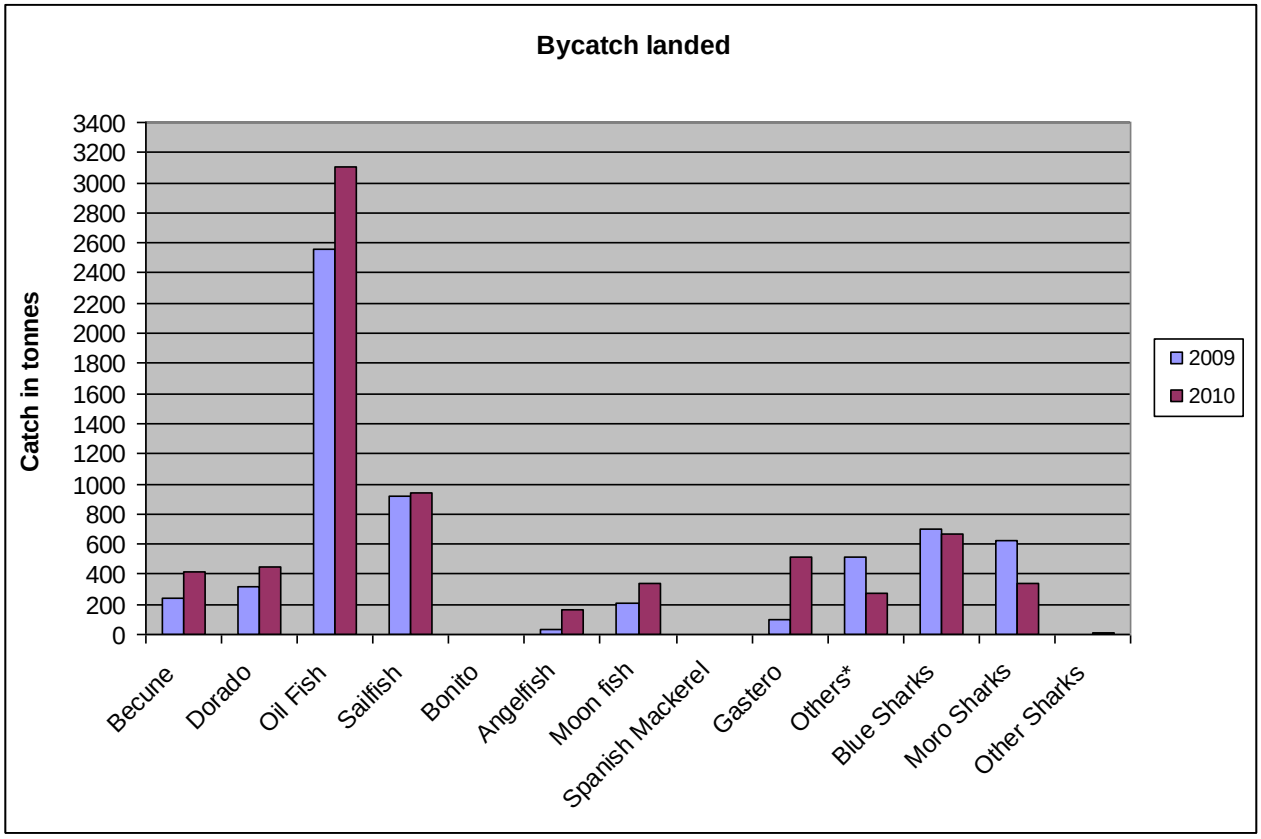
7.4 Total bycatch landings for 2009 and 2010

The total landings of both licensed and non-licensed vessels is given in the table below, showing the percentage composition of bycatch transshipped/landed. It is seen that oilfish is the main bycatch landed (42.16% of total bycatch) followed by sharks (about 18%) and sailfish. (13.88 %).

Table 10: Total bycatch landed in 2009/2010

Species	**2009**	**2010**	**Total**	**%**
	Qty (t)	**Qty (t)**	**Qty (t)**	
Becune (*Acanthocybium solandri*)	241	410.9	651.9	4.85
Dorado (*Coryphaeana hippurus)*	315	446.1	761.1	5.67
Oilfish (*Ruvetus pretiosus*)	2561	3102.8	5663.8	42.16
Sailfish (*Isthiophorus platypterus)*	923.2	941	1864.2	13.88
Bonito (*Katsuwonus pelamis*)	4.4	0.3	4.7	0.03
Angelfish (*Lepidotus brama*)	30	163.8	193.8	1.44
Moon fish (*Lampris guttatus)*	203	342	545	4.06
Spanish Mackerel (C*omberomorus commerson*)	3.3	1.4	4.7	0.03
Gastero (*Gasterochima melanpus*)	94	518.2	612.2	4.56
Others*	515	269.4	784.4	5.84
Blue Sharks (*Prionace glauca*)	695	670	1365	10.16
Moro Sharks *(Isurus oxyrinchus)*	628	337	965	7.18
Other Sharks	5	14	19	0.14
Total	6217.9	7216.9	13434.8	100

Figure 8:Total bycach landed in 2009/2010



8. Studies/information on bycatch

The bycath issue has not been thoroughly studied in Mauritius. Mauritius has a relatively large EEZ, thus a substantial bycatch is likely to occur. Most data on bycatch is obtained from logbook information and from catch declaration. Licensed vessels are obligated under law to declare and sell their bycatch in Port Louis, whereas unlicensed vessels are under no obligation to sell their bycatch. However, upon arrival into port, all vessels are required to declare all species on board including bycatch.

Current studies undertaken in Mauritius on the bycatch under the South West Indian Ocean Fisheries Projects are:

(i) Rapid By-catch assessment in the artisanal fishery of Mauritius
(ii) Observer Program
(iii)Studies on relationships between target species and bycatch

9. Marine mammal diversity and status

Not much is known about the diversity and status of marine mammals around Mauritius. Other than a cataloguing of some species seen in the waters of the island, little research

has been conducted to determine population, diversity, and status. Corbett (1994), during a year-long study, observed that spinner dolphins and sperm whales were the most common cetacean species around the island. In addition, baleen whales, including blue, humpbacks, and fin whales, have been recorded. A variety of odontocetes also occur: pantropical spotted dolphin, bottlenose dolphin (Indo-pacific and common), Risso's dolphin, striped dolphin, melon-headed whale, pygmy killer whale, and Blainville's beaked whale (Corbett, 1994). The spinner dolphin is reported to be common in the Bay of Tamarin, where they rest during the day.

10. Marine mammal bycatch

No cetacean bycatch has been recorded around Mauritius.

11. Socio-economic issues

Most foreign tuna fishing longliners calling at Port Louis transship their catch and do not sell their products on the local market except in few cases where some fish is sold to the local canneries. To ensure a supply of pelagic fish at a reasonable price on the local market, a condition has been imposed in the longline fishing licences that all bycatch should be sold to the Agricultural Marketing Board (AMB) which is a government agency. The AMB then puts these fishes on the local market for local consumption.

12. Legal Framework

The Fisheries and Marine Resources Act 1998 (FMRA) provides the necessary legal framework for fisheries and marine living resources management. Section 16 (1) (c) of the Fisheries and marine Resources Act 2007, provides that " no person shall fish or cause any person to fish any marine turtle, marine turtle egg or any marine mammal.

Section 58 (3) of the Fisheries and marine Resources Act 2007, provides that "Where a fishery control officer has reason to believe that a violation of a fisheries management measure under an international agreement to which Mauritius is a party has been committed on the high seas, and considers that it would be impracticable to apply for a warrant, the fishery control officer may, without a warrant –
(a) seize and detain any Mauritian boat or vessel;
(b) where authorised by an international agreement to which Mauritius is a party, seize and detain a foreign boat or foreign vessel, together with its gear, store and cargo, fish, or other article which he has reason to believe has been used in the commission of the violation

With regards to Resolution 10/06 on Reducing the Incidental Bycatch of Seabirds in Longline Fisheries, the companies representing the longline fishing vessels were directed to inform operators that all vessels fishing south of the parallel of latitude 30^{o} South have to carry and use bird-scaring lines (Tori lines).

Resolution IOTC 05/05 concerning finning is also being implemented.

A condition of licence for foreign longliners makes it obligatory for the licensee to sell its bycatch to the Agricultural Marketing Board and this bycatch is put on the local market through middle men.

13. Strategy for future work

It is reckoned that presently, there are certain shortfalls in the data collection system that needs to be improved. One possibility is the revision of the present logbook that is supplied to the master. This is not explicit enough to cover the different bycatch species.

At the local level, there is a need to harmonise the different documents that are presently being used for the collection of data at the arrival of a vessel in port.

A more detailed study need to be carried out with regards to the bycatch of the fleets of different nationalities calling at Port Louis.

14. References Cited:

1. D. Norungee (2010) Report on Tuna Fisheries in Mauritius , IOTC Thirteenth Session of the Scientific Committee Mahé, Seychelles, 6-10 December 2010

2. Jeremy Kiszka, Catharine Muir, Chris Poonian, Tara M. Cox, Omar A. Amir, Jérôme Bourjea, Yvette Razafindrakoto, Nina Wambiji & Nanet Bristol (2008) Marine Mammal Bycatch in the Southwest Indian Ocean: Review and Need for a Comprehensive Status Assessment, *Western Indian Ocean J. Mar. Sci.* Vol. 7, No. 2, pp. 119–136, 2008