Received: 7 October, 2011
IOTC-2011-WPTT13-49

Thai Tuna Fisheries in the Indian Ocean during 2007 - 2010

Pirochana Saikliang, Wilailux Premkit and Phithak Chaidee

Deep Sea Fishery Technology Research and Development Institute,
Marine Fisheries Research and Development Bureau, Department of Fisheries.

Paknam, Samut Prakarn 10270, Thailand

Summary

There are two types of Thai tuna fishing gears namel, tuna longliner and tuna purse seine, which operated in the Indian Ocean during 2007 - 2010. Data collection from their logbooks displayed important information of catch, fishing operation and effort. During 2007 - 2010, 1,904 days fishing operation were recorded. Thai tuna longliners that composed of 3 tuna longliners in 2007 and 2 tuna longliners during 2008 - 2010. Their main fishing ground was located in the southern part of the Indian Ocean (around the east and south coast of Madagascar). The total catch was highest in 2010 for 607.69 tonnes followed by 461.64, 295.23 and 265.53 tonnes in 2007, 2009 and 2008 respectively. The highest CPUEs was found in 2010 (13.62 fishes/1,000 hooks) followed by years 2007, 2008 and 2009 (10.20, 5.88 and 5.16 fishes/1,000 hooks, respectively). During 2007 - 2009, yellowfin tuna was caught with the highest proportion or catch composition (32.80 %) followed by bigeye tuna, albacore, swordfish, other fishes and sharks. In 2010 albacore was caught with the highest proportion or catch composition (63.5%).

Tuna purse seine fishery operated by four Thai purse seiners, 952 fishing operations was conducted in the Indian Ocean during 2007 - 2010. Fishing ground was mainly in the western Indian Ocean. Tuna purse seine fishery can be operated throughout the year in both the eastern and western parts of the Indian Ocean with the peak from February - May and September - October. Total catch was 28,688.50 tonnes. It was found that skipjack tuna comprised the highest proportion (64.94%) followed by bigeye tuna (18.83%), yellowfin tuna (13.78%) and bonito (2.44%). The average size of skipjack, yellowfin and bigeye tuna were 50.34±9.87, 63.32±23.09 and 63.24±16.94 cm., respectively.

Introduction

Thailand is one of the world leading country in producing marine resource canning products mainly for export and domestic consumption as well. Among those canning products, tuna is considers to be the most important products. But the raw materials used for canning industries are mostly imported from various contries in the world. Therfor, Thai government had established the policy to develop tuna fisheries and it had been already put into the marine fisheries policy of the countries since 1983. Tuna fisheries developments of Thailand at the first step were focused on neritic tunas exploited in the Thai EEZ. Later on the oceanic tuna fisheries development have been put into action since the early 2000s up to the prsent.

Fishing grounds for tuna longlines fishery

The study on Thai tuna longline fisheries in the Indian Ocean was based on data collection from logbooks of tuna longline vessels which included information of fishing operation. Three Thai tuna longliner vessels operated in the Western Indian Ocean in 2007,

while in 2008 - 2010 only two Thai tuna longliner vessels remained on fishing there. The main fishing grounds were east coast and south of Madagascar as well as southern part of the western Indian Ocean (Figure 1).

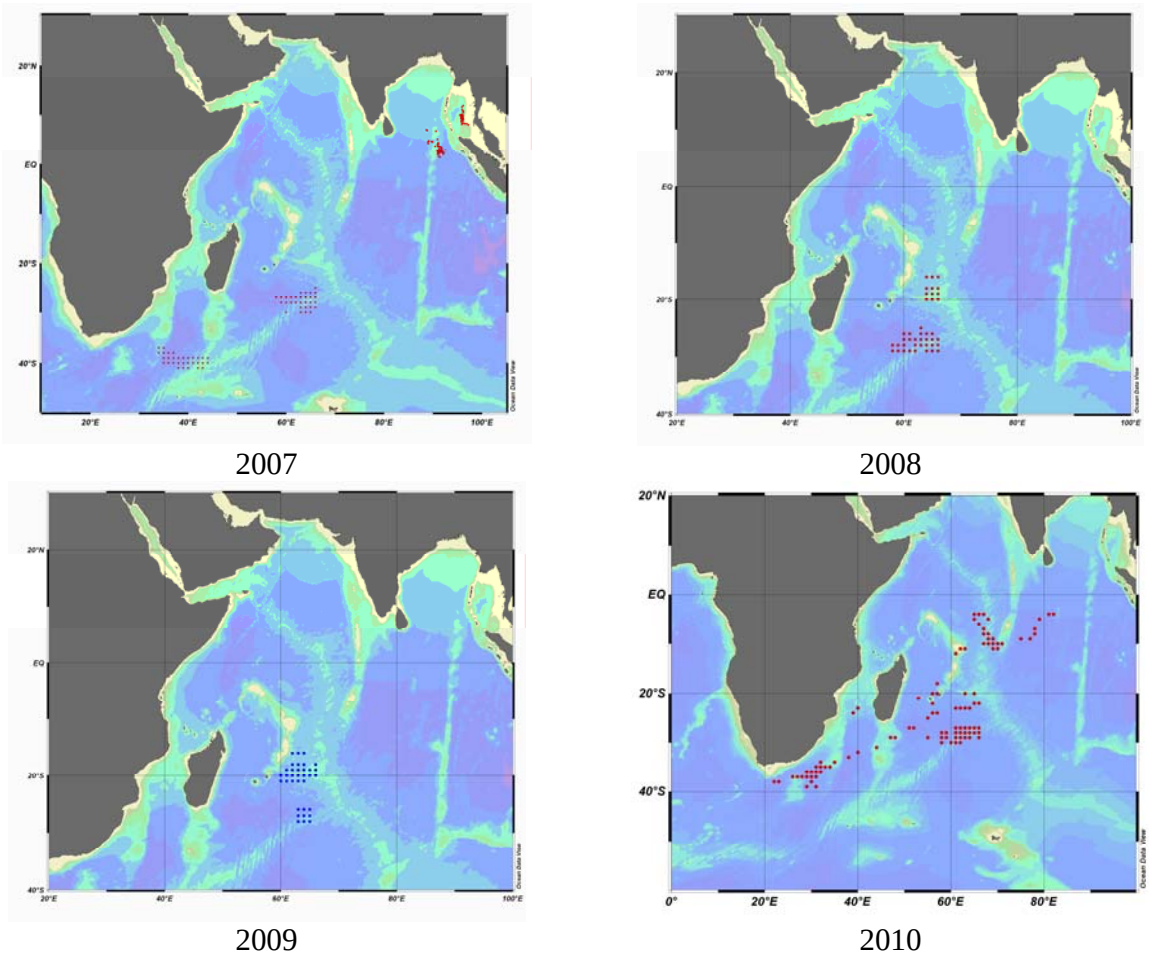


Figure 1 Fishing ground by Thai tuna longliners operated in Indian Ocean during 2007 - 2010

Fishing efforts, catches, percentage compositions and CPUEs between 2007 - 2010

Fishing efforts of tuna longlines operated during 2007 - 2010 are shown in table 1. In 2007, Thai tuna longliners exerted the highest fishing effort 1,503,600 hooks (537 fishing days). On the other hand, fishing efforts in 2010 were decreased to 1,324,400 hooks (473 fishing days).

Annual catches in 2007 - 2010 were estimated to 461.64, 269.53, 295.23 and 607.69 tonnes, respectively. The major species caught during the past 4 years were albacore (*Thunnas alalunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). Their catches in 2007 were 115.07, 138.61, 111.18 and 8.23 tonnes, respectively. Those species yield lower catches during 2008-2009 but they were increased in 2010, especially, the catches of albacore and bigeye tuna were highest in 2010 (263.41 and 170.10 tonnes, respectively). The CPUEs of Thai tuna longliners in 2007 - 2010 ranged between 5.16 and 13.62 fishes/1,000 hooks, with an average CPUE of 8.84 fishes/1,000 hooks. In 2007, the CPUE was

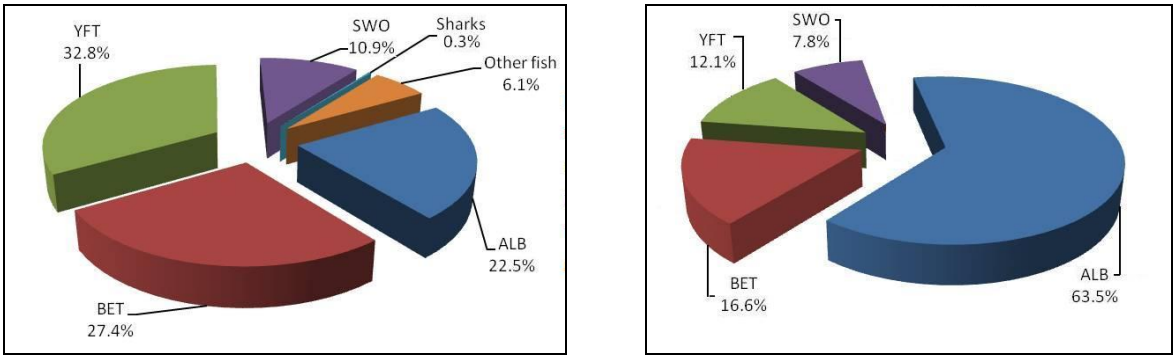
10.20 fishes/1,000 hooks, and the lowest CPUE was 5.16 fishes/1,000 hooks in 2009. Nevertheless, the CPUE was highest at 13.62 fishes/1,000 hooks in 2010 (Table 1).

Table 1 Fishing efforts, catches and CPUEs of Thai tuna longliners operated in the Indian Ocean during 2007-2010

Year	Fishing days	No. of Hooks	Total No. of fish	Catches weight (tonnes)							CPUE/fish (1,000 hooks)
				ALB	BET	YFT	SWO	Sharks	Others	Total	
2007	537	1,503,600	15,334	115.07	138.61	111.18	8.23	0.71	87.84	461.64	10.20
2008	417	1,167,600	6,863	22.84	69.74	89.76	59.35	--	27.84	269.53	5.88
2009	477	1,335,600	6,897	23.57	152.07	64.96	54.63	--	--	295.23	5.16
2010	473	1,324,400	18,044	263.41	170.10	93.60	80.58	--	--	607.69	13.62
Total	1,904	5,331,200	47,138	424.89	530.52	359.50	202.79	0.71	115.68	1,634.09	8.84

Remarks : ALB = Albacore BET = Bigeye tuna YET = Yellowfin tuna
SWO = Swordfish Others = Other species

During 2007 - 2009, the average percentage composition by number of albacore, bigeye tuna, yellowfin tuna, swordfish and others were 22.5, 27.4, 32.8, 10.9, 0.3 and 6.1 respectively. In contrast, in 2010 the percentage of catch composition of albacore, bigeye tuna, yellowfin tuna, and swordfish were 63.5, 16.6, 12.1 and 7.8 respectively. However, sharks and others were not reported by Thai tuna longliners in 2009 - 2010 (Figure 2).



Average catches composition during 2007-2009 Catches composition in 2010

Figure 2 Catch compositions by Thai tuna long-liners operated in Indian Ocean during 2007 - 2010

Fishing grounds for tuna purse seine fishery

The number of Thai tuna purse seine vessel has been decreased from 7 to remain five vessels since January to June 2007, while the catches were derived from only four fishing vessels. The fishing operation revealed that West Indian Ocean was the main of fishing ground during 2007 - 2009 before moving to east Indian Ocean in 2010 (Figure 3).

Result from Thai tuna purse seine fishing vessel monitoring found that there was abundant fishing grounds in western Indian Ocean in 2007-2009 (Figure 3), particularly in off shore of Somalia was the most important fishing ground and follows by the south west of Seychelles. After that, it was moved to eastern part of Indian Ocean in 2010 caught by Thai fishing.

During 2007 – 2010, the yield of tuna caught by Thai purse seine fishing vessel in the Indian Ocean was increased from 6,337.0 tonnes in 2007 to 9,466.5 tonnes in 2008 and slightly deceased to 9,273.0 tonnes in the following year. In 2010 Thai tuna purse seines fishing vessels were operated in Indian Ocean only 6 months with total catch of 3,612.0 tonnes before moving to other areas.

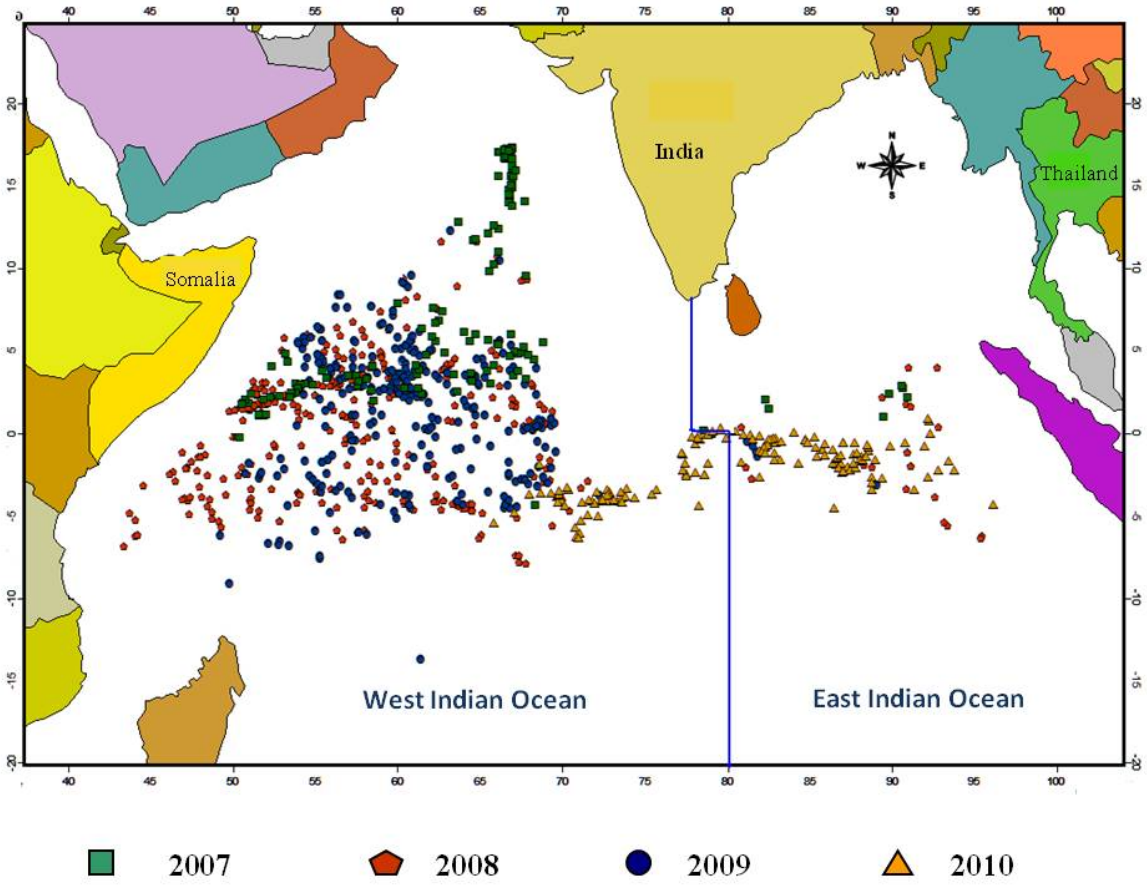


Figure 3 Fishing ground of Thai tuna purse seine operated in Indian Ocean during 2007- 2010

Fishing efforts, catches, percentage compositions and CPUEs between 2007 - 2010

It is observed that the fishing effort of Thai tuna purse seine was irregular all year round. However, the analysis on the fishing effort of this fishing gear showed that intensive fishing occurred in February - May and September-October. Fishing effort was slightly increased from February to the end of April or May. After that the fishing effort was dramatically decreased and then it kept increasing in August or September of every year. For the yield and catch rate, they are always variable. However it may conclude that the high catch rate hit the peak on March-May and August-September which are similar trend with the yield (Figure 4).

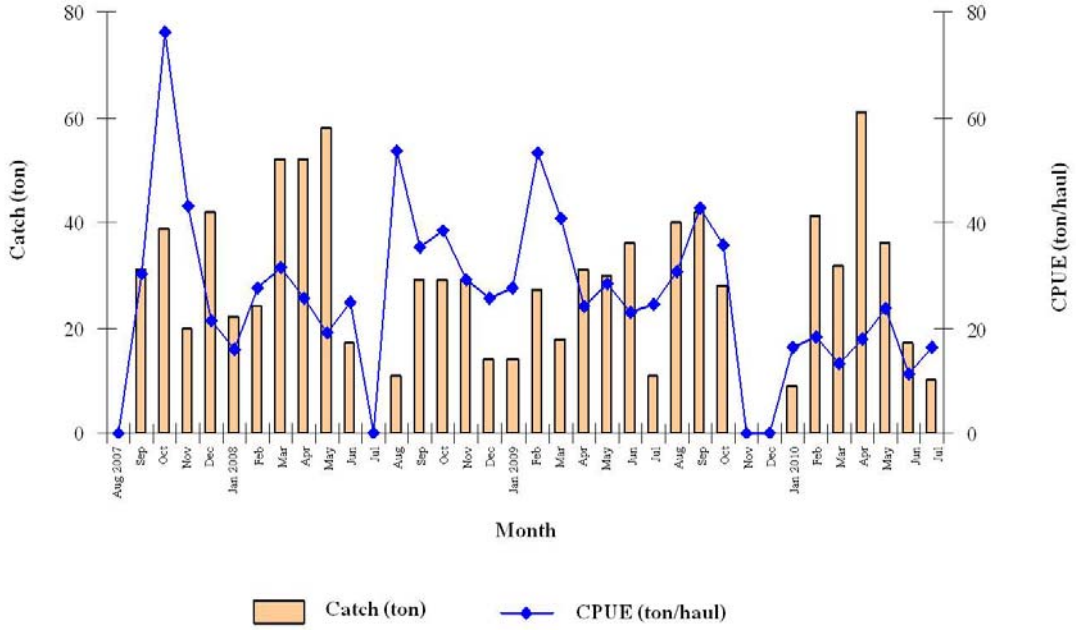


Figure 4 Fishing effort (No. of hauling) and average catches (CPUE-tonnes/haul) of tuna by tuna purse seine in Indian ocean during 2007 - 2010

Taking into consideration on the yield of 3 species of tunas (skipjack, yellowfin and bigeye tuna) in 2007 - 2010, it found that skipjack was a majority catch which had a higher proportion than other 2 species in the same fishing ground. The comparison on catch in each month indicated that the high catch found in August - November while the low catch were obtained from December - January and June - July (Figure 5).

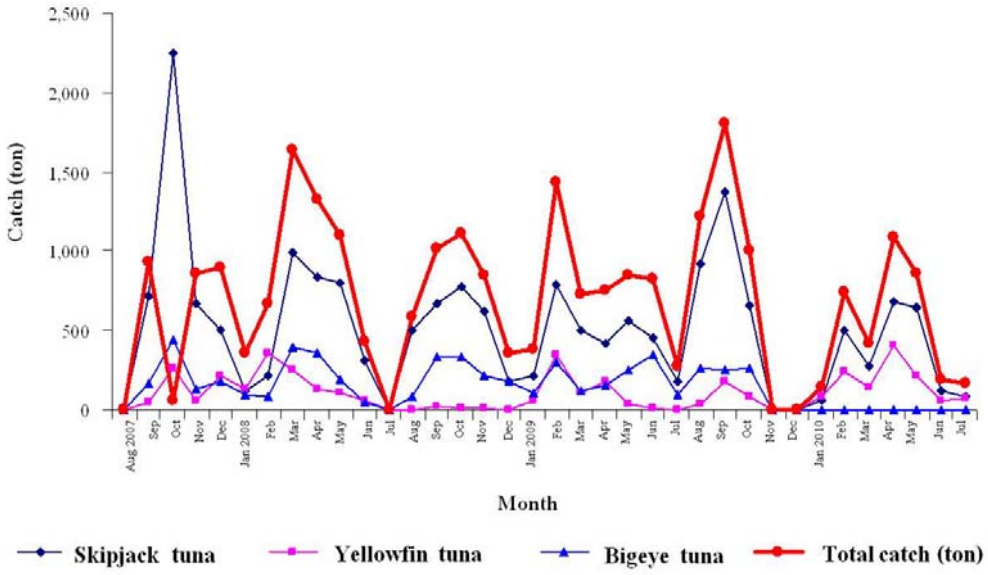


Figure 5 Monthly catch of tuna caught by Thai tuna purse seine operated in Indian Ocean during 2007 - 2010

The catch composition of Thai tuna purse seines showed that the proportion of skipjack tuna was highest in total catch (64.94%) and follow by bigeye tuna and yellowfin tuna (18.83% and 13.78%) respectively. The remain was bonito.

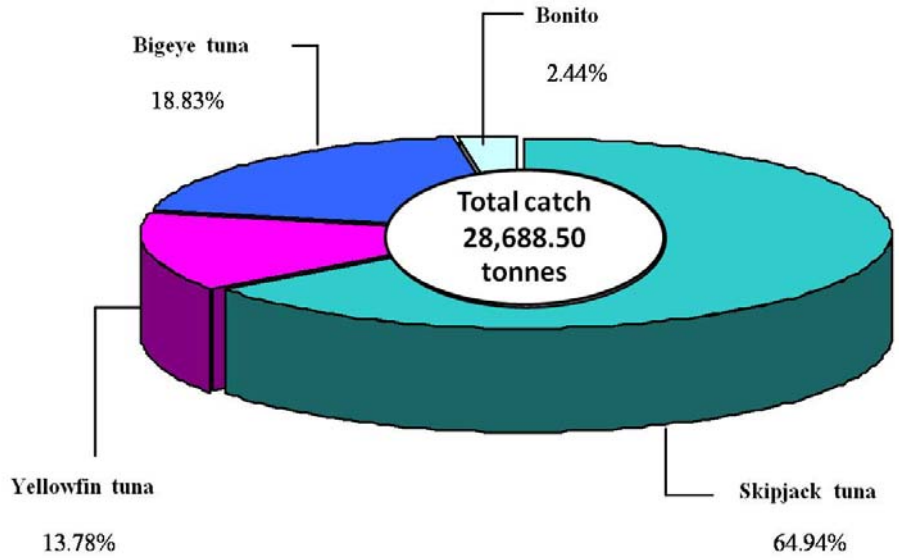


Figure 6 Catch composition (%) caught by Thai tuna purse seine operated in Indian Ocean during 2007 - 2010

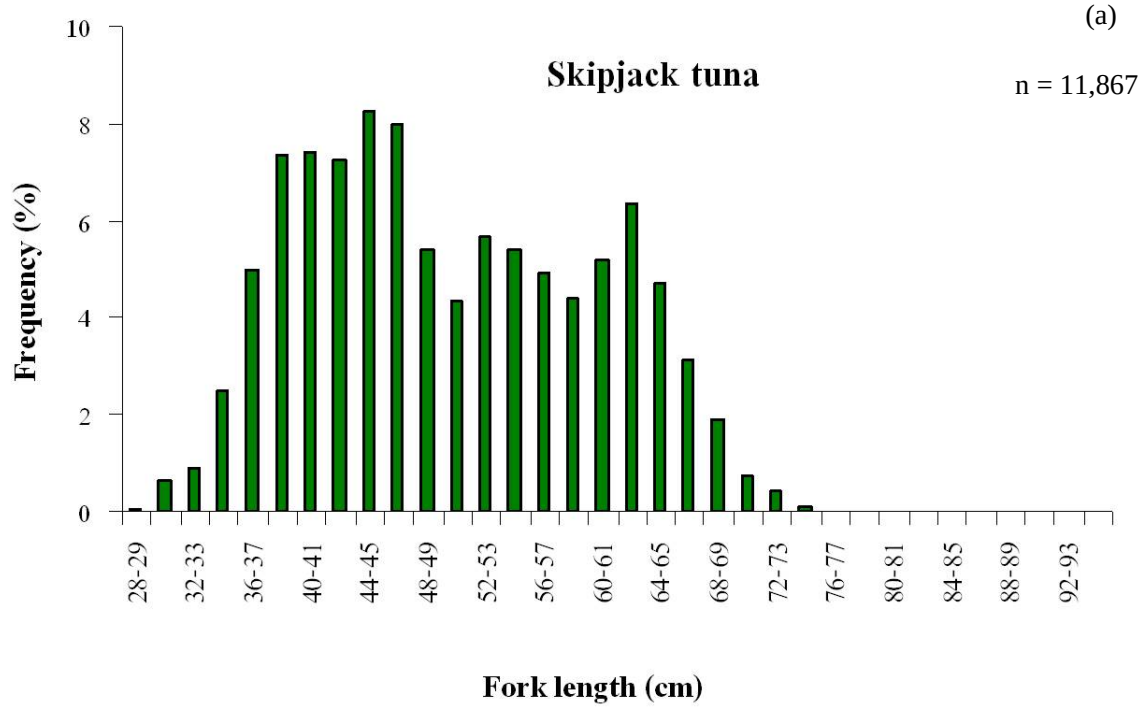
Size distribution of tuna

11,867 skipjack tuna have been sampled for length composition studies, it was found that the mid-range of folk length between 29.00 - 89.10 cm. with average length 50.34±9.87 cm. It is noticed from this data that it was categorized in 2 modal grounds. The first group was length between 29.00 - 50.00 cm. while the second was between 50.00 - 89.00 cm. At the length range between 44.00 - 45.00 cm. that the high mode was found in this fish group, it comprised 8.28% (Figure 7a).

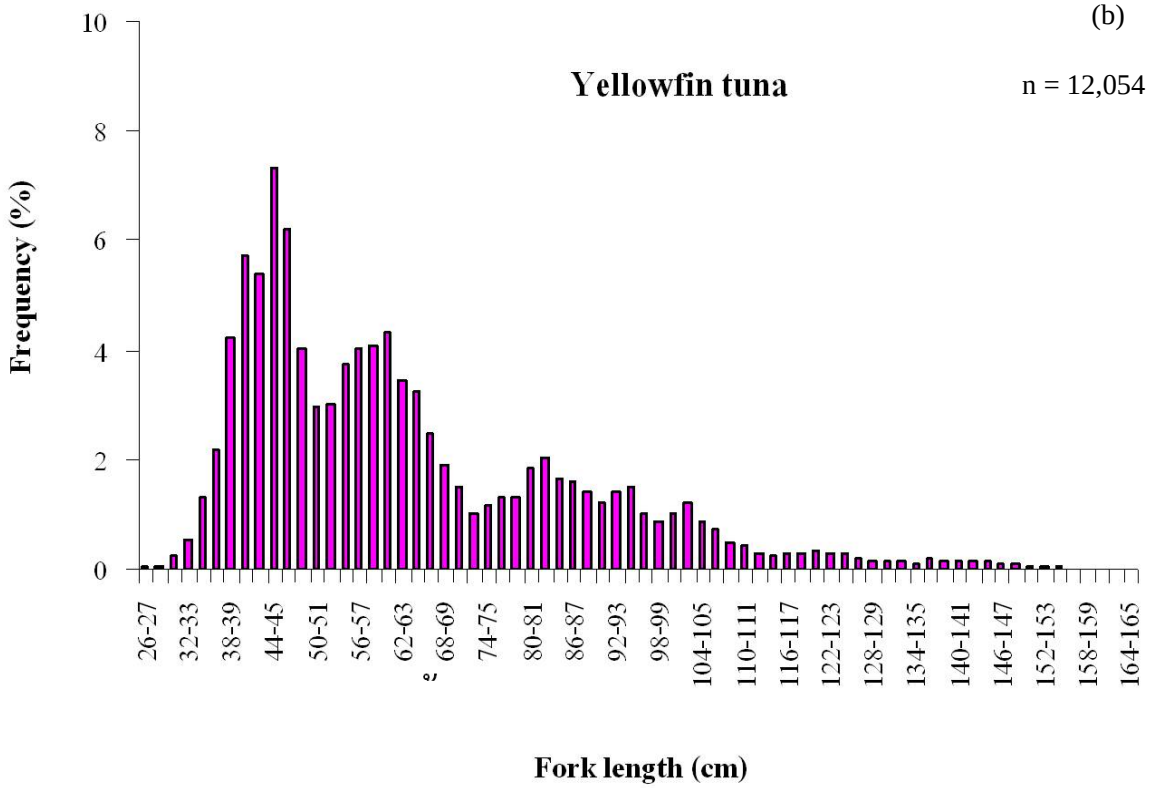
The sampling on 12,054 yellowfin tuna have been found that the mid-range of folk length between 27.00 - 160.00 cm. with 63.32±23.09 cm. are on average length. It was categorized into 3 groups. The first group was mostly found at the length between 27.00 - 70.00 cm., followed by the length between 70.00 - 115.00 cm. and 115.00-160.00 cm. respectively. At the range between 44.00 - 45.00 cm., this fish size comprised 7.35% of yellow tuna caught at that time (Figure 7b).

The sampling on 8,490 bigeye tuna found that mid-range of folk length between 29.50 - 157.00 cm. with 63.24±16.94 cm are on average length. It was categorized in 4 groups. The first group was mostly found at length between 29.50 - 75.00 cm., followed by the length between 75.00 - 95.00 cm., 95.00-105.00 cm., and 105.00 - 157.00 cm respectively. At the range between 56.00 - 57.00 cm., this fish size comprise 6.01% of total catch of bigeye tuna (Figure 7c).

(a)


Skipjack tuna
n = 11,867
Frequency (%)
0
2
4
6
8
10
28-29
32-33
36-37
40-41
44-45
48-49
52-53
56-57
60-61
64-65
68-69
72-73
76-77
80-81
84-85
88-89
92-93
Fork length (cm)

(b)


Yellowfin tuna
n = 12,054
Frequency (%)
0
2
4
6
8
10
26-27
32-33
38-39
44-45
50-51
56-57
62-63
68-69
74-75
80-81
86-87
92-93
98-99
104-105
110-111
116-117
122-123
128-129
134-135
140-141
146-147
152-153
158-159
164-165
Fork length (cm)

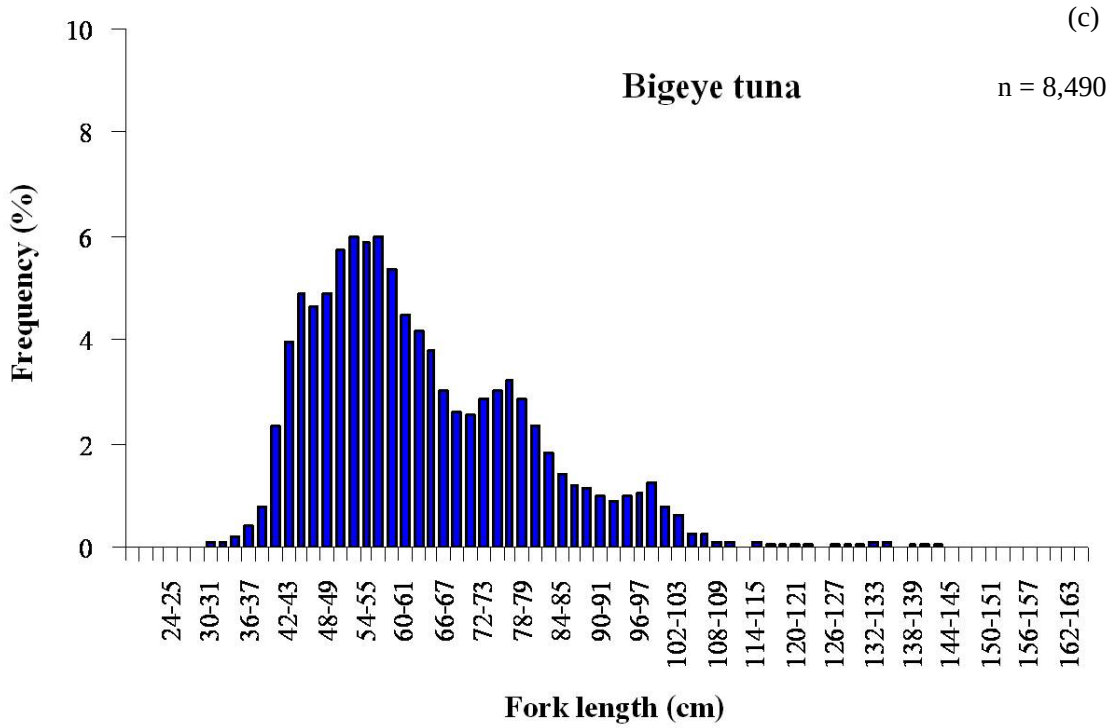


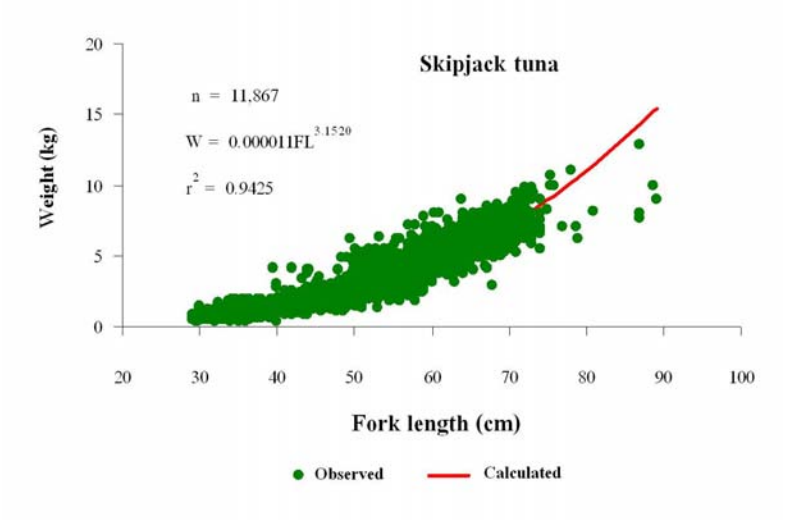
Figure 7 Length frequency distribution of Skipjack tuna (a) Yellowfin tuna (b) and Bigeye tuna (c) caught by Thai tuna purse seine in Indian Ocean during 2007 - 2010

Legth-wieght relationship

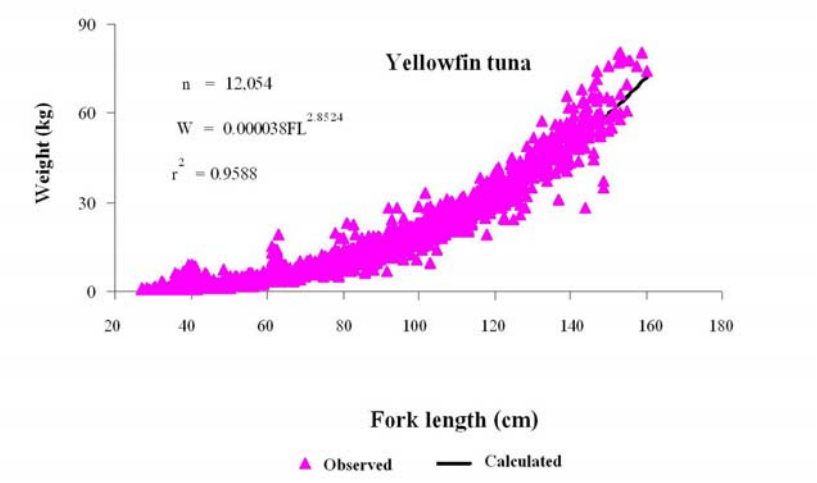
The relationship analysis between folk length and body weight of skipjack, yellowfin , and bigeye tuna were analysed and they are shown in table 2 and figure 8.

Table 2 Length-weight relationship of tuna caught by purse seine in Indian Ocean during 2007 - 2010

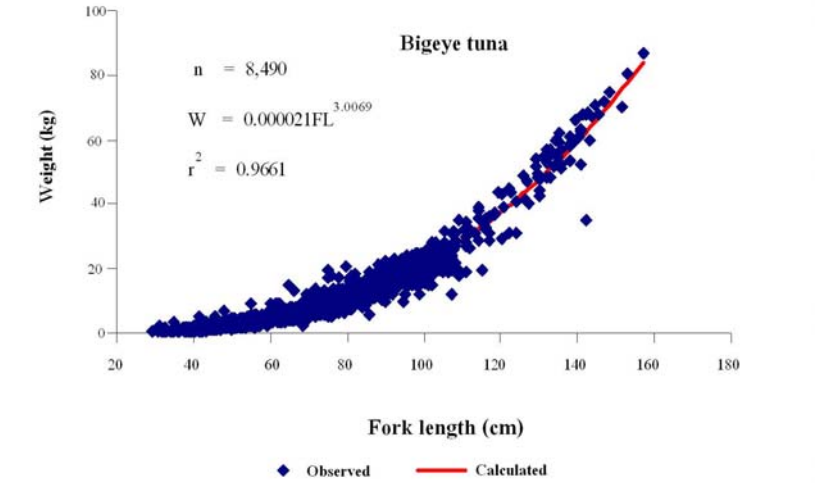
Items	**Skipjack tuna**	**Yellowfin tuna**	**Bigeye tuna**
Number of fish	11,867	12,054	8,490
Folk length (cm.)	29.00-89.10	27.00-160.00	29.50-157.00
Body weight (kg.)	0.40-12.80	0.40-80.50	0.40-86.50
Length-weight relationship	$W = 0.000011FL^{3.1520}$	$W = 0.000038FL^{2.8524}$	$W = 0.000021FL^{3.0069}$
r^2	0.9425	0.9588	0.9661



(a)



(b)



(c)

Figure 8 Length-weight relationship of Skipjack tuna (a) Yellowfin tuna (b) and Bigeye tuna (c) in Indian Ocean during 2007 – 2010