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Analysis of catch of neritic tuna and sharksinMalacca Strait, west coast of Malaysia Peninsula.

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Abstract

Tuna fisheries are getting increasing important for future deep-sea fisheries contributions in the fisheries sector in Malaysia. Apart from oceanic tuna from the Indian Ocean, neritic tuna species are among the important pelagic fish caught by commercial and traditional fishing gears. The main neritic tuna found in Malaysian waters were longtail (*Thunnus tonggol*) and kawakawa (*Euthynnus affinis*) and a frigate (*Auxis thazard*). They were caught by commercial fishing gears, trawl nets and purse seines and several other traditional fishing gear. The Strait of Malacca in the west coast of Peninsular Malaysia is the only Malaysian continental shelf that fall under IOTC areas of competent. About 45% of the neritic catch in Malaysia were from the Malacca Strait (west coast of Peninsular Malaysia) and 28% from the east coast of Peninsular Malaysia. Neritic tuna, Spanish mackerel and sharks constituted about 0.36%, 0.34% and 0.15% of the catch by trawl nets in Malacca Strait and in purse seines, neritic tuna represented 9% of the catch. Annual catch of neritic tuna in the Malacca Strait showed increasing trends but the opposite trends occured in the South China Sea. From catch of purse seines in the Malacca Strait, the vessels of size 25 – 39.9 GRT and 40 - 69.9 GRT constributed 21% and 76% respectively to the catch. There are between 48 and 56 species of sharks that inhibit in Malaysian waters. They constituted 0.62% of the marine catch in Malaysia and 0.2% in the Malacca Strait. The widely distributed sharks in the Malaysian marine waters include spot-tail shark (*Carcharhinus sorrah*), blackspot shark (*Carcharhinus sealei*), Milk shark (*Rhizoprionodon acutus*), Scalloped hammered shark (*Sphryna lewini*) and Sicklefin weasel shark (*Hemigaleus mirostoma*). Most of the catch were from trawl nets.

Key words: Neritic tuna, shark, Malacca Strait.

INTRODUCTION

The marine capture fisheries which made up of inshore and deep-sea fisheries production contributed about 75% of the total national fish production. In 2010, the total marine landing was 1,212,270 tonnes declined by 13% from 2009 which amounted 1,393,226 tonnes. The coastal fisheries contributed more than 78% of the total marine fish landings and the rest from the deep-sea fisheries. Under the 3rd National Agriculture Policy, the government of Malaysia identify the deep-sea fisheries as a potential source of national income under fisheries sector through the development of fisheries industries. Tuna fisheries include oceanic tuna and neritic tuna fisheries. For oceanic tuna fisheries, Malaysia as a member of IOTC, since 2003 is beginning to develop its fisheries industries by fishing in the Indian Ocean. For neritic tuna, its fisheries started as early 1987 by the introduction of tuna purse seines in Malaysia. Catch of neritic tuna help in the development of fish processing industries in Malaysia. The present amount of catch of the neritic tuna still below the market demands for fish processing industries. By encouraging the offshore fishing, the catch of pelagic fish particularly neritic tuna will result in a significant increase not only to meet the current market demand, also expending the present fish processing industries.

Fishing areas in Malaysian waters

Marine fishing areas in Malaysia can be classified into several fishing sub-areas, west and east coast of Peninsular Malaysia, Sarawak and Sabah fishing waters. In the west coast of Peninsular Malaysia is the Malacca Strait while in the east coast is the South China Sea. In Sarawak, its fishing areas is the South China Sea. For Sabah, the South China Sea covers the western and northern side of the state, while northwest and southeast of Sabah are facing Sulu Sea and Sulawesi (Celebes) Sea respectively (**Figure 1**). Malacca Strait which is under the IOTC areas of competent, its shoreline include extending to 5 west coast states; Perlis, Kedah, Penang, Perak and Selangor. Except Penang, other states, their fisheries are only confine to the neritic tuna, fishing in the continental shelf within the Malaysian EEZ in the Malacca Strait. For Penang, the the catch of oceanic tuna were from the vessels fishings in the Indian Ocean.

Figure 1: Fishing areas in Malaysian waters

Neritic tuna Fisheries

Fishings for neritic tuna are mostly confined to the continental shelf on the west coast (Malacca Strait) and the east coast (South China Sea) of Peninsular Malaysia. Major gears used to catch tuna vary between the different parts of Malaysia. Purse seine and trawl nets are quite common in the west Malacca Strait while in the east, purse seine and troll-lines are the major fishing gears operating up to offshore areas (the EEZ boundary of 200 nm). In Sarawak waters, the use of gill nets is quite dominant. For purse seine, there are two types of fishing, searching a wild school and using FAD. Currently, most of the purse seiners use FAD to catch neritic tuna as they are efficient and cost effective.

During early 1980, small tuna was not a target species. They normally obtained as by-catch from gill nets and purse seines. Only in 1987, when tuna purse seines were first introduced, thus boosting the tuna landings. Gradually after operating by searching a wild tuna school, the purse seiners started to use spotlights to aggregate fish (Chee, 1996). There was a tagging experiments on neritic tuna carried out in the South china Sea. The results showed that 50% of the recaptured tuna came from the purse seine operators (Raja Bidin, 1990).

Trends of annual landings

In general, landingsof neritic tuna showedan increasing trends from 1994 to 2002. From the catch at 25,821 tonnes 1994 it increased to 64,659 tonnes in 2002 before it drastically decreased to 41,400 tonnes in 2003 and maintained the amount untill 2005. The catch gradually increased again to 63,391 tonnes in 2008 before it declined to 48,529 tonnes in 2009(**Figure 2**). While the landings in the Malacca Strait showed a steady increasing trends with small fluctuations, the opposite

occured in the east coast of Peninsular Malaysia (South China Sea). The catch in the Malacca Strait indreased from 4,625 tonnes in 1990 to 20,147 tonnes in 2010. In the South china Sea, the catch increased steeply from 8,007 tonnes in 1996 to 34,648 tonnes in 2000 and declined 13,800 tonnes in 2004 and end up to 19,919 tonnes in 2010 (**Figure 3**). .

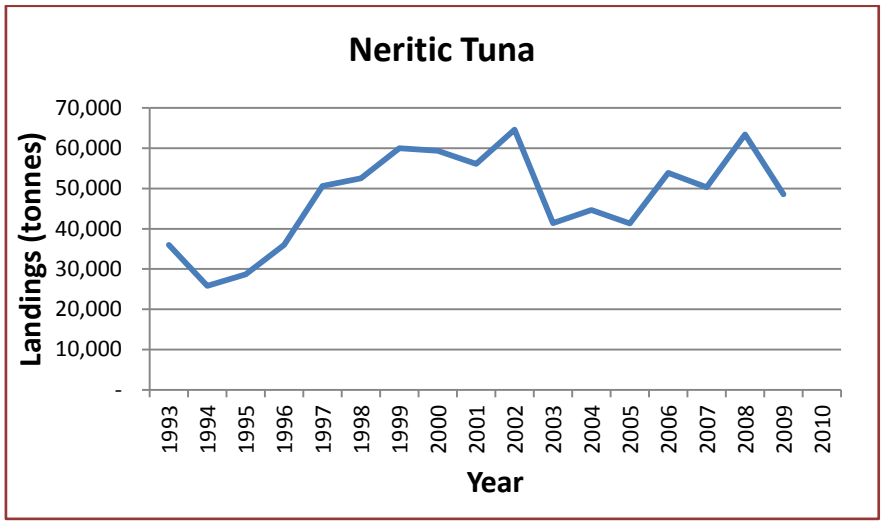

Figure 2: Annual landings of neritic tuna in Malaysia 1993-2009.

Out of total catch in Malaysia, neritic tuna estimately constributed 4.1% of the catch and at the same time Spanish mackerel and sharks constributed about 1.1% and 0.68% respectively. The strait of Malacca is the major contributor to the neritic tuna landings in Malaysia where it constributed 45% of the total neritic tuna catch and second by the South China Sea at 28%.

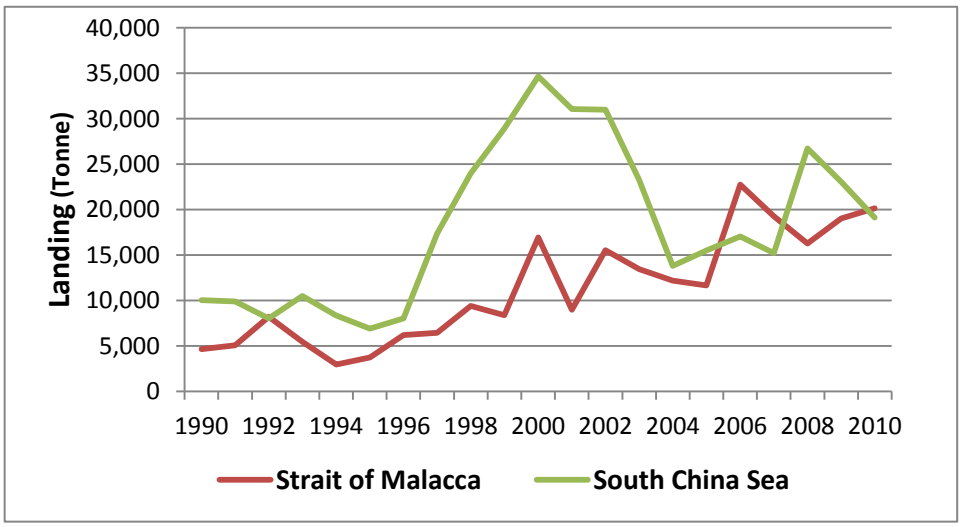

Figure3: Landing trends of neritic tuna in Malaysia and in the Strait of Malacca.

Catch composition of commercial gears

A total of 76 species of commercial values were found in the Strait of Malacca. They are caught by various fishing gears both commercial and traditional. Trawl nets, one out of two commercial gears, initially targeted the demersal fish but lately, using a modified technique known as high opening trawl nets, they managed to catch both a large portion of demersal fish and a small percentage of pelagic fish. **Figure 4** shows some major species commonly caught by the trawl nets. On average, the trawl net contributed about 70% of the total marine catch in the Malacca Strait.

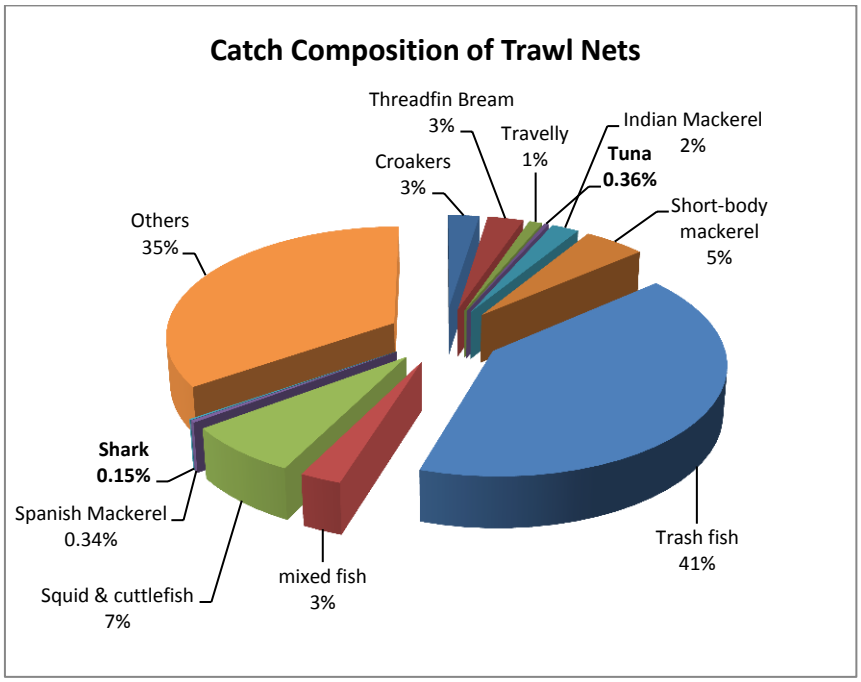

Figure 4: Catch composition in percentage of trawl nets in the Strait of Malacca

High value fish made up only 59% of the catch from the trawl nets while about 41% are undersize fish with low value previously known as trash to which since long time ago widely used as feed meal in marine cage culture industries. On average, the trawl nets catch neritic tuna, spanish mackerel and sharks in percentage of 0.36%, 0.34% and 0.15% respectively.

For purse seines, another type of commercial fishing gears, the target fish were from the pelagic species. The gears constribute 30% of the total catch in the Strait of Malacca. The main target species were short-body mackerel (*Rastrelliger brachysoma – 29%*) sound scad (*Decapterus spp*. – 22%), neritic tuna (9%) and Indian mackerel (*Ratrelliger kanagurta- 7%*). **Figure 5** shows the catch composition by the purse seines in the Strait of Malacca.

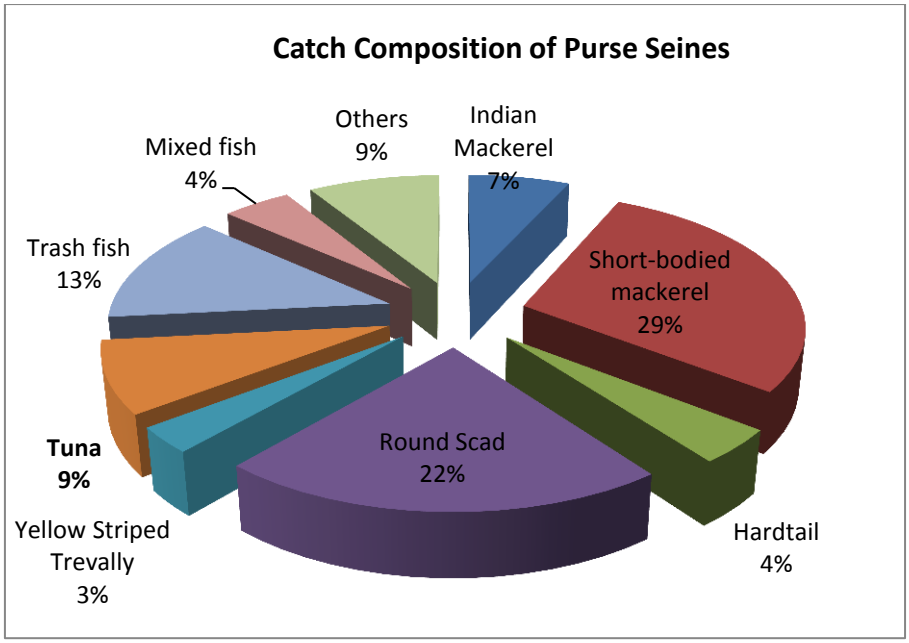

Figure 5: Catch composition in percentage of purse seines in the Strait of Malacca

Tuna Catch by sub-areas.

Fishing in Malaysia are divided into 5 major sub-areas. The west coast and east coast are referred to western and eastern sides of Peninsular Malaysia. In the western side of Peninsular Malaysia is the Malacca Strait while in the eastern is the South China Sea. For Sarawak and the Federal Territory of Labuan, the fishing areas are in the South China Seawhile for Sabah it consists of the South China Sea in the western and northern side, Sulu Sea on the northeastern and Sulawesi Sea (Celebes sea) In the southeastern.

Table 1 shows the catch of tuna and tuna-like species in 5 sub-areas in Malaysia waters. For oceanic tuna and tuna-like species, landings in the west coast were from the vessels fishing in the Indian Ocean. The catch of longtail were higher in the west coast, but for kawakawa they were more abundance in the east coast of Peninsular Malaysia. In Sabah, oceanic tuna such as yellowfin, bigeye and skipjack were caught in the Sulawesi Sea. They were caught by tradition hook and lines fishing gears. Frigate (*Thunnus thazard*) and bullet tuna (*Thunnus rochei)* were found to be relatively abundance in the Sulawesi Sea than other fishing sub-areas. The eastern part of Sabah waters is known of having high biodiversity of marine species as the areas are featured with corals islands, continental shelf, sloping and deep water areas.

Table1: Catch by fishing sub-areas in Malaysia (Annual Fisheries Statistic, 2009).

Species	Malaysia	West Coast	East Coast	Sabah	Sarawak	Labuan
Longtail	27,569	13,764	7,262	3,778	2,558	208
Kawakawa	19,123	5,160	11,254	1,932	647	130
Frigate	1,837	83	248	1,238	225	44
Skipjack	4,460*	-	3	3,624	834	-
Oceanic tuna	3,488*	2,282	5	1,201	-	-
Sailfish	511*	99	135	168	-	107
Swordfish	122*	112	7	-	30	-
Spanish mackerels	12,633	4,178	2,543	2,797	2,484	632
Tuna landings by sub-areas	**69,743**	**25,678**	**21,457**	**14,738**	**6,778**	**1,121**
Total landing by sub-areas	**1,393,226**	**729,558**	**336,512**	**172,584**	**125,136**	**29,136**

- Species from the Indian Ocean.

Neritic Tuna

Common neritic tuna species found in Malaysia waters consist of longtail (*Thunnus tonggol*), kawakawa (*Euthynnus affinis*) and frigate (*Thunnus thazard*). Bullet tuna (*Thunnus rochei*) are also caught by in a small number, and the highest landings of bullet tuna were in the eastern Sabah from the Sulawesi Sea. From 2000 to 2009, landing of neritic tuna fluctuated without a clear trends. The highest catch in Malaysia was 64,659 tonnes in 2002 before it declined to the lowest at 41,320 tonnes in 2005. The catch than increased again from 53,871 tonnes in 2006 to 63,391 tonnes in 2008 before it steeply decreased to 48,529 tonnes in 2009 **(Figure 6).** In the Malacca Strait, the catch seemed to gradually increase from 8,978 tonnes in 2001 to 19,007 tonnes in 2009. The landing trends in the east coast on Peninsular Malaysia looked parallel with the trends of landings in Malaysia.

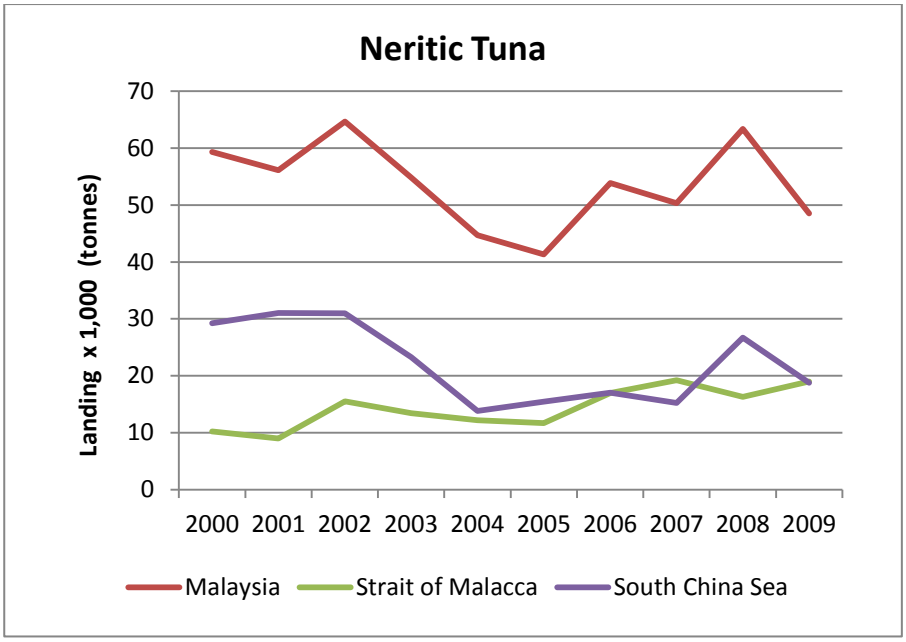

Figure 6: Annual landing trends of neritic tuna in Malacca Strait and South China Sea fro 2000-2009.

Generally, neritic tuna were caught mainly by trawl nets, purse seines, drift/gill nets and hook & lines. Purse seines are the main fishing gears that catch neritic followed by trawl nets and for drift/gill nets and hook & lines they are widely used in the east coast of Peninsular Malaysia compared to other sub-areas. For hook & lines, in the east coast of Peninsular Malaysia, such gears using trolling technique. The trolling are carried out around FADs or floating objects and sometimes looking the fishermen are searching for wild schools.

Table 2: Tuna catch by fishing gears in Malacca Strait and South China Sea. (Annual Fisheries Statistic 2009).

	Species	Trawl nets	Purse seines	Drift/gill nets	Hook & lines	Total catch	%
Malaysia	LOT	832	22,079	3,413	893	27,569	55.67
	KAW	172	16,539	1,047	1,347	19,123	43.46
	FRI	27	1.423	209	21	1,837	0.87
Malacca Strait	LOT	662	12,987	151	4	13,764	72.42
	KAW	33	5,122	5		5,160	27.15
	FRI	9	73			83	0.44
South China Sea	LOT	32	6,570	1	659	7,262	38.21
	KAW	84	9,547	476	1,130	11,254	59.21
	FRI		221	22	5	248	1.30

Table 2: shows the catch by different gears by species.

Catch of neritic tuna by all gears were dominated by longtail followed by kawakawa. The same pattern of composition was observed in Malacca Strait. In the South China Sea, kawakawa was dominant than longtail. Frigate tuna constituted only small percentage of the neritic tuna catch in all areas.

Catch by vessels size.

For purse seines, most of the catch of the neritic tuna were from the vessels of size above 25 GRT. **Figure 3a** shows that purse seine vessels from category 40 – 69.9 GRT and >70 GRT contributed 93% of the neritic tuna and 94% of marine fish landings. The highest catch of neritic tuna and other fish by the vessels 40 – 69.9 GRT and > 70 GRT were parallel to the number of registered vessels from these two categories. This reflected that the higher catch from these two categories of vessels were resulted from the increase in number of efforts. Bigger GRT vessels catch fish far from the coastal areas. For vessels from 40 – 69.9 GRT and > 70GRT, they are only allowed to operate beyond 12 nm and 30 nm from the shore. Thus, most the neritic tuna were caught toward the offshore areas, beyond 12 nm from the shore.

Table 3a: Catch of tuna and tuna-like species by purse seines of various size(GRT) in the Malacca Strait 2007-2009.

Year	Gross Registered Tonnes (GRT	0.9 - 9.9	10 - 24.9	25 - 39.9	40 - 69.9	> 70	Total landings
2009	No of Vessel	11	0	305	2,043	1,308	3,667
	LOT			933	6,635	5,420	12,987
	KAW				1,661	3,461	5,122
	FRI					73	73
	SHK				39		39
	COM			2	69	134	195
	Total fish landings	1438		10,235	83,059	73,841	168,574
2008	No of Vessel	43	89	232	1,819	1,211	3,394
	LOT	346	34	120	5,488	6,161	12,149
	KAW				751	1,805	2,557
	FRI						
	SHK						
	COM	2	1		71	109	183
	Total landings	1,347	1,565	9,122	79,263	77,391	168,687
2007	No of Vessel	12	9	290	1,706	1,104	3121
	LOT		1	55	5,550	8,689	14,294
	KAW			2	2	1,031	3,448
	FRI						
	SHK		1				1
	COM				164	37	201
	Total landings	1,321	86	10,542	7,201	81,129	165,086

Similar to purse seines, catch of neritic tuna by trawl nets were dominated by bigger vessels from categories 40 – 69.9 GRT and 25 – 39.9 GRT where their catch represented 76% and 21% respectively from total neritic tuna landings in Malacca Strait (Table 3b). Average number of registered vessels from 2007-2009 for categories 40 – 69.9 GRT and 20 – 39.9 GRT were 6,840 and 6,492 units respectively. The highest number of registered vessels were from category 10 – 24.9 GRT with 18.521 unit. However, the catch from category 10 – 24.9 GRT only represented 0.8% of total neritic tuna landings in the Malacca Strait. The landing patterns indicated that neritic tuna were caught in the areas beyond 12 nm from the.

Table 3b: Catch of tuna and tuna-like species by trawl nets of various size(GRT) in the Malacca Strait 2007 – 2009.

Year	Gross Registered Tonnes (GRT	0.9 - 9.9	10 - 24.9	25 - 39.9	40 - 69.9	> 70	Total
2009	No of Vessel	3307	16,363	7,934	7,236	1,377	36,217
	LOT		16	253	344	9	622
	KAW			1	26	6	33
	FRI			0	8	1	9
	SHK	5	132	408	614	57	1217
	COM	12	302	849	608	120	1891
	Total landings	4,725	82,491	132,788	127,203	32,120	379,326
2008	No of Vessel	5,561	19,199	5,680	6,237	1,209	37,886
	LOT			177	1,201	21	1,409
	KAW			2	12	3	16
	FRI						
	SHK	1	90	113	365	40	608
	COM	18	355	494	436	77	1,380
	Total landings	6,524	94,787	100,421	129,226	28,929	359,887
2007	No of Vessel	6,068	20,002	5,861	7,046	1,388	40,365
	LOT		33	59	1,145	48	1285
	KAW		2	3	21	12	37
	FRI						
	SHK	5	119	164	389	56	733
	COM	16	352	474	465	132	1,439
	Total landings	9,903	107,143	140,163	234,289	73,493	564,991

Monthly catch of longtail and kawakawa fluctuated constantly and show no sign of seasonal landings **(Figure 7**). They were caught throughout the year with no indication of apparent declining or increasing.

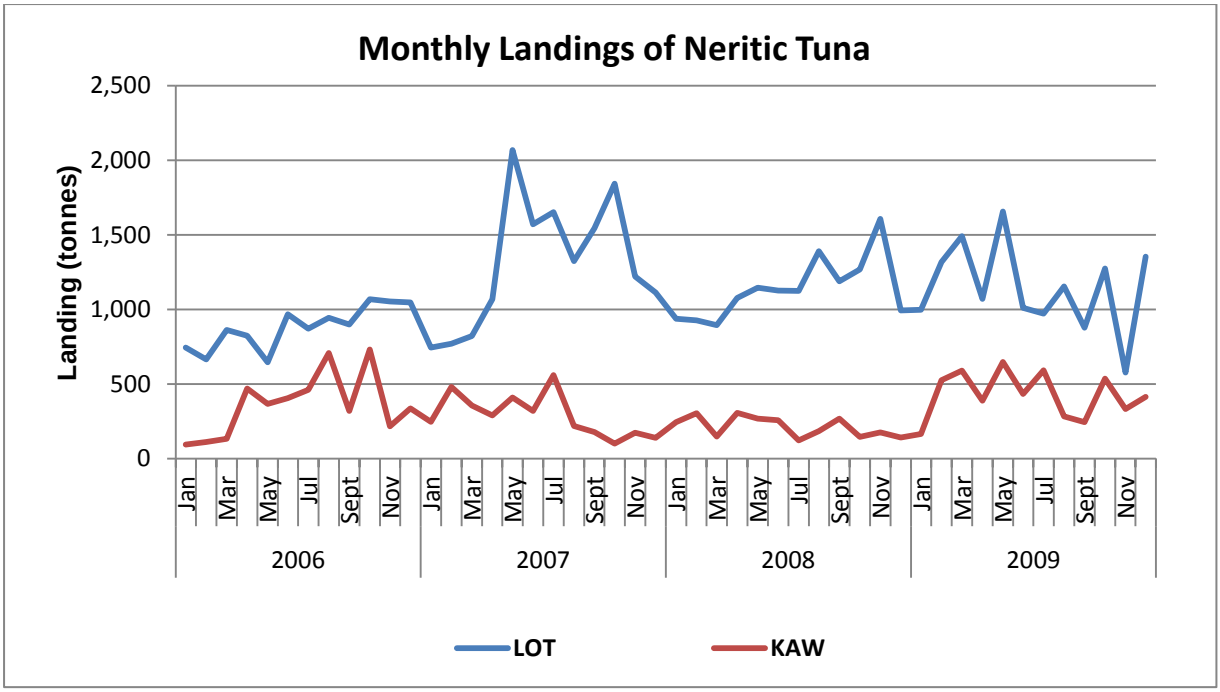

Figure 7: Monthly catch of Longtail and Kawakawa from the Malaccca Strait.

Sharks Species

The sharks landings that constitute a part of the demersal fishery occur throughout the Malaysia fisheries waters. They are not targeted by fishers but are caught together with other commercially important species. They are brought back as a whole to the port and sold at the reasonable price with the fins fetching a better price. A few studies and publication including taxonomic study of sharks are available in Malaysia. Cantor (1849) published a catalogue of Malaysian fishes in which it included 25 species of sharks and rays. Mohammed Shaari (1971) identified 6 species of sharks and rays from trawl surveys in Penang waters. For taxonomic study, Mohsin and Ambak (1996) provided taxonomic keys to 40 species of shark and rays from 19 families found in Malaysian waters. Ahmed et al. (1999) reported 48 species of sharks inhabiting the Malaysian fisheries waters. Recent study by Yano *et al.* (2005) stated that a total of 56 species of sharks were confirmed to inhabit in Malaysian waters. The study also indicates that only 7 species of sharks are widely distributed in Malaysia and almost all are of food fish.

The widely distributed sharks spcies include Spot-tail shark (*Carcharhinus sorrah*), Blackspot shark (*Carcharhinus sealei*), Milk shark (*Rhizoprionodon acutus*), Scalloped hammerhead shark (*Sphyrna lewini*) and Sicklefin weasel shark (*Hemigaleus mirostoma*). Based on landing data collected in 2003 and 2004, the most dominant species of sharks found in Malaysia waters are from family Hemisyllidae (longtailed carpet sharks) and Carcharhinidae (requiem sharks).

Landing Trends of Sharks

Sharks catch in Malaysia constitute only 0.62% of the total marine catch. In the Malacca Strait and South China, the average sharks catch represented only 0.2% and 0.58% of the total catch respectively. **Figure 8** shows the landing trends of shark in Malaysian and other sub-areas; From 2000 to 2005, landings of sharks in Malaysia almost constant at the range of 8,000 to 9,000 tonnes before it declined gradually from 9,165 tonnes in 2005 to 7,212 tonnes in 2009. Landings trends in Malacca Straits and South China were also constant around 1,000 and 2,000 tonnes respectively. There was a sudden increased in catch in the South China Sea during 2005 which effected the annual Malaysian catch of sharks in that year.

A large portion of sharks landings were from trawl nets and they represented only 1.5% of the catch by trawl nets (Figure 4). Table 6b shows the catch of sharks by various vessel size (GRT) of trawl nets in the Malacca Strait. The sharks were caught by various vessel sizes of trawlers. However, the vessels of size 40 – 69.9 GRT and 20 – 39.9 GRT dominated the catch and they costributed 53% and 27% respectively of the sharks catch by the trawlers in the Malacca Strait.

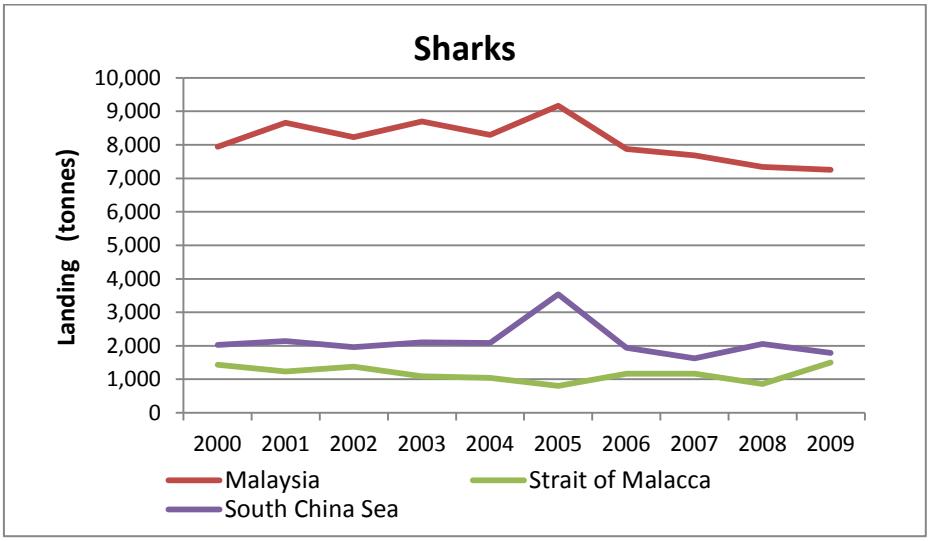

Figure 8: Annual landings of sharks in Malaysia from 2000-2009.

Monthly trends of sharks catch in the Malacca Strait showed a minor fluctuations except in December 2006 and January 2007 where there were a steep increased in catch at 145 tonnes and 191 tonnes respectively (**Figure 9**). After Janaury 2007, the monthly catch stabled between 65 and 85 tonnes. In 2009, the monthly catch showed an increasing trends with all above 100 tonnes and reaching the highest in December 2009 at 191 tonnes.

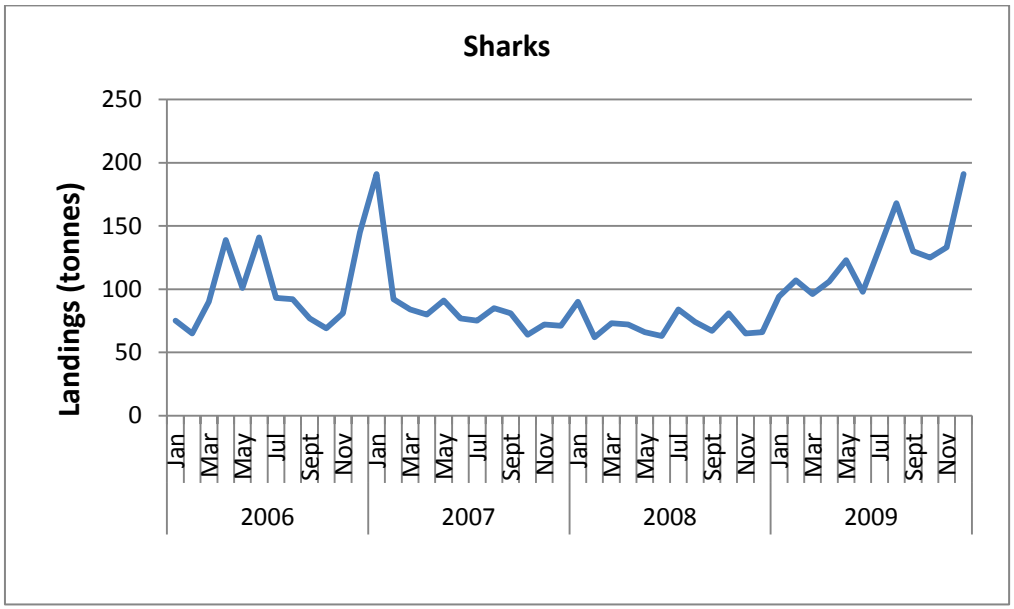

Figure 9: Monthly catch of sharks in Malacca Strait

CONCLUSION

Even though neritic tuna form only a small percentage of total marine catch, it still one of the important factor for the development of fish processing industries in Malaysia. Generally, there is still apperant indication that the stock of tuna is declining and this reflect the present stocks can still be further exploited. Increasing the fishing capacity especially of the bigger tonnage of vessels, particularly purse seines may increase the catch of neritic tuna. Sharks are the species that hard to be indentified to species level during sampling. Estimations of sharks catch at species level are only possible during research surveys.

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