Neritic Tuna Fishery and Some Biological Aspect in West Coast of Peninsular Malaysia.

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ABSTRACT

Annual catch of neritic tuna in the Malacca Straits showed an increasing trend but the opposite were observed in the South China Sea. Purse seiners contributed about 82% of the annual catches of neritic tuna and it is the most important fishing gear for this fishery, especially the 40-69.6 GRT and >70 GRT vessel size. The use of Fish Aggregating Device (FAD) is a common practice by purse seiners to catch small pelagic species including neritic tuna. Average catch rate of neritic tuna by purse seine was estimated at 333 kg/day at sea. Monthly length weight measurement of longtail tuna and kawakawa showed a relationship of $W= 0.00000843L^{3.1173}$ for kawakawa and $W= 0.0000103L^{3.09}$ for longtail. Monthly length distribution analysis indicated that larger longtail and kawakawa are more readily available in September/October and November, respectively. A study of gonad maturity of these two species was started in March 2015.

INTRODUCTION

Malaysia is a maritime nation, surrounded by four seas; namely the Straits of Malacca, South China Sea, Andaman Sea and Sulu Sea. Marine fishing areas in Malaysia can be divided into several fishing sub-areas, namely the west (Malacca Straits) and east coast (South China Sea) of Peninsular Malaysia, Sarawak (South China Sea), and Sabah waters which include the South China

Sea on the west coast and the Sulu and Celebes Seas in the east coast. The Malacca Straits is part of the IOTC area of competence, and includes the state of Perlis, Kedah, Penang, Perak and Selangor. The Malaysian EEZ in the Malacca Straits is adjacent to Indonesia in the west and to Thailand in the north (Fig. 1).

Total marine fish productions in Malaysia were not much different for 2013 and 2014, during which 1,482,899 metric tons and 1,440,109 metric tons were respectively landed. Based on catch statistics from the Department of Fisheries Malaysia, offshore fisheries contributed only 22% of the total landings.

Therefore, there is an emphasis by the government to develop tuna fisheries not only in coastal waters, but also in offshore waters within the Exclusive Economic Zone (EEZ). Tuna fisheries, which include both oceanic and neritic tuna, are targeted to be developed in the near future. The second strategic development plan for tuna fisheries was launched at the end of 2013.

During the early 1980s, small tuna (as neritic tuna were called then) were only caught as by-catch by gill nets and purse seines. When tuna purse seines were introduced in 1987, the neritic tuna fisheries started to develop. A tagging experiment on neritic tuna carried out in South China Sea showed that 50% of the recaptured tuna came from the purse seine operators (Raja Bidin, 1990). Initially purse seine operators visually searched for tuna schools. Gradually, some of these operators started to use lights to aggregate fish (Chee, 1996). Following complaints from other fishermen, the use of lights were regulated and limited to less than 30 kilowatts, although there have been incidences of non-compliance.

Figure 1 : Malaysian fishing areas.

EXPLOITATION OF NERITIC TUNA

In Malaysia, neritic tuna consists of longtail tuna (Thunnus tonggol), kawakawa (Euthynnus affinis) and frigate tuna (Auxis thazard and Auxis rochei). Neritic tuna contributed 3.95% of the total marine landings. Although the contribution in weight is rather low, the value of this group of fish is still substantial at more than USD121 million in 2014 (Table 1). In the year 2014, neritic tuna landings amounted to 56,816 mt; decreasing by 1% compared to 57,345 mt in 2013.

Figure 2 shows the annual landings of neritic tuna in Malaysia, and the contribution from west coast of peninsular Malaysia for comparison, from the year 2000 until 2014. Landings in Malaysia ranged from 40,000 mt to 65,000 mt. The highest catch was recorded in 2008 and 2002 with 65,000 mt and 62,000 mt respectively. There was a decreasing trend in landings from 2002 to 2005 before an increasing trend until 2008. Landings of neritic tune in Malaysia appear to have stabilised from 2010 to 2014.

Table 1: Neritic tuna landing and value in Malaysia in 2014

	Value (USD)	Quantity (mt)
Frigate	4,278,620	2,302
Longtail	61,235,411	24,841
Kawakawa	55,650,332	29,672
Total	121,164,363	56,815

Exchange rate 1 USD ≈ RM3.7

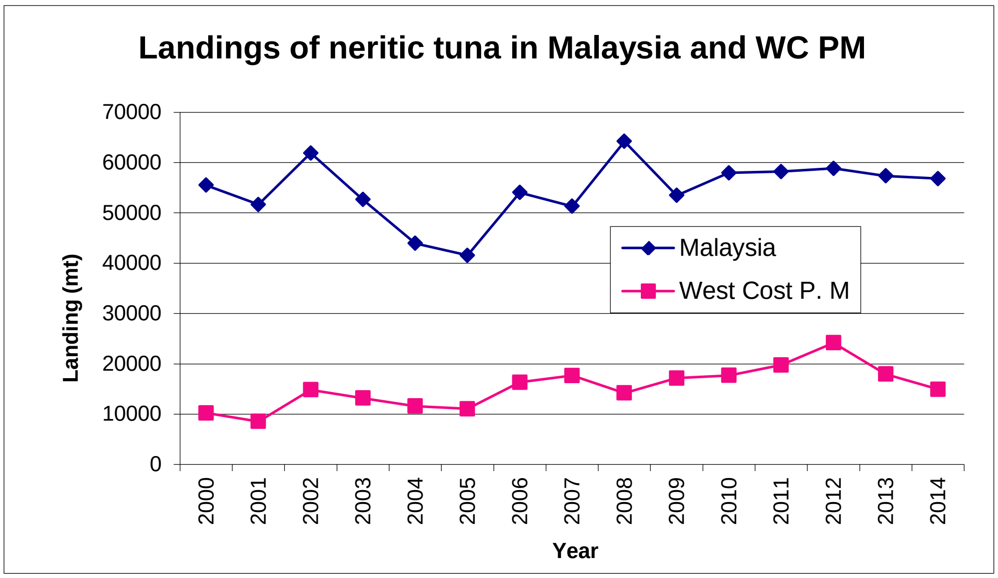

Figure 2: Total landings of neritic tuna in Malaysia and West Coast of Peninsular Malaysia.

Landings of neritic tuna on the west coast of peninsular Malaysia showed a generally increasing trend from the year year 1970 to 2012 (Figure 3). Landings have then decline until 2014 when they decreased by 38% from that of the year 2012. In 2014, nearly 30% of neritic tuna landings in Malaysia came from the Straits of Malacca. The rest of the landings came from the East Coast of Peninsular Malaysia, Sabah and Sarawak.

Neritic tuna landings in 2014 declined significantly in the individual states on the west coast of peninsular Malaysia; with each decreasing by nearly 45% compared to 2012. This significant decline coincides with a decrease in the number of purse seiners licensed by the Department of Fisheries Malaysia in 2014 (Figure 4).

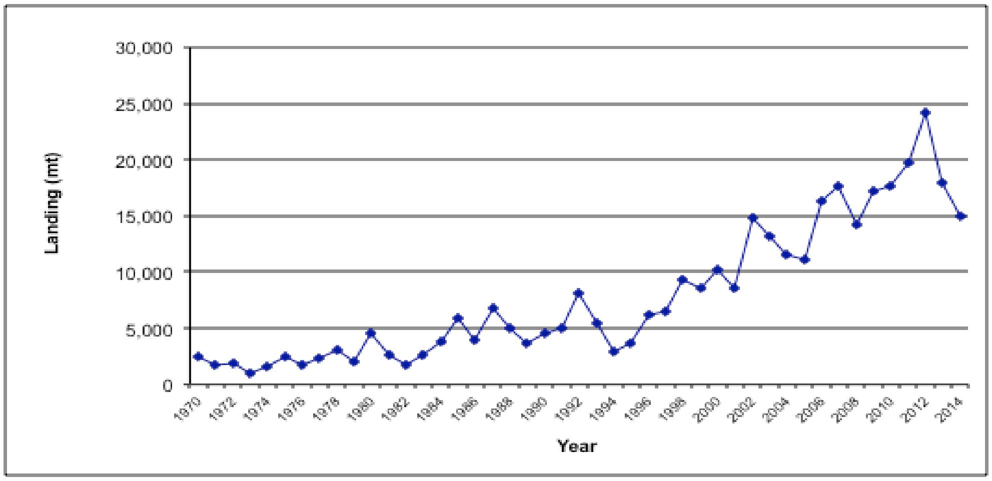

Figure 3: Landings of neritic tuna by multiple gear in west coast of peninsular Malaysia.

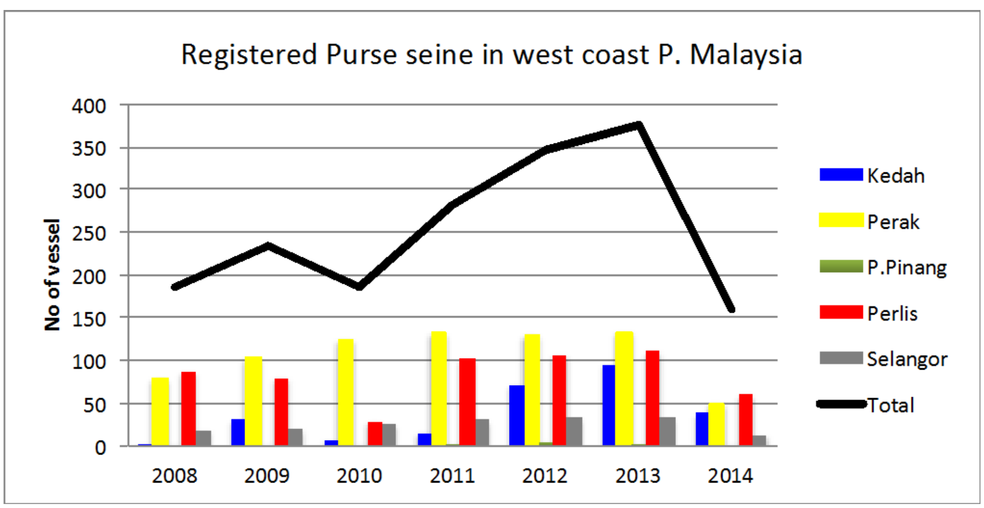

Figure 4: Number of registered purse seine vessels in west coast peninsular Malaysia.

The state of Perlis has the highest number of registered purse seiners with 60 vessels in 2014, followed by Perak with 49, Kedah with 38 vessels and Selangor with 13 vessels. There are no registered purse seiners in Penang in 2014, although there were 2 vessels registered in 2013. Since these large-sized vessels are not restricted by state boundaries in their areas of operations, the size or length of coastlines of these states have no influence on the number of registered purse seiners. Thus, Perlis that has the shortest coastline compared to the other states has the most number of registered purse seiners.

A review of the landing data of large purse seiners, i.e. 40-69.9 GRT and ≥ 70 GRT, on the west coast of peninsular Malaysia in the year 2014 indicates that neritic tuna is not the main target group. The CPUE of these vessels was 2997.7 kg/day at sea, while the catch rate of neritic tuna was only 332.2 kg/day at sea, or only 11.08% of the total.

MONTHLY LANDINGS OF NERITIC TUNA, WEST COAST, PENINSULAR MALAYSIA

The mean monthly landings of neritic tuna on the west coast of peninsular Malaysia suggest that this species group is more abundant from May to October (Figure 5). However, the large standard deviations for September and October indicate that landings for these months, although higher than other months, are not consistent.

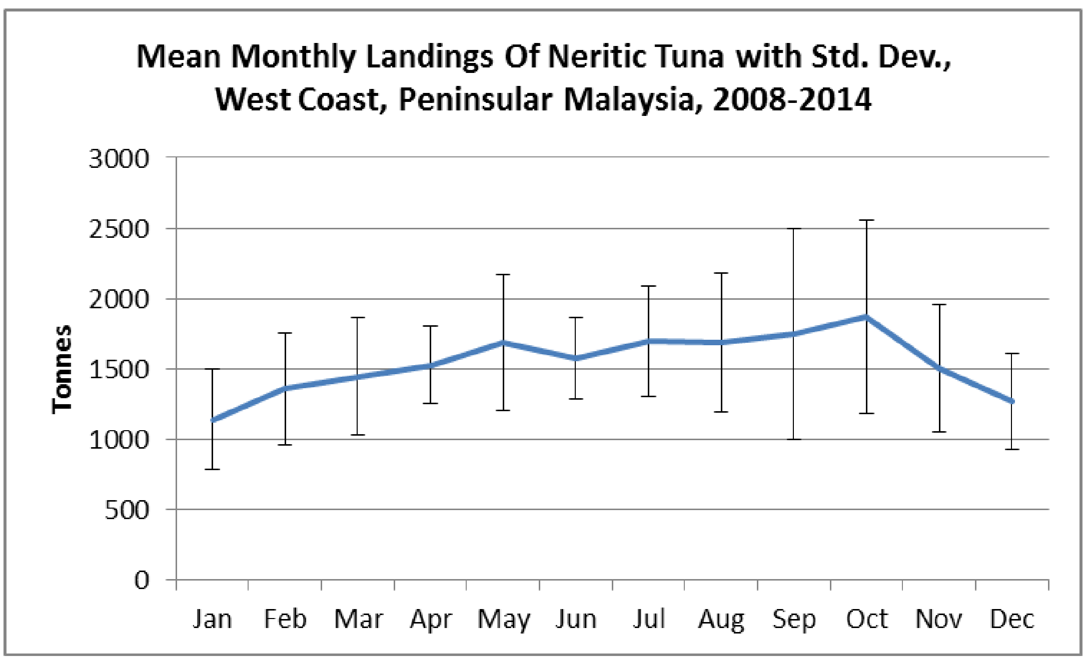

Figure 5: Mean Monthly Landings of Neritic Tuna with Std. Dev., West Coast, Peninsular Malaysia, 2008-2014.

Mean monthly landings of longtail tuna are consistently higher than the other two species (Figure 6). In some months the mean landings of longtail tuna are more than double those of kawakawa. There appears to be two modes, or periods of abundance, for longtail tuna, i.e. in April/May and September/October, but these are not very pronounced. The high standard deviation for September is due to the relatively very high landings in 2010. Kawakawa appears to have one mode of abundance from May to October. The high standard deviation for October is due to high variations in annual landings for this month. In comparison, landings of frigate tuna are rather low and insignificant, although they appear to be more abundant from March to July.

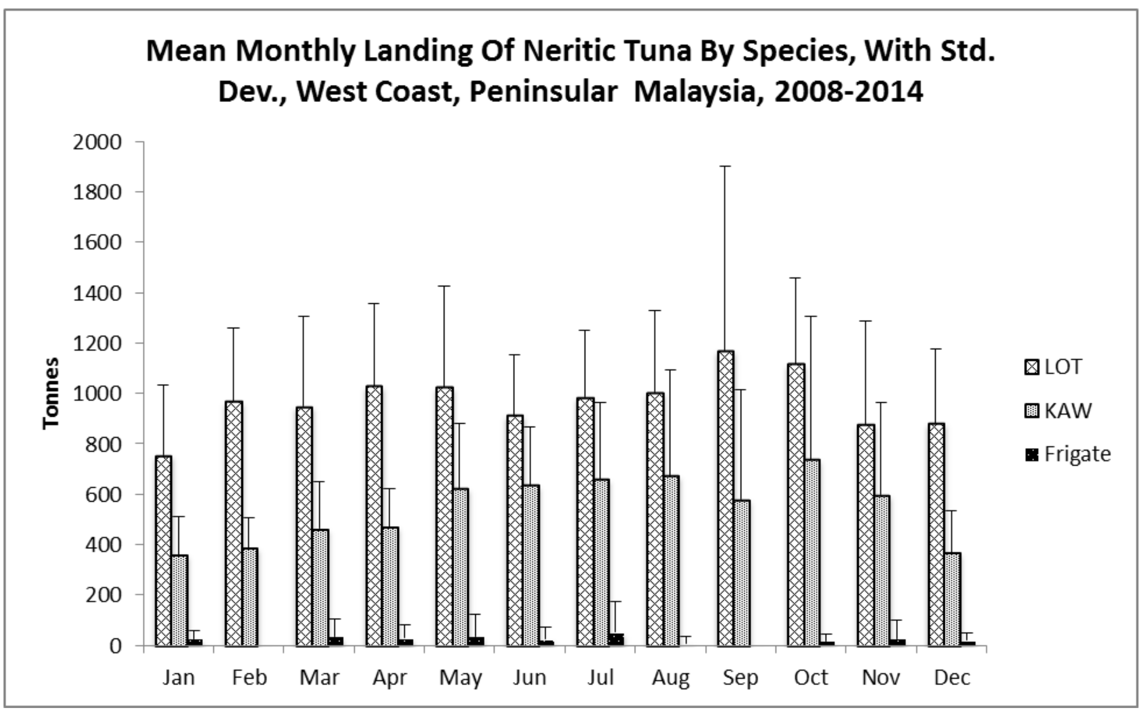

Figure 6: Mean monthly landings of neritic tuna species on the west coast of peninsular Malaysia from 2008 to 2014.

PURSE SEINE FISHING METHODS

Table 2 shows the neritic tuna landings of purse seiners using different operating methods in the year 2014. The most successful method is by using fish aggregating devices known as Payao. This is also the only method that was used to catch frigate tuna. The searching method yielded only longtail tuna, while the catch of neritic tuna using light was very minimal. The use of light as an aggregating device mainly targets other small pelagics.

Table 2: Total landing of neritic tuna by Purse seines in West coast Peninsular Malaysia in 2014

Spesies	Light	Payao	Searching	Total
Thunnus tonggol (Longtail tuna)	2.14	4924.40	423.81	5350.35
Euthynnus affinis (Kawakawa)	1.08	6622.81		6623.89
Auxis thazard (Frigate tuna)		920.00		920.00

FISH AGGREGATING DEVICES (FADs)

Almost the entire operations of purse seine vessel >70 GRT using FADs were located in waters 40 meters in depth. Using FADs as a tool to gather the fish and has increased the fishing efficiency. In Malaysia, FADs have 4 main components or structure, namely a buoy or floating object, a main line, palm leaves usually from coconut trees to act as lures and an anchor or weight (Figure 7). The palm leaves need to be changed after 3 to 4 months or when they are damaged. This FADs are taken care of by purse seine operators to prevent usage by other fishermen. Thus these FADs can be deemed to be the properties of the relevant operators.

Figure 7: Palm leaves and concrete blocks that act as anchors are some of the main components of an FAD.

Observations of Vessel Monitoring System (VMS) data for a specific purse seiner over one month shows the vessel operates in the same area for a certain period (Figure 8). This srongly suggest that the vessel has FADs in it's area of operation.

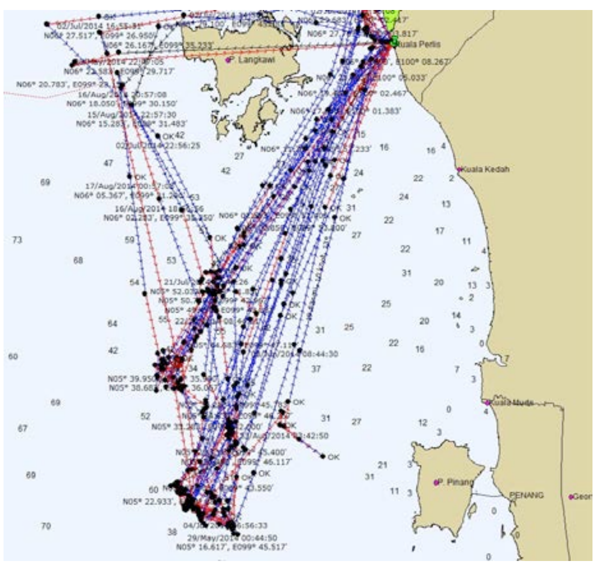

Figure 8: Fishing areas by a specific Purse seiner >70GRT vessel registered in Kuala Perlis in the year 2014.

SOME BIOLOGICAL ASPECTS

A biological study on neritic tuna is currently being undertaken in Kuala Perlis, the main fishing port in the northern region of the west coast of peninsular Malaysia. The study was started in 2014 and scheduled to end in 2015. This study include size distribution, length-weight relationship and gonad maturity studies. Below are some of the preliminary findings from data already collected, since data collection is currently ongoing. The samples for length-weight relationship were not separated by sex, since this would require purchasing the fish at a high cost using limited fundings.

Length-weight relationship

The fork length and wet weight of longtail tuna landed at Kuala Perlis, Perlis ranged from 21-54 cm and 0.19 kg to 2.7 kg. The length weight relationship of the longtail was calculated using the equation $W= aL^b$ where, W = weight in grams. L= fork length in mm; and a and b are constants. The length weight relationship is given by the formula $W= 0.0000103L^{3.09}$ (Figure 9).

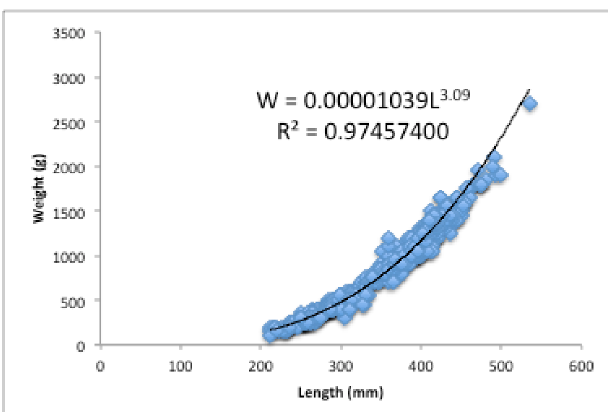

Figure 9: Length-weight relationship of longtail tuna from monthly data collection in Kuala Perlis

The fork length and wet weight of kawakawa landed at Kuala Perlis, Perlis ranged from 13-59 cm and 0.10 kg to 3.4 kg. The length weight relationship of longtail tuna was calculated using the equation $W= aL^b$ where, W= weight in grams. L= Fork length in cm; and a and b are constants. The length weight relationship is given by the formula W= 0.00000843L $^{3.1173}$ (Figure 10).

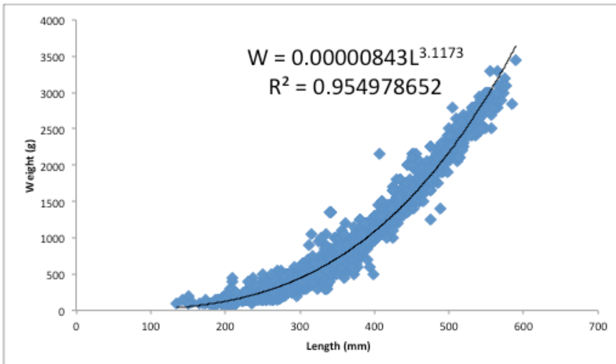

Figure 10: Length weight measurement of kawakawa collected monthly in Kuala Perlis

Length-weight relationship for frigate tuna was not done due to sporadic landings of this species.

Size Distribution

A preliminary analysis of the size distribution of longtail tuna landed at Kuala Perlis from May to November 2014 indicates the presence of two modes, from around 260 mm to 310 mm and from 390 mm to 420 mm (Figure 11).

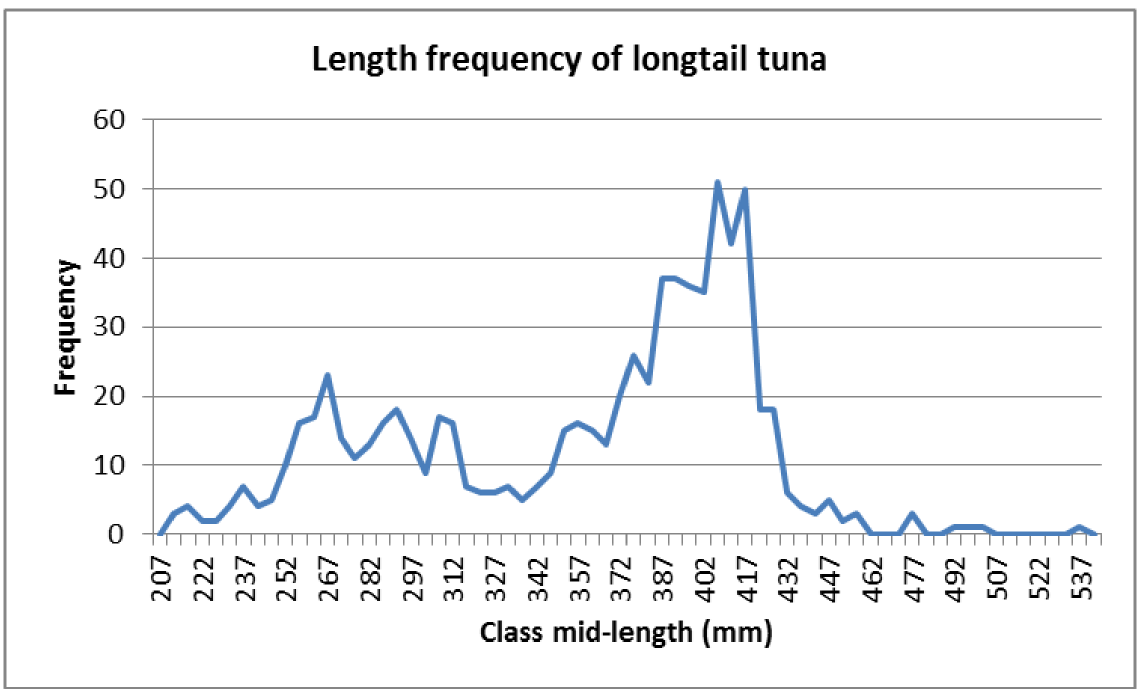

Figure 11: Length frequency distribution of longtail tuna from Kuala Perlis, May – November 2014.

A similar analysis for kawakawa from Kuala Perlis over the period of May 2014 to January 2015 indicates a unimodal distribution that peaks from around 320 mm to 420 mm (Figure 12).

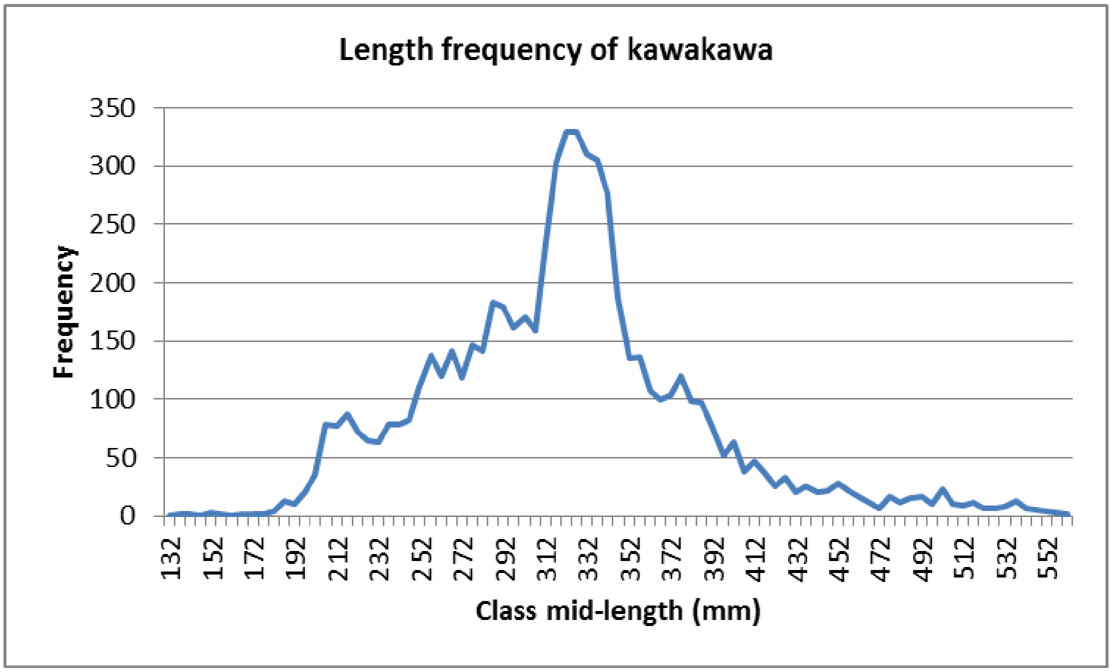

Figure 12: Length frequency distribution of longtail tuna from Kuala Perlis, May 2014 – January 2015.

Another preliminary analysis of size distribution, based on the same data set, suggest that larger longtail tuna and kawakawa are relatively more abundant in September/October and November, respectively.

DISCUSSION

Neritic tuna in Malaysia is currently not a major component of the capture fisheries industry, although this species group is distributed almost throughout Malaysia waters. The neritic tuna fisheries on the west coast of peninsular Malaysia made up approximately 20% to 30% of the Malaysian neritic tuna fisheries. The bulk of the landings comes from the South China Sea, Sulu Sea and Sulawesi Sea.

The National Agri-Food Policy calls for an increase in marine capture fisheries production. Towards this end the Department of Fisheries, Malaysia is working towards developing her offshore fisheries, since the coastal fisheries have been fully exploited. One of the fisheries targeted to be developed further is the neritic tuna fisheries. The government is sponsoring the deployment of Payaos in Sabah and Labuan waters.

Although the neritic tuna fisheries on the west coast of peninsular Malaysia should also be further developed, the limited fisheries waters in this area is a constrain, when compared to the waters around the east coast, Sarawak, Sabah and Labuan. Thus, it is expected that the main focus on developing the neritic tuna fisheries will not be in the west coast.

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