Received: 30 September, 2011
IOTC-2011-WPTT13-17

# Catch, species composition and biology of tuna caught in the Indian Ocean by the Malaysian tuna longliners

Samsudin Basir

Captured Fisheries Division,
FRI Kampong Acheh,
32000 Sitiawan, Perak.
MALAYSIA.
Email addr: samsudin@dof.gov.my s_basir@yahoo.com

## ABSTRACT

Penang port has long been recognized as a potential port for transshipment of tuna caught from the Indian Ocean. After facing a period of continuous declining in tuna landings from vessel operating in the Indian Ocean, Malaysia stand to develop his own fleet for tuna fishing in open seas particularly in the Indian Ocean. From 15 vessels in 2003, the number of registered flag vessels increased to 59 in 2010 while total catch of tropical tuna increased from 770 tons to 1138 tons during the same period. Vessels landings at Penang port were seasonal, peak during October to February the following year as most of the vessels believed to operate in the eastern Indian Ocean. From 2000 to 2002, three training and research trips were carried out using training vessel from DoF and two rented commercial tuna longline vessels. Catch and biology of yellowfin and bigeye were obtained from these trips. During the trip with 2 commercial longline vessels, a total of 533 yellowfins (231 males + 302 female) and 423 bigeyes (194 males + 229 females) were sampled over the period July to October. Both vessels operated in areas between Longitude 77°E – 85°E and Latitude 5°N – 5°S. Their average cpue were at 6.7± 1.8 and 4.7 ± 2.7 respectively. Average size of yellowfin and bigeye caught were 119cm and 125cm respectively. More than 60% of yellowfin and 40% of bigeye were sexually matured during the period of study.

**KEY WORDS:** yellowfin, bigeye, longlines, fishing areas, maturity, fecundity

## INTRODUCTION

Under the 3th National Agriculture Policy, deep-sea and offshore fisheries were identified as potential contributors to meet the ever increasing domestic demand on source of protein. In the 9th Malaysian Plan, again, deep-sea fisheries was identified as a potential economic sources under the fisheries sector. The deep-sea fisheries will become a catalyst in the development of fisheries industry particularly in captured fisheries. Malaysia always maintain annual marine production above 1,000,000 tonnes. Out of that, coastal fisheries contributed 80% of total annual marine production while the rest made by the

deep-sea fisheries. Coastal fisheries have already reached maximum exploitation and they are now saturated with various type of fishing gears. In the present situation, there can be no further increase in coastal fisheries production in future. While strictly maintaining and managing the present coastal ecosystem from continuous destruction, the government need to look into another source of fisheries resources to reduce the pressure on coastal fisheries and at the same time to increase the production from capture fisheries.

Looking at the location of Penang state and it's relevant to the tuna fisheries in the Indian Ocean, Penang port is considered located at a strategic area and can be developed as a hub to tuna fisheries i.e. for transshipment activities of the fishing vessels from the Indian Ocean. History has proven that Penang port had been become one of the main transshipment port for tuna longline vessels. In 1998 Malaysia has decided to become an active player in tuna fishing in the Indian Ocean and by October 1998, Malaysia committed itself to be a member of the IOTC. Since then, through guideline under the fisheries development action plan, several efforts from various relevant agencies have taken place to achieve the objectives to develop the oceanic tuna fisheries industry. Several exploratory trips to the Indian Ocean by the DoF training vessels as well as with the commercial tuna longline vessels had taken place, aimed as training and research on tuna fishing.

**History of oceanic tuna landing at Penang port.**

Since early 1960s, Penang port, Malaysia was noted to be one of the busiest ports that dealt with transshipment of tuna from the Indian Ocean. Foreign longliners especially from Taiwan, Republic of China, Korea, Japan and purse seiners from Spain and Russia were attracted to Penang Port for its strategic location in the north of the Strait of Malacca, facilities available and well transportation system. In 1974, Taiwanese longliners unloaded 12,000 tonnes of

frozen tuna for transshipment to major market such as Japan (Mohamad, 1993). The unloading and transshipment activities in Penang port has created downstream activities that brought revenue and job to Penang state. But after some social problems at the port, vessels restrictions were introduced which resulted for the reduction in the transshipment in the late 1970s. The change in the international trade of tuna also have an adverse effect on the development of Penang as the transshipment port.

**Tuna landing trends 1990-2002**

Landing trends of the foreign vessels at the Penang port since 1990 to 2002 is shown in Figure 1. The landing of oceanic tuna from the Indian Ocean showed a declining trend from 9,543 tonnes in 1990 to only 2,773 tonnes in 2002, declined by 71% since 1990. Similar trend was observed in the number of calls at Penang port which fell from 1,139 calls in 1990 to only 174 calls in 2002. Year 1991 and 1992 recorded the highest landing, surpassed over 10,000 tonnes/month. Figure 2 shows the monthly landing trends of tuna from the Indian Ocean and number of calls at the Penang port.

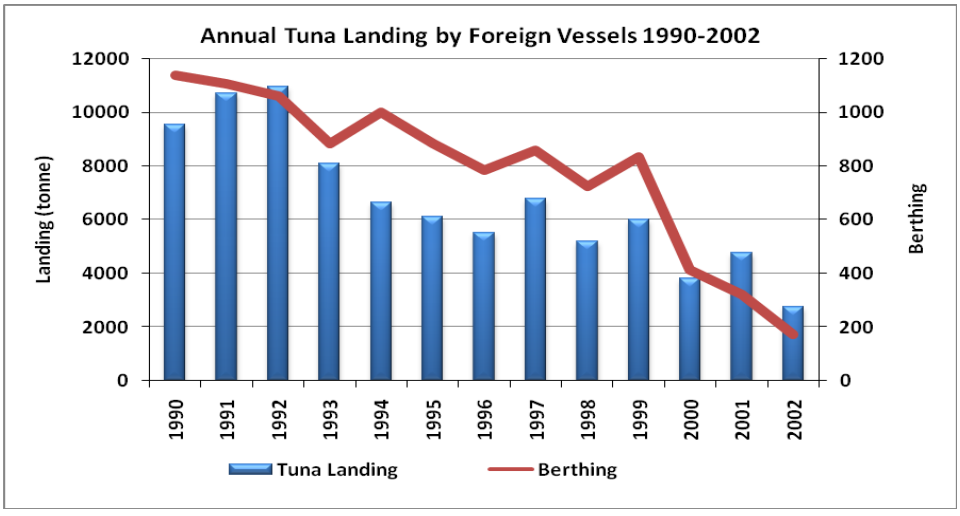



Figure 1: Annual landing trends of foreign vessel 1990-2002 at Penang Port

Landing of tuna at the Penang port peaked toward the end of the year, starting from September to February the following year, and sometimes until March. During this period, the tuna longliners shift their fishing areas toward the eastern Indian Ocean, from 85$^{o}$E until to the west coast off Sumatera, and Adaman Sea in the northern Sumatera. Then, the vessels will land their catch in the nearby port such as Penang, Phuket as well as in Indonesia.

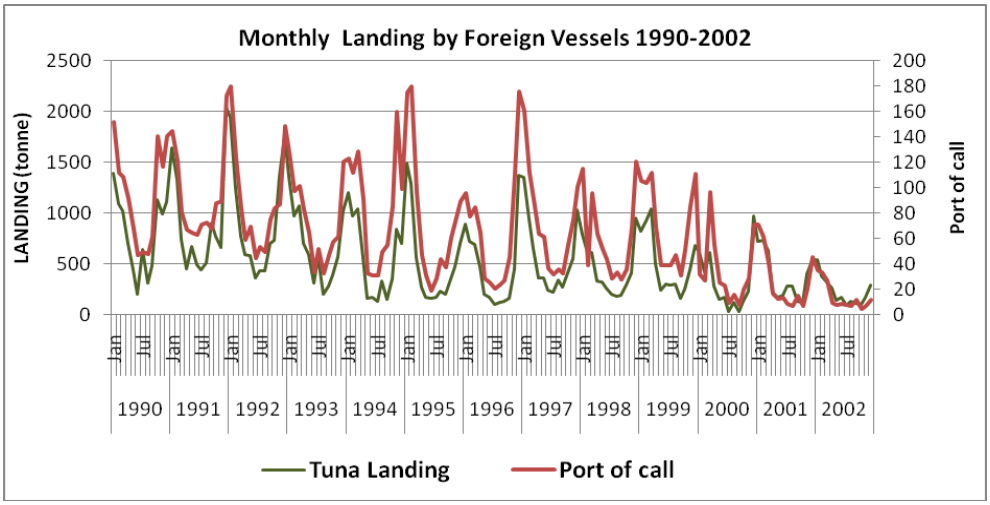



Figure 2: Monthly landing trends of foreign vessels at Penang port.

Out of peak season. from March to September, the landings of tuna at the Penang port fell and to the lowest recorded at 39 tonnes/month. During this period, most longline vessels move their fishing operations toward the western Indian Ocean and therefore they transshipped their catch at the Mauritius, Seychelles and Sri Langka.

Between mid 1992 to end of 1993, Under the Indo-Pacific Tuna Development and Management Programme (IPTP) Malaysia involved in monitoring of tuna landings transshipped through Penang. From this monitoring programme, information on total catch, species composition, and size information of the major tuna species. i.e. yellowfin tuna (*Thunnus albacores*) and bigeye

(*Thunnus obesus*), was compiled. The seasonality of fishing activities, fishing grounds and fishing vessel information were documented (Chee and Khoo, 1992)

.

**Tuna landing trend 2003-2010**

From 2003, landing on tuna by foreign vessels continued to decline from 1,247 tons in 2003 to 82 tons in 2010. The number of berthing by foreign vessels also showed a similar pattern, declining from 73 in 2003 to only 5 in 2010 (Figure 3). There was a sudden drop in landing of YFT and BET along with the number of berthing from 2003 to 2006 before making a slight increased toward 2007 and 2008 and fell again to the lowest in 2009 at 56 tonnes and end up with 82 tonnes in 2010.

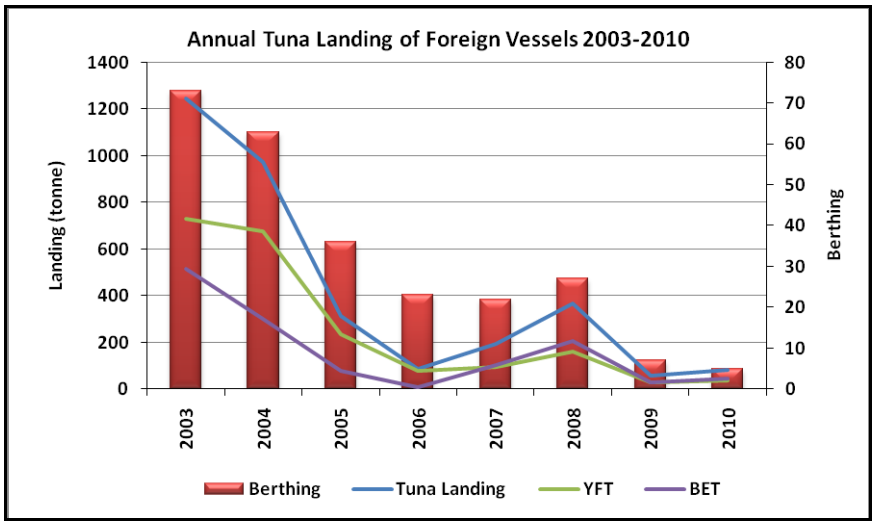



**Figure 3: Annual tuna landing by foreign vessels at Penang Port 2003-2010**

Figure 4 shows the monthly landing patterns of YFT, BET and number of berthing at the Penang port. The seasonal landings still obvious where they peaked during October to February the following year.

There are several factors that contribute to decreasing tuna landings and port of calls at the Penang port. Some of the vessels from Taiwanese fishing

company that usually use Penang port as transshipment port, have join with locals to set a join venture companies for tuna fishing in the Indian Ocean. Stiff competition from other regional ports such as in Phuket, Indonesia and Sri Langka also become a driven factor that reduce the tuna landings and number of berthing. Good facilities and low cost services offered by other regional ports compared to new Malaysian International Tuna Tuna (MITP), Penang making Penang port less attractive.

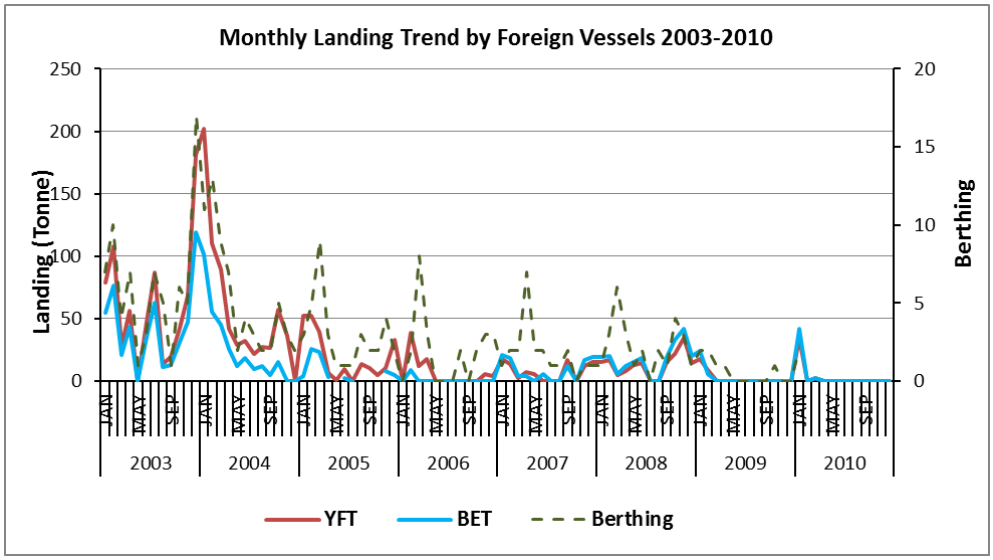



Figure 4: Monthly landing patterns of YFT, BET and number of berthing at Penang port.

For some IUU vessels that fish in the Indian Ocean, Penang port not anymore a save transshipment port. Enforcement of regulations in port monitoring system at MITP by the Fisheries Authority has driven away potential IUU vessels from using Penang port.

**Landings by Malaysian flag vessels**

Malaysia officially started to registered his own flag vessels with the IOTC during end of 2002. From that period, Malaysia fleet started to increase from 16 vessels in 2003 to 59 vessels in 2010. All are tuna longliners, bought by the

local companies from Taiwan and Indonesia. Number of local companies to involve in tuna fishing in the Indian Ocean also drastically increased and this bring about the increase in vessels permit application to the DoF. The size of vessels vary in LOA and gross registered tonnages (GRT) from 19 – 65 m and 38 – 882 GRT respectively. The vessels of less the 24 m LOA are fishing vessels and those bigger than that are carrier vessels.

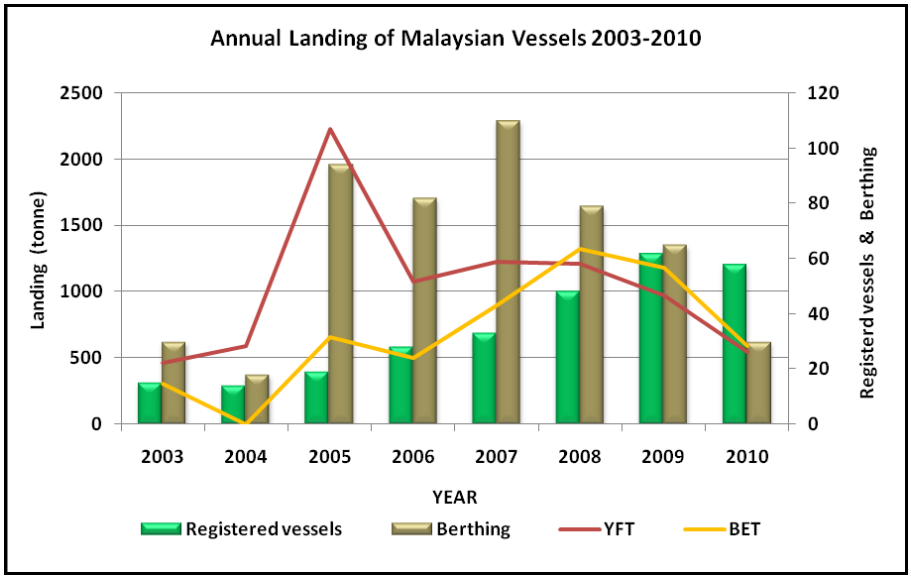



**Figure 5: Annual growing pattern of Malaysian fishing fleet to Indian Ocean.**

The growing pattern of Malaysia fleet, landings of YFT and BET and berthing are shown in Figure 5. The highest landing of YFT was recorded in 2005 at 2229 tonnes, parallel with the increase in berthing at 94. Landings of YFT tuna always exceeded BET until 2007 and from 2008 to 2010 the BET annual landings slightly higher than YFT. Landing patterns are seasonal, peak during October to February the following year. Out of this period, sometimes no landing and berthing recorded from Malaysian flag vessels (Figure 6). The amount of catch landed vary depending on the size of vessels. On average, normal landing by each vessel at the MITP range from 20 – 35 tonnes and the recorded maximum landing by single carrier vessel was 108 tonnes.

During off season, from March to September, most Malaysian flag vessels fish in the western Indian Ocean and land their catch in Port Louis, Mauritius and may be some in Victoria, Seychelles. High fuel prize pushes operation cost higher and fishing vessels have to look into cost saving operation such as using the nearest ports to transship their catch. Records of Malaysian flag vessels landings in Mauritius only available since 2009 and only then all landings information by Malaysian flag vessels outside MITP have to available to the DoF Malaysia by the fishing company.

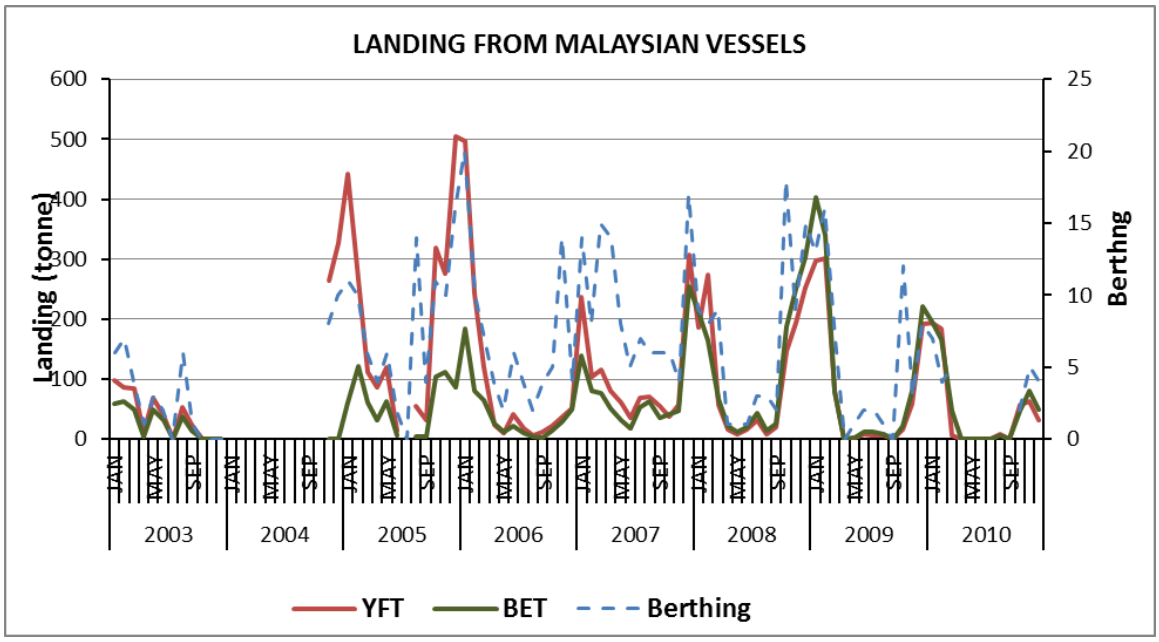



**Figure 6: Monthly landing pattern of Malaysia vessels at MITP.**

**Trip to Indian Ocean by trainning vessel.**

Malaysia made two exploratory trips to the Indian Ocean with his training vessel K.L. PAUS during a period of 2000 and 2001. The trips were aimed for training for department staff and potential fishermen in tuna longline fishing and for research purposes. It marked the first serious step taken by the Malaysia to join and become a high seas fishing country. During the 1st and 2nd trips, they manage to catch 6 (yellowfin) and 8 (6 yellowfin and 2 bigeye) respectively using 400 hooks and 500 hooks at later trip (Table 1). Yellowfin and bigeye tuna formed about 66% of total catch from each trip.

Table 1: Catch and species composition of tuna longline during training and research trips to Indian Ocean using K.L. PAUS (Anon 2001).

| | | 1st trip | | | | 2nd trip | | |
|---|---|---|---|---|---|---|---|---|
| **Date** | | **November 2000** | | | | **February 2001** | | |
| **Areas** | **Latitude** | **0 - 5° N** | | | | **1 - 5° N** | | |
| | **Longitude** | **85-90 ° E** | | | | **89-91 ° E** | | |
| **No of shooting** | | **4** | | | | **6** | | |
| **Hook** | | **400** | | | | **500** | | |
| **Depth** | | **100 - 200** | | | | **100 - 220** | | |
| **Species** | **Scientific name** | **No** | **Wt** | **%** | | **No** | **Wt** | **%** |
| **Yellowfin** | ***Thunnus albacares*** | **6** | **241** | **67** | | **6** | **248** | **43.1** |
| **Bigeye** | ***Thunnus obesus*** | **-** | **-** | **-** | | **2** | **123** | **21.4** |
| **Shark** | ***Alopias pelagicus*** | **-** | **-** | **-** | | **1** | **58** | **10.1** |
| **Shark** | ***sp. A*** | **-** | **-** | **-** | | **4** | **102** | **17.1** |
| **Shark** | ***sp. B*** | **-** | **-** | **-** | | **1** | **7** | **1.2** |
| **Swordfish** | ***Xiphias gladius*** | **7** | **33.1** | **9** | | **6** | **35** | **6.1** |
| **Lancet** | ***Alepisaurus ferox*** | **4** | **9.4** | **3** | | **4** | **2** | **0.4** |
| **Marlin** | ***Maikara mazara*** | **1** | **70** | **20** | | **-** | **-** | **-** |
| **Tuna-like sp.** | ***Lepidocybium flavobrunnuem*** | **1** | **4.5** | **1** | | **-** | **-** | **-** |

**Trip to Indian Ocean by commercial tuna longline vessel.**

In 2002, Malaysian government had rented two commercial tuna longline vessels from local fishing company for training and research purposes for a period of July to October. For each vessels, at each trip they carried 16 trainees for tuna longline fishing to undergo training with the vessel crews. The trainees were trained from setting up the longline, shooting, hauling and catch handling during onboard. During the trips, information on catch, fishing areas and species composition were recorded. During uploading at the fishing port, every specimen of YFT and BET, their size, weight and maturity stages were measured.

Table 2 a and 2b show the catch information of each vessels for every trip and their CPUE. From Penang port, on average it took on average 7 days non-stop journey to the fishing areas and for fishing, it takes a day from shooting to end of line hauling. Total number of catch for vessel A and B from all the trips were 229 and 354 respectively while average catch/trip for vessel A and B and their variation were at 57 (±10.9) and 88 (± 33) respectively. At most of the trip, the catch of BET exceeded YFT. For cpue (tail/1000 hooks) of vessels A and B, they ranged from 4.2 – 8.1 and 2.5 – 8.2 and their average cpue were at 6.7± 1.8 and 4.7 ± 2.7 respectively.

Table 2a: Catch information of vessel A (extract from Anon, 2002)

| Vessel A | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Total day per trip | Operation days | No of hook | No of hauls | Species composition | | Total | Catch per 1000 hk |
| | | | | | BE | YF | | |
| July | 23 | 7 | 1200 | 5 | 38 | 8 | 46 | 7.7 |
| August | 28 | 10 | 1200 | 8 | 62 | 16 | 78 | 8.1 |
| September | 26 | 10 | 1200 | 9 | 48 | 27 | 75 | 6.9 |
| October | 28 | 14 | 1200 | 6 | 29 | 1 | 30 | 4.2 |

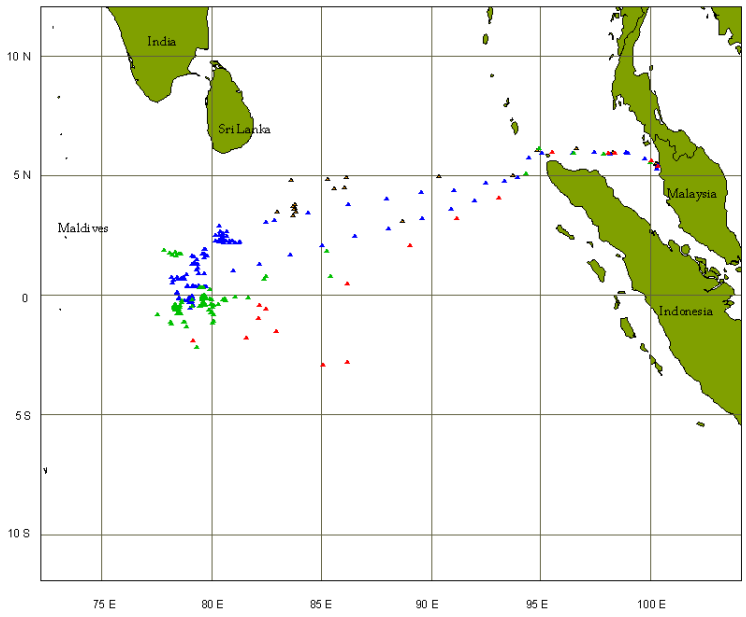
Table 2b: Catch information of vessel B (extract from Anon, 2002)

| Vessel B | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Total day per trip | Operation days | No of hook | No of hauls | Species composition | | Total | Catch per 1000 hk |
| | | | | | BE | YF | | |
| July | 26 | 10 | 1500 | 9 | 23 | 11 | 34 | 2.5 |
| August | 29 | 13 | 1500 | 10 | 66 | 18 | 84 | 5.6 |
| September | 27 | 11 | 1500 | 10 | 16 | 24 | 40 | 2.7 |
| October | 30 | 16 | 1500 | 16 | 154 | 42 | 196 | 8.2 |

**Fishing areas.**

In each trip of each vessel, every location of shooting and hauling of longline were recorded with GPS provided to each vessel. Figure 7 shows the fishing areas of vessels A and B during a period of July to October. Nearly all the fishing occurred within the areas latitude $5^{o}$N to $5^{o}$S and longitude $77^{o}$E to $85^{o}$E. The highest catch made by vessel A in August and September at $0^{o}$17'S, $78^{o}$E and $4^{o}$50' N, $84^{o}$ E respectively. For vessel B, the highest catch were in October where 23 tuna were caught at $05^{o}$00' N and longitude $84^{o}$01' E.

Vessel A




Vessel B

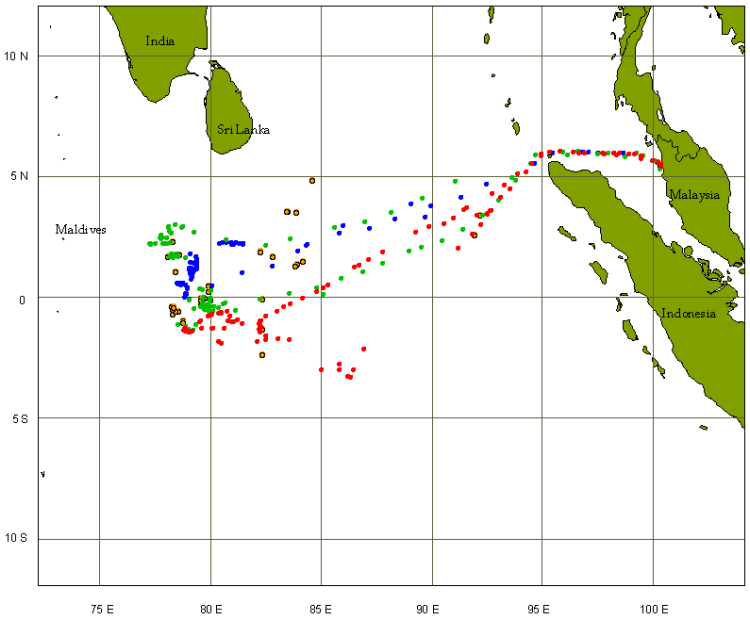



Figure 7: Fishing locations of vessel A and B during the trips from July to October 2002.

**Biology of yellowfin and bigeye caught during the trips.**

The size of bigeye and yellowfin caught during a period of July to October ranged from 84-169 cm and 91-155 cm respectively. The highest size of bigeye was recorded during October (119.13 cm ± 14.22 ) while yellowfin in August (124.57 cm ± 10.45 ). Average weight of bigeye and yellowfin ranged from 29.20 - 37.5 kg and 31.80 - 35.76 kg respectively (Anon 2002).

Higher percentage (75%) of female yellowfin were found to sexually mature (stage 3 and 4) in September and October, while for male higher percentage (61-87%) were mature in August and October. During the same period, less then 50% of bigeye were found to mature where for male, the highest was in September and for female in September and October. Size of first maturity for male and female yellowfin were found to be at 109 cm and 105 cm respectively and for bigeye, at 111 cm and 101 cm respectively.

**CONCLUSION**

Penang port has experience in becoming the most busiest port for transshipment of tuna catch from the Indian Ocean. It still known to be highly potential to develop as one of the important tuna port along with other regional ports. Malaysia still new in open sea fisheries particularly fishing in the Indian Ocean. However, it has gained a lot of experiences going through the period from 2002 until 2010. We have gone through training and research activities on the tuna fisheries. From that, in the 9$^{th}$ Malaysian Plan, we have achieved some of the objectives in promoting tuna fisheries industry in Malaysia. For the next development strategic, Malaysia plan to increase its fishing fleet to achieve its objectives to increase oceanic tuna landings at the MITP. Spiral effects from increase in tuna landings at Penang port are the development of fish-based downstream industries. Apart from that, as a member of IOTC, Malaysia committed in cooperation and complying to all the management plans and

resolutions from the IOTC. A continuous efforts from the DoF and other agencies relevant to the fisheries industry to implement various measures outlined by resolutions of the IOTC are being addressed.

## REFERENCES


Anonimous, 2001: Report on Fishing trip to Indian Ocean using K.L. PAUS. Department of Fisheries, Malaysia.)

Anonimous 2002. Report on Research and training trip to Indian Ocean using commercial tuna longline. Department of Fisheries, Malaysia.

Anonimous 2003. Tuna Fisheries in Malaysia. Department of Fisheries, Malaysia. pp. 114.

Chee, P. E. and S.K. Khoo., 1992. Monitoring landings of Taiwanese tuna longliners at Penang harbour. Paper presented at the Expert Consultation of Stock Assessment of Tuna in the Indian Ocean. *Coll Vol. Indo-Pac, Tuna Dev. Mgt. Programme* 4: 260-266.

Mohamad, Z., 1993. Penang now the top jetty. The Star Publications Sdn Bhd., Penang, 22 April 1993. 16 pp