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**BILLFISHES LANDINGS IN SOUTHWESTERN INDIAN OCEAN BY  
MALAYSIAN TUNA LONGLINERS.**

**Samsudin Basir  
Sallehudin Jamon  
Effarina Mohd Faizal**

*FRI Kampong Acheh, Capture Fisheries Division,  
Department of Fisheries, Malaysia.  
32000 Sitiawan, Perak, MALAYSIA.*

All the catch of billfishes by Malaysian temperate tuna longliners were from the fishing areas in the southwestern Indian Ocean. The catches were transshipped at Port Louis, Mauritius for export along with the albacore tuna landings. The total catch of billfishes by Malaysian tuna Longliners in 2016 was 76.6 tonnes, decrease by 39% as to 2015. Only two species groups of billfish were recorded in the logbook of vessels operators; black marlin (*Makaira indica*) and swordfish (*Xiphias gladius*). The landings of black marlin and swordfish in 2016 were 42.03 tonnes and 34.56 tonnes respectively which accounted 2.37% and 1.95% of total landings by Malaysian tuna longliners. For sailfish species, it is believed that they were recorded as a 'mixed fish' catch. Average nominal CPUE of Black Marlin and Swordfish were 0.1 and 0.4 tonnes/1000hk respectively with maximum respectively at 0.33 and 1.21 tail/1000hk. The nominal CPUEs of swordfish higher during the period April – August 2016 and toward the end of the year.

Keywords: billfishes, swordfish, marlin.

## **INTRODUCTION**

Since 2012, Malaysian tuna longliners shifted their target from tropical tuna to albacore tuna. Their temperate tuna fishing areas are mainly in the southwestern on Indian Ocean off the east coast of Madagascar and South Africa. Their most active fishing areas cover from 10<sup>0</sup>S in the north to southernmost areas beyond 40<sup>0</sup>S. Until 2016, there are 5 Malaysian flag tuna fishing vessels with one carrier actively fishing in the Indian Ocean. They use Port Louis, Mauritius as their fishing port to upload and transshipped their catch.

Billfish or sailfish are comprised of two families, Xiphiidae and Isotiophoridae which include three genera with eight identified species (Collete et al., 2006). These two families of billfish are well known as pelagic fish (Fierstine, 1997) in open ocean. Due to their pelagic swimming behaviour, billfish prey on other pelagic fish as their food. Billfish mostly prey on

herrings, sardines, shads, smaller mackerels and tuna. Teleost are common prey for billfish regardless of the distribution of billfish in the ocean (Vaske Jr et al., 2011). Oceanic fast swimming billfishes have large surface areas of gill lamellae that help in gas transfer because it use ram ventilation to pass water through their gill (Wegner et al., 2010). Highly migratory in tropical and temperate waters world-wide (IOTC, 2011), billfish also exhibit sexual dimorphism in maximal size, growth rates, and age at maturity; females reach larger sizes, grow more rapidly, and mature later than males. The species usually found in surface waters above the thermocline, often near shore close to land masses, islands and coral reefs in tropical and subtropical waters of the Indian and Pacific oceans. They feed on fishes, squids, cuttlefishes, octopods, large decapod crustaceans and mostly on small tunas when abundant (Nakamura 1985). This paper describes the status of billfish catches and the pattern of nominal CPUEs of the tuna longliners fishing the in the western Indian Ocean. This paper also briefly describes on the latest catch composition of billfishes by tropical tuna longliners which operate in the eastern Indian Ocean and landings their catches in Penang Port.

## **MATERIAL AND METHOD**

Malaysian tuna longliners catch records were monthly obtained through their logbooks which are a mandatory for all vessels operators to submit to the Malaysian authority. In 2016, nearly all the tuna catch records were from the tuna longliners operating in the western Indian Ocean. From January 2017, there are several tropical tuna fishing vessels started their operation and using Penang as their landing port. For temperate tuna longliners, they actively fishing in areas from 10°S in the north to southernmost area beyond 45°S and longitudinal range from 30°E to 60°E. On average each tuna fishing vessels apply 3000 hooks during each shooting and this is taken as an effort unit. The catch record from logbook of the vessels operators only identify billfish as Black Marlin (BLM) and Swordfish. It is believed that under Black Marlin they may consist of blue marlin (*Makaira nigricans*) and striped marlin (*Tetrapturus audax*) as well while sailfish catches, they group them as mixed fish. The catches of billfishes by tropical tuna longliners were also analyzed to show their monthly landing pattern. A total of 10 tropical tuna fishing vessels start their operation from January 2017.

## **RESULTS**

### **Fishing Areas**

Catches of billfishes by Malaysian tuna longliners in 2016 in the western Indian Ocean covered the areas from 10° S to southern most beyond 40°S and longitudinal from 30°E to 65°E. Figure 1 shows the of fishing areas coverage by the Malaysian tuna longliners in 2016 and up to

July 2017. In 2017, several Malaysian flag longliners started fishing in areas in the northern hemisphere from 0°N to 10°N and from 60°E to 95°E in the eastern Indian Ocean targeting tropical tuna species.

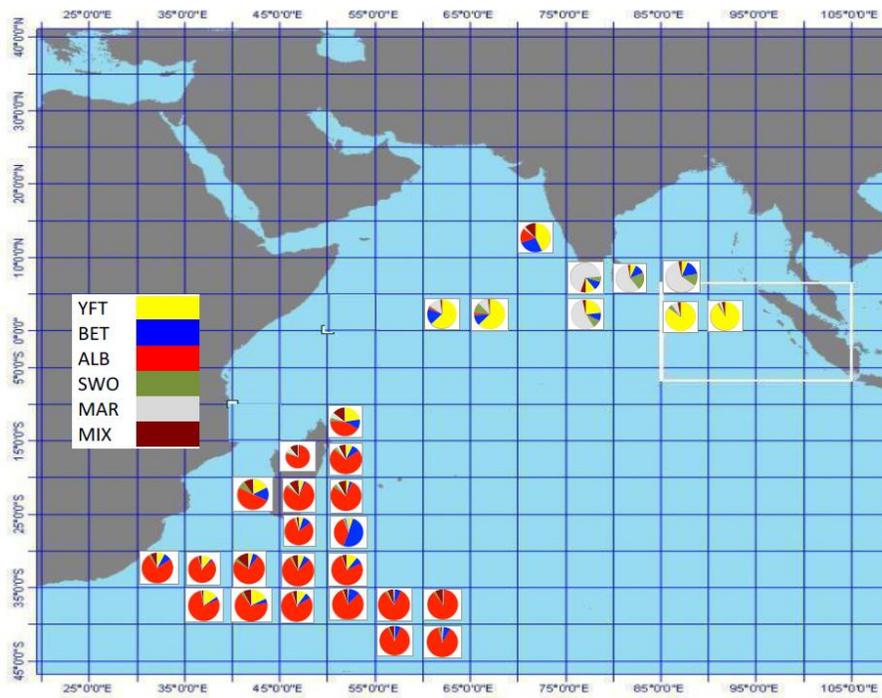


Figure 1: Fishing areas covered by Malaysian tuna longliners in the west and East Indian Ocean. The areas in the northern hemisphere in the Eastern Indian Ocean were the fishing areas covered by tropical longliners based in Fishing Port in Malaysia.

## Annual Landings

Figure 2 shows annual landings of billfishes by Malaysia flag tuna longliners since 2003 to 2017. In 2017, the record was only to July 2017. Overall, the catches of billfishes declined starting from 2008 reaching the lowest in 2012. The landings of billfishes increasing again from 2013 at 54 tonnes to reach the maximum 126 tonnes in 2015. In 2016, the catches decreased by more than 57% as to 2015. In 2017, the billfish catches consist of the landings from recorded 15 fishing vessels; 5 temperate tuna longliners and 10 tropical tuna longliners. As the fishing vessels increase, the catches of billfishes in 2017 (up to July) have increased by 83% to 99.5 tonnes compared to landings in 2016. During the same period (January – July 2017), the catch of billfishes from temperate tuna longliners and tropical tuna longliners were 25 tonnes and 75 tonnes respectively.

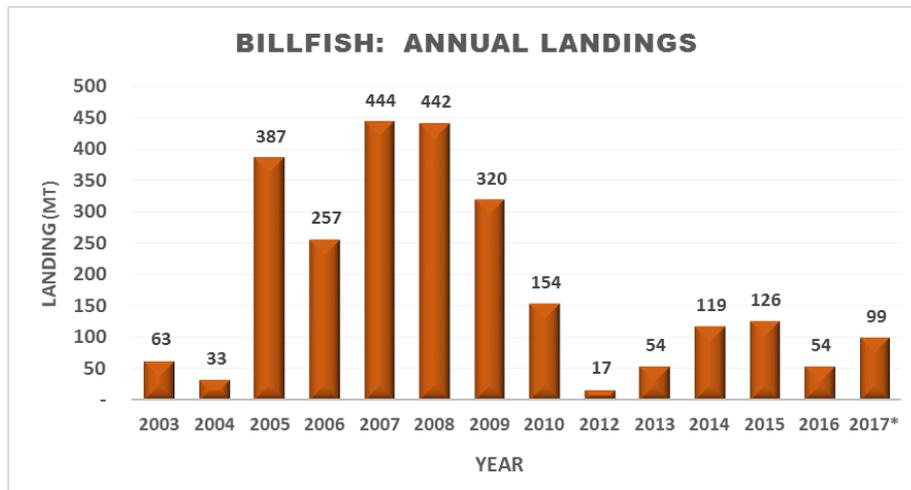


Figure 2: Annual landings of billfishes by Malaysian flag tuna longliners fishing in the Indian Ocean.

#### Catch Percentage of Billfishes and Mixed Fish.

Annual catch (%) of billfish and mixed fish from total landings of tuna longliners operating in the Indian Ocean is shown in Figure 3. Average catch (%) of billfishes from 2003 to 2010 was 11%, much higher than average catch (%) during the period of 2012 to 2016 which was 6.5%. For the period of 2003 – 2010, the catch of billfishes were from tropical tuna longliners whereas from 2012 – 2016, all the landings were contributed by the temperate tuna longliners. The catch (%) in 2014 was the highest by the temperate tuna longliners at 11.34% and the lowest in 2016 at only 3.31%. In 2017, the percentage catch are from both temperate and tropical tuna longliners. Mixed fish catch only constantly recorded from 2012 until present year with the catch at the range of 4 – 8% out of total.

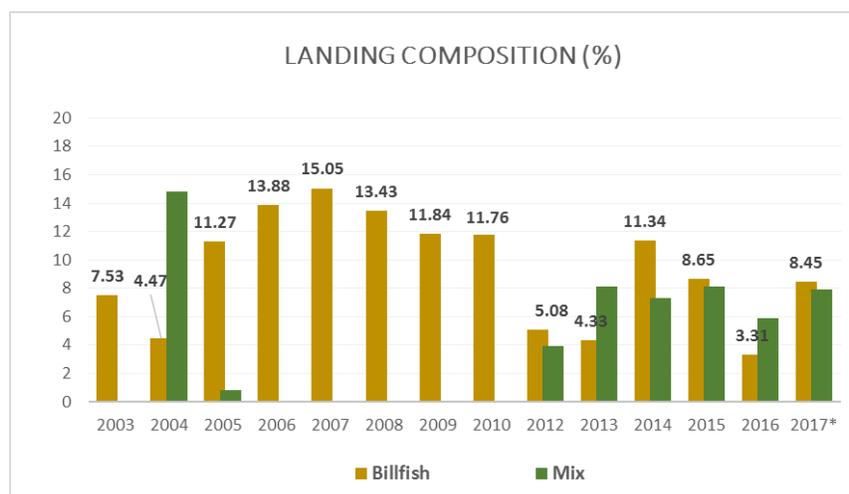


Figure 3: Catch percentage of billfishes and mixed fish by Malaysian tuna longliners from 2003 to 2017 fishing in the Indian Ocean.

The catch pattern of black marlin and swordfish from 2013 to 2016 is shown in Figure 3. For black marlin, the landings seemed stable within the range of 18.5 to 31.5 tonnes with the average 24.4 tonnes. The lowest catch was in 2016 at 18.48 tonnes and the highest in 2013 at 31.48 tonnes (Figure 3). However, the catch of swordfish vary significantly during the same period with the range from lowest catch in 2013 at 22.3 tonnes to the highest in 2015 at 103.9 tonnes. The catch of swordfish in 2016 dropped by 66% to 35.3 tonnes. All the landing during the period of 2013 to 2016 were from temperate tuna longliners fishing in the western Indian Ocean.

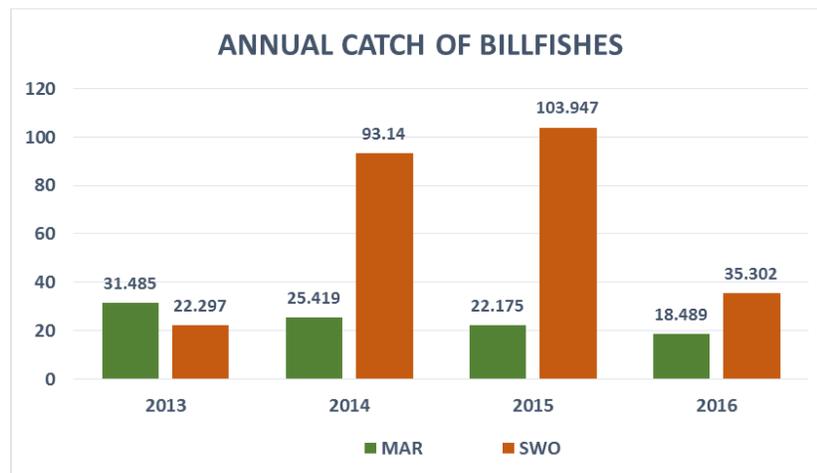


Figure 4: annual landing of Marlin and Swordfish from 2012 to 2016 by Malaysian temperate tuna longliners in the Eastern Indian Ocean.

### Catch Composition

Catch composition of billfish species shown in Figure 4 were from the average landings of tropical tuna longliners and temperate tuna longliners during the period January – July 2017. The landings by temperate tuna longliners are dominated by tuna species (90%) with albacore tuna accounted to 82% and the billfish and mixed fish represent 10% of the catch. From the billfishes landings, the swordfish contribute 2.2% with the least by blue marlin 0.1%. For tropical tuna longliners, the average catch of tuna species accounted 69% of the total landings. The tuna species is dominated by yellowfin bigeye and albacore at 43%, 14% and 12% respectively. The catch of billfish species in tropical tuna landings is dominated by striped marlin and blue marlin and swordfish accounted only 4% each. Generally the catch composition in tropical tuna longliners landing is more distributed compared to the catch by temperate tuna longliners.

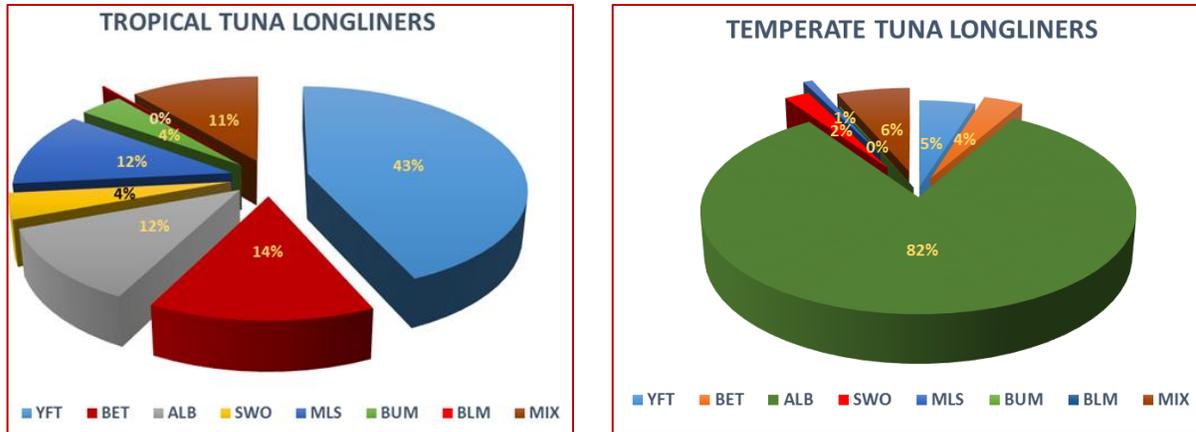


Figure 4: Catch composition (%) of billfish species by Malaysian flag tropical tuna longliners and temperate tuna longliners operating in the Indian

### Monthly Landings

Monthly landings of billfishes from 2013 to July 2017 is shown in Figure 2. Only black marlin and swordfish catch were constantly recorded since 2013 to 2016. The catch of black marlin in most of the time is low except during the end of the year. For SWO the catch were relative stable during March to August in 2016 and toward the end of the year, the landings show the increase. The landings of swordfish and black marlin in 2016 were 2.9 and 1.5 tonnes respectively. For both black marlin and swordfish, the landing appear to increase at the end of the year and early of the following year. In comparison, the swordfish landings in 2014 and 2015 were higher than in 2016. The landing of striped marlin were higher from January to April 2017 and sharply dropped during May. The catch of striped marlin and blue marlin were from tropical tuna longliners operating in eastern Indian Ocean near the equatorial waters.

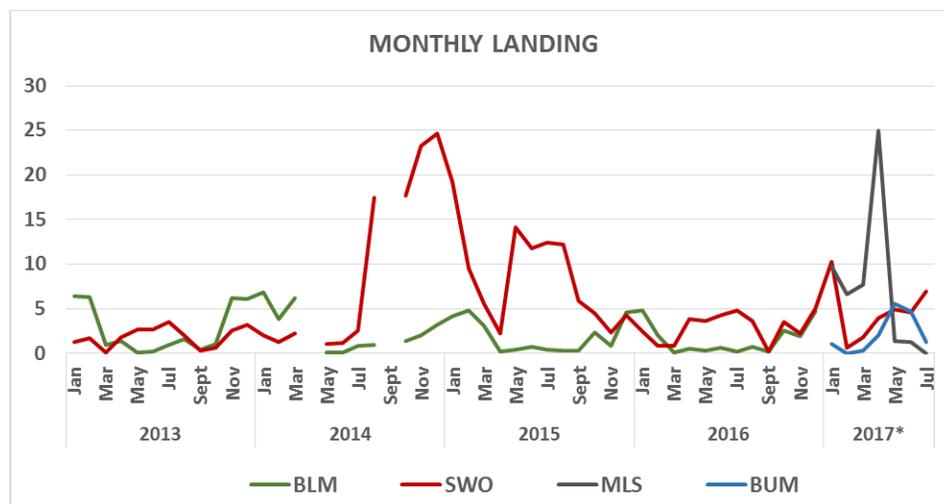


Figure 5: Monthly landing of billfishes by longliners targeting albacore tuna and tropical tuna.

### Fishing Effort and CPUEs of Marlin and Swordfish

Distribution of fishing effort ( number of hooks) used by tuna longliners from 2013 to 2016 is shown in Figure 6. The range of effort used during 2016 was 88,400 to 404,400 hooks. There were two extreme fluctuation in effort in 2016 where the effort level reduced to the lowest in February to March and in September. The sharp decrease in effort was due to the regular maintenance of the fishing vessel at port and this normally take a month. For each vessel normally a total of 3000 hooks are used at each shooting during fishing operation. April to August 2016 is the peak fishing season where all the vessels moving southward to hunt for albacore tuna.

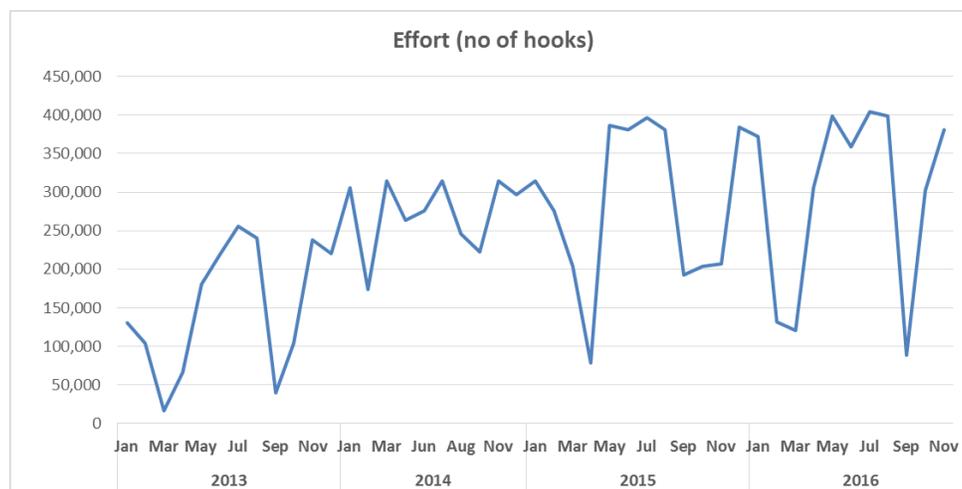


Figure 6: Fishing effort (number of hooks) used by Malaysian temperate tuna longliners from 2013 to 2016.

### CPUEs of Marlin and Swordfish

Figure 7 shows the trend of nominal CPUEs for Marlin and Swordfish of Malaysian tuna longliners. The range of nominal CPUE for marlin species was 0.002 – 0.33 tail/1000hk with the average 0.01 tail/1000 hooks. The CPUEs of Marlin seemed to increase toward the year end until the early of the following year. The CPUE of swordfish show a declining trend from January to November 2015 and relatively stable within 0.1 – 0.3 tail/1000hk until the end of 2016. The range of CPUE for swordfish was 0.4 – 1.21 tail/1000hks with the average 0.4 tail/1000hks. Unlike 2015, the swordfish CPUEs in 2016 seems stable with less extreme fluctuation.

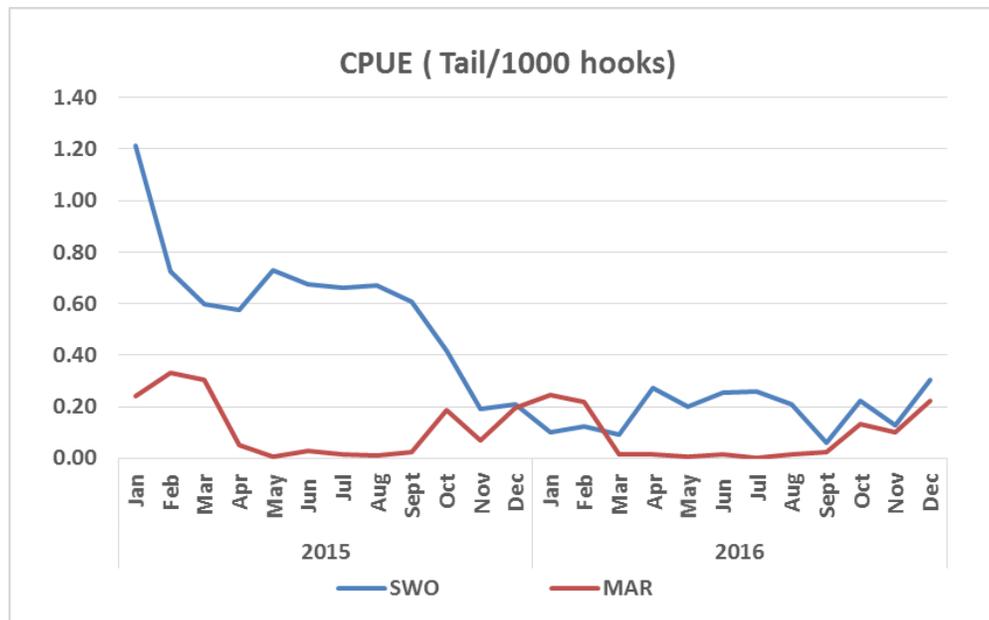


Figure 7: Trend of nominal CPUEs of Marlin and Swordfish from Malaysian tuna longliners targeting albacore tuna.

## DISCUSSION

As the temperate tuna longliners landed their catches in Port Louis, Mauritius, this hinder the monitoring capacity by the Malaysian Fisheries Authority to specify billfish catches to the species. At present, catch data on billfish are only taken from the logbook of the vessels operator. Malaysia expect to improve their catch effort data collection on billfish in near future as the tropical tuna longliners have started their operation since January 2017 and land their catches in Penang. This will enable Malaysian Fisheries Authority to monitor landing data on billfishes and improve the catch effort reporting on each billfish species. The catch of billfish contribute less than 12% out of the total landings by temperate tuna longliners but much higher by tropical longliners at 20%. With the contribution of billfish catches from the tropical tuna longliners landings at the Penang Port, this will help trigger the development of processing industry on tuna and tuna-like species including billfish.



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