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Catches of yellowfin tuna (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*) from longline in Kenya EEZ during the year 2016

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Yellowfin tuna (*Thunnus albacares*), and bigeye tuna (*Thunnus obesus*) are the main target pelagic species caught by a Kenyan longliner in the Kenyan EEZ during the year 2016. The total landings recorded were 150 tons. Yellowfin tuna landings were 50 tons representing 33% of the total catch. Bigeye tuna was the second most landed species with 28 tons representing 19% of the total catch. The two tuna species represented 52% of the total catches landed from the Kenya longliner. Other major species landed were swordfish and black marlin representing 13% and 7% of the total catch respectively. A look at the temporal distribution of the catches showed the month of May recording the highest catches with nearly 36.9 tons reported while the lowest catches were recorded in August standing at 9.7 tons. The yellowfin tuna catches were highest in the month of May with 22.4 tons recorded while the lowest was in September with 0.7 tons recorded. The highest catch for bigeye tuna was reported in September with 10.7 tons recorded while the lowest was in July with no catches of bigeye reported. The average size of Bigeye tuna was 47.2 ± 7.3 kgs while the yellowfin tuna recorded an average weight of 39.2 ± 13.7 kgs. The size frequency of the catches showed a unimodal distribution in bigeye catches and two distinct length classes in yellowfin tuna. The catches of 2016 are also compared with the 2007 longline catches in Kenya EEZ.

Introduction

Fishing in the Kenyan EEZs has been affected by piracy for a long time and the last time a Kenyan longliner fished in the waters was in 2011 when the only Kenyan longliner was hijacked by the pirates. Ever since then, little activity has been observed in the waters until recently when the foreign longliners and a local one returned to fish in the area. The activities of these DWFN were quite high during the 2005 to 2007 season before the full impact of piracy, which led to disappearance of the vessels. This report looks at the data reported by the Kenyan longliner in 2016 and compares it with the catches reported by longliners during the year 2007 when 33 longliners that had acquired Kenyan fishing licences. The daily catch report is as per the recording of the skippers in the logbook. During the 2016 period, the State Department fore fisheries and the Blue Economy also deployed observers on board the vessels who were able to collect lengths of different species caught and are also reported here.

Catch Composition

During the 2016 year, the total catch by the longliner was 150.4 tons. This catch were dominated by yellowfin tuna (33%) and bigeye tuna (19%). The other species reported were swordfish (13%), Black marlin (7%) and hammerhead shark (6) while the rest of the species represented 22% of the catch (Figure 1). The catch in 2007 was dominated by bigeye tuna (42%) and yellowfin tuna (29%). The composition of swordfish then was third at 12%. The landings of marlins combined then was 4% (Figure 2). The total landings reported by the 33 longliners then was 1,001 tons.

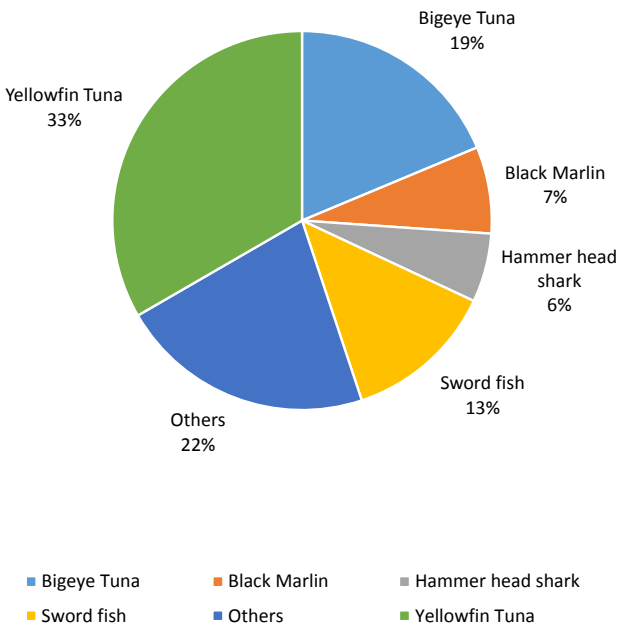

Figure 1: Catch composition of the longline in 2016

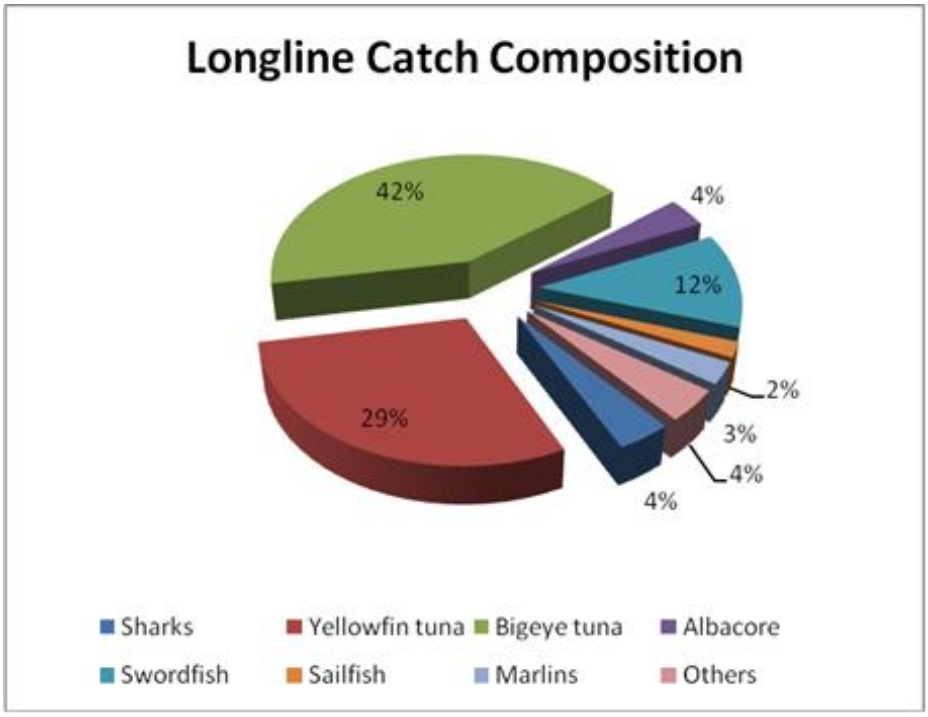

Figure 2: Catch composition of longline vessels in Kenya EEZ in 2007

Monthly catches.

The month of May recorded the highest catches ≈ 37 tons followed by July and September ≈ 23 and 17 tons respectively. In the months of August and October were the lowest catches reported as ≈ 10 tons each (Figure 3). In 2007, the highest landings were reported in March, April and June with ≈ 191, 145 and 110 tons respectively. The lowest catches were recorded in August and October, which corresponds to the 2016 lowest catches (Figure 4).

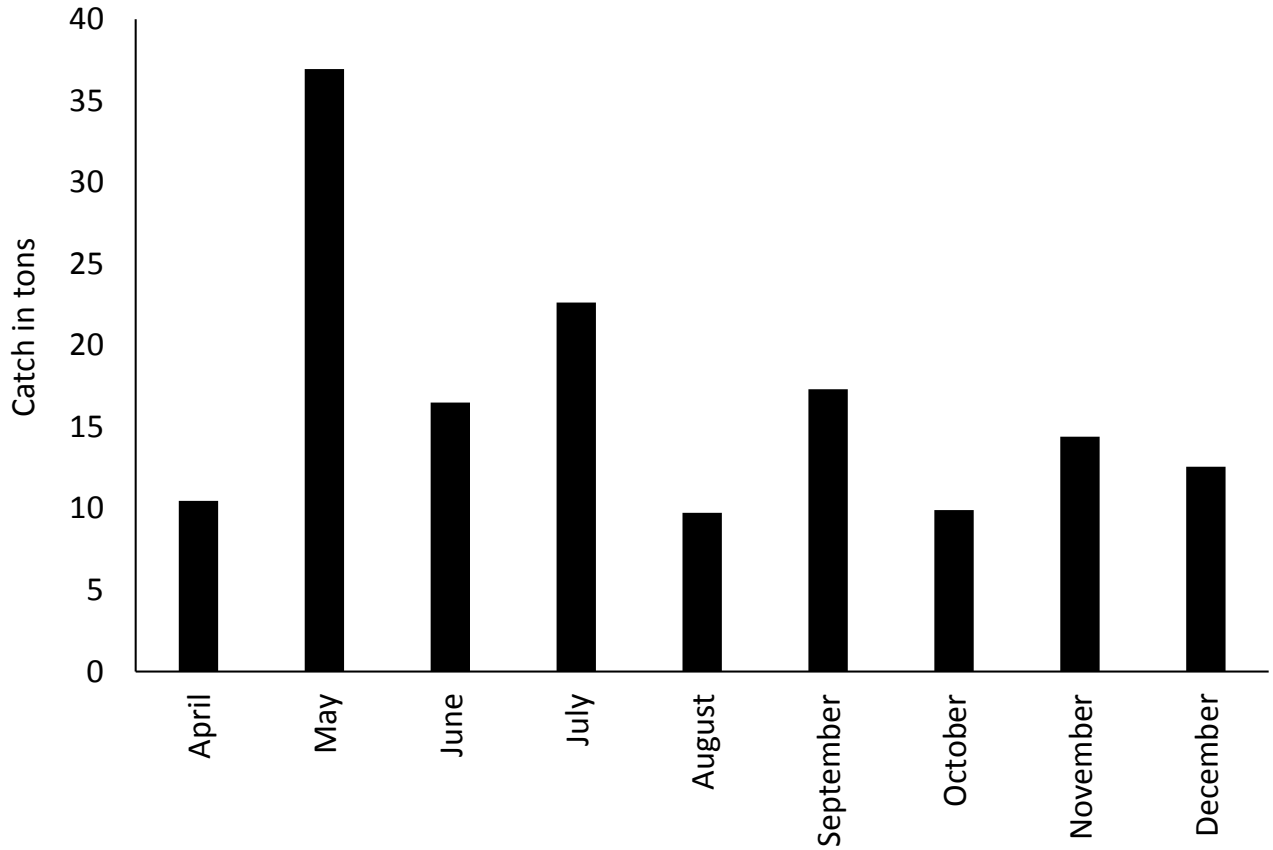

Figure 3: Monthly catches in 2016

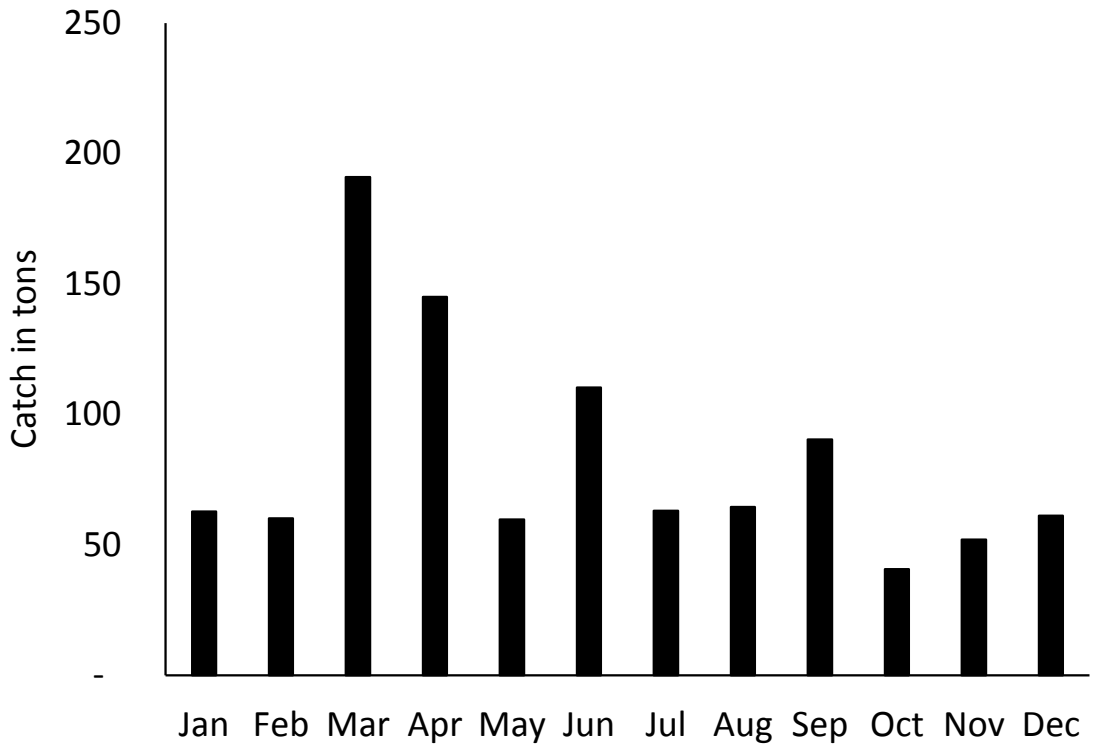

Figure 4: Monthly catches in 2007

Fishing effort

The fishing effort here is considered in terms of the average number of hooks deployed per vessel per month and also the number of days when actual fishing took place. The average number of hooks deployed per day from April to August was 1,500 but the numbers increased from September to 2,200 with the highest reported in November with an average of 2,400 hooks (Table 1). The number of hooks deployed by the longliners in 2007 ranged between 3,100 and 2,300 (Figure 5). In 2016, the number of fishing days were highest in July and lowest in September. During the 2007 fishing, the average monthly number of fishing days per vessel were highest in June and lowest in February (Table 2).

Table 1: Effort in terms of average hooks per day and number of fishing days in 2016

Month	Av. No. of hooks per day	Number of fishing days	Total catch
April	1,500	8	10,460
May	1,500	23	36,937
June	1,500	21	16,495
July	1,500	29	22,634
August	1,500	12	9,730
September	2,200	8	17,307
October	2,300	16	9,909
November	2,400	20	14,410
December	2,300	14	12,559
Total		**151**	**150,441**

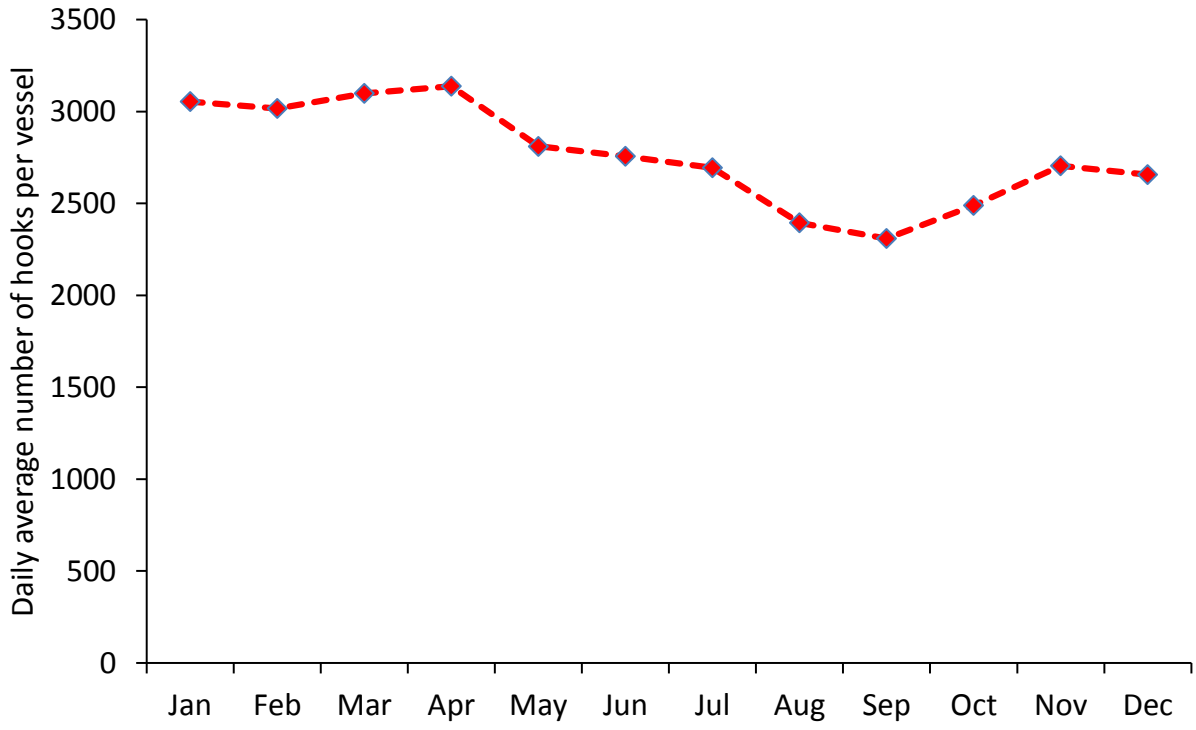

Figure 5: Average number of hooks per vessel in 2007

Table 2: Effort in terms of average hooks per day and number of fishing days in 2007

Month	Fishing days	Vessels	Average fishing days per month	Av. Hooks per vessel
Jan	74	6	12	3100
Feb	44	7	6	3000
Mar	144	14	10	3100
Apr	116	9	13	3100
May	74	5	15	2800
Jun	207	13	16	2800
Jul	170	13	13	2700
Aug	154	12	13	2400
Sep	184	13	14	2300
Oct	111	11	10	2500
Nov	92	6	15	2700
Dec	73	9	8	2700

Catch per unit effort

The monthly average catch of fish in numbers per 1000 hooks was mainly below 10 except for yellowfin tuna where catches of over 30 fish were recorded in May. Yellowfin tuna, bigeye tuna and swordfish were the highest number of fish caught per 1000 hooks per day (Figure 6). The catches of black marlin in May also exceeded 10 though they remained low for the other months. Bigeye tuna and swordfish catches dominated in September while the catches of the other species declined. This could have resulted due to the shift in the operations of the vessels where the number of hooks increase and the average setting depth of the hooks increased. The catches in 2007 were relatively lower than the 2016 catches. The highest catches were of yellowfin tuna about 10 fish per 1000 hooks per day (Figure 7).

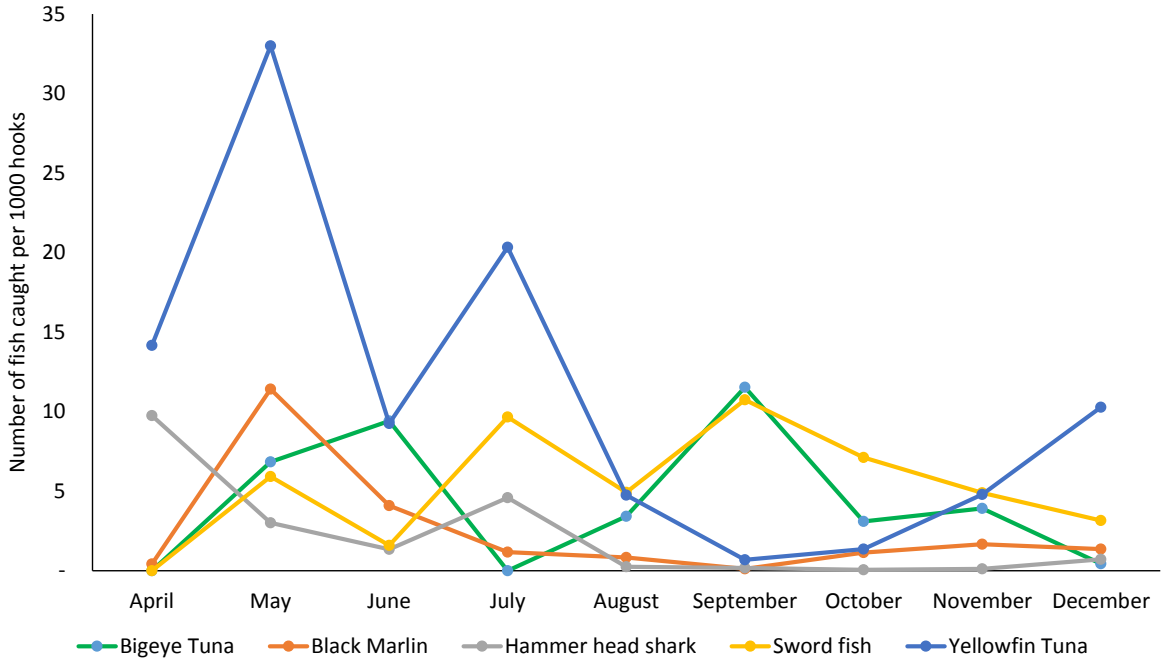

Figure 6: Catch in number of fish per 1000 hooks in 2016

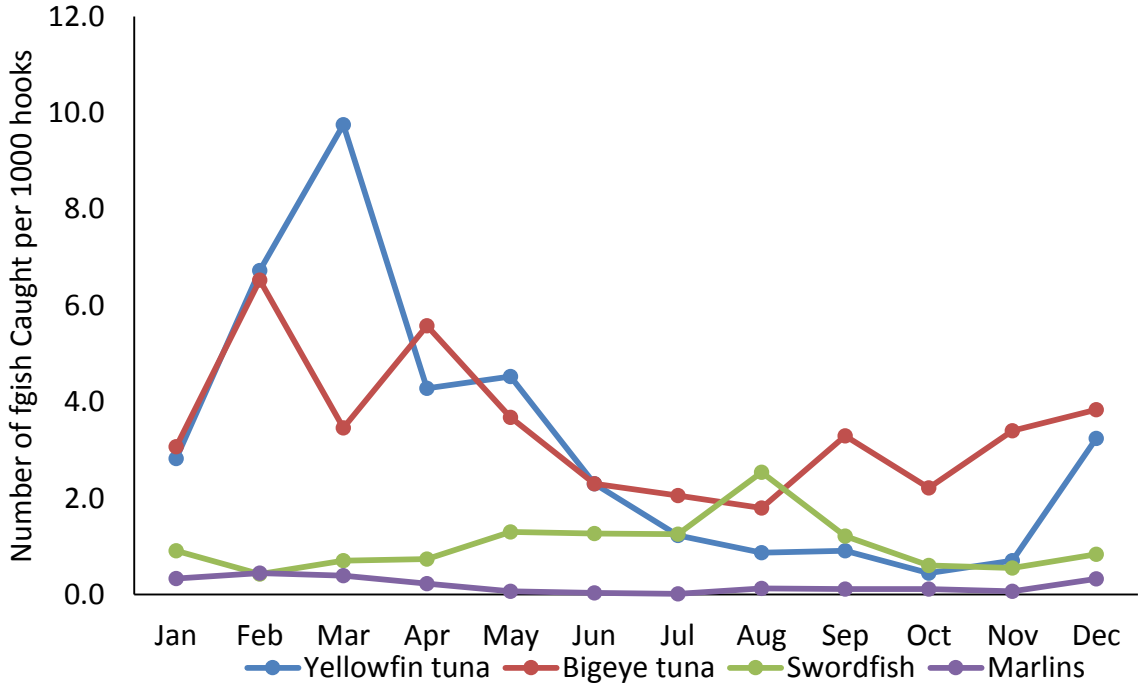

Figure 7: Catch in number of fish per 1000 hooks in 2007

Length frequency of the catches

During the fishing expedition, an observer was placed on board for species identification and collection of biological data for a period of one month. A total of 24 species were identified from the catch. The length measurement taken for yellowfin tuna and bigeye tuna were fork lengths while for the swordfish, the lower jaw fork length was used. The species mainly caught were swordfish, yellowfin tuna and bigeye tuna and the number of fish sampled for length for the three species were 106, 79 and 77 respectively. The length distribution of the three species showed a unimodal distribution for bigeye tuna with a peak at 152.5cm. The smallest fish were from the 57.5 mid length class while the largest fish were from the 187.5 mid length class. Yellowfin tuna had three class modes with the smallest from the 57.5 mid length class. The second group had a peak at 97.5cm while the largest group had a peak at 147.5 cm. As similar pattern was also observed in the swordfish with three modes at 82.5cm, 117.5cm and 172.5cm. The largest swordfish belonged to the 212.5 mid length class.

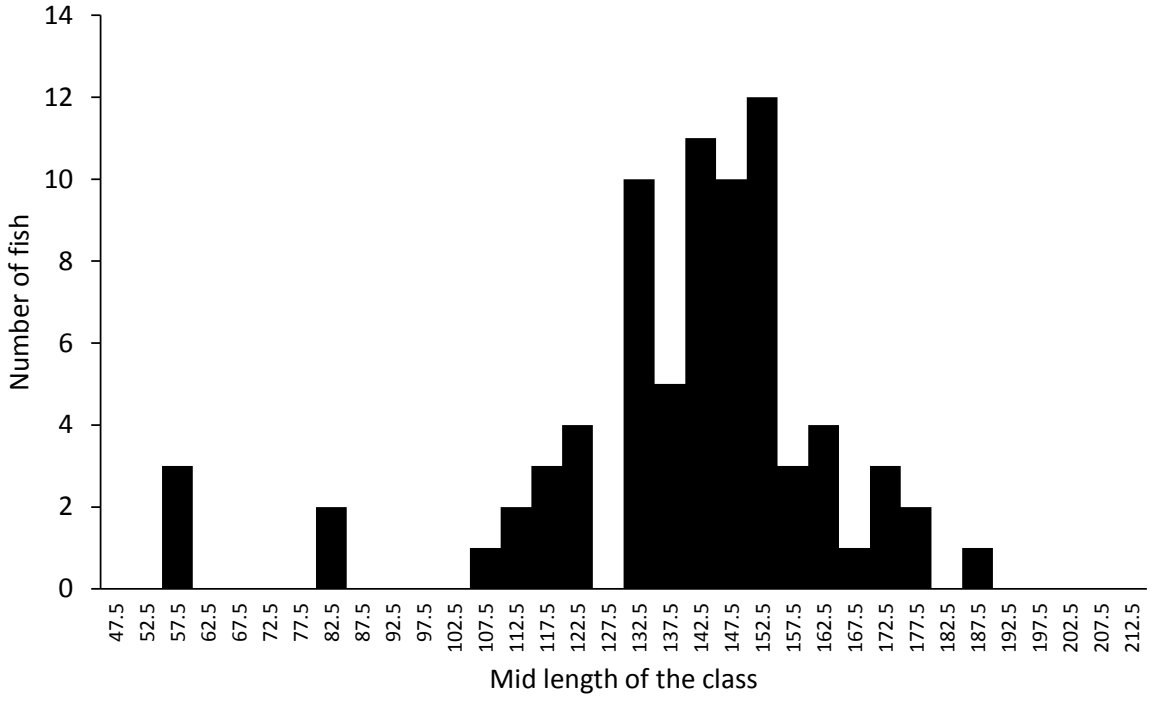

Figure 8: Length frequency distribution of *Thunnus obesus*

Figure 9: Figure 8: Length frequency distribution of *Thunnus albacares*

Figure 10: Figure 8: Length frequency distribution of *Xiphias gladius*

Discussion

The catches of 2016 were dominated by yellowfin tuna while those of 2007 were dominated by bigeye tuna. In both instances, swordfish was the third species in terms of total catch. The difference in the catches could be due to the operations as it was noted that when the hooks depths increased, the catches of bigeye tuna were more than those of yellowfin tuna. There was a substantial increase in the composition of black marlin in the recent catches. The combined catches of all marlins in 2007 was only 2% while the recent catches had 7% of the total catches being black marlins. This shows a slight shift in the species composition over time, though yellowfin tuna and bigeye tuna are still the most dominant species in the Kenya EEZ.

The monthly landings for the 2016 lacked the January to March period as compared to the 2007 duration which covered the whole year. In the recent past, May, July and September were the months with the highest catches while in 2007, the highest catches were recorded in March, April and June. In both instances, the March to July season seems to dominate the catches in the Kenyan EEZ. A closer look at the catch per unit effort shows a higher average CPUE for the combined species during this period. The yellowfin tuna CPUE is usually high in the first half of the year while the bigeye tuna dominates in the second half of the year. The month of September in particular has a high catch of both swordfish and bigeye and from the operation point of view seems to be a time when the fishing gear configuration is changed. While in 2007 the other vessels reduced the average number of hooks per day, the 20016 fishing had the reverse with the number of hooks being increased. A closer look at the set by set operations of the vessels would give more insight into the changes in operation and the species composition of the catch.

The length structure of bigeye tuna was mainly unimodal with most of the fish caught being in the range of 137cm to 152cm. The catches of yellowfin

tuna and swordfish revealed different cohorts being exploited by the fishery with the dominant group for swordfish being the 112cm to 142cm length classes. Yellowfin tuna on the other hand had two prominent peaks at 97.5cm and 142.5cm classes. In all the three species, there were small individuals of yellowfin tuna and bigeye tuna at 57.5cm length class while those of swordfish were at 82.5cm. This seems to be the recruitment length for the species into the longline fishery. Although the majority of the catches from longline fishery are mature individuals, the recruitment sizes though not many in number is composed of immature individuals.

Conclusion

There has been a slight change in the species composition and the catch per unit effort over the ten years period which have been affected by the piracy within the Kenyan EEZ. A deeper insight into the operations of the vessels and the gear settings would be more informative. The continued observer program in the longline fishery is encouraged to provide more insights on the tuna longline fishery.