COMPARISON BETWEEN INDUSTRIAL AND ARTISANAL TUNA FISHERY IN KENYA

By Stephen Ndegwa[1], Zachary Ogari[1], Alex Lukhwenda[1], Elizabeth Mueni[1], Nina Wambiji[2], Maorine Okeri[2]

Abstract

The paper looks at data from both Industrial vessels and artisanal vessels from 2019 to 2022. In terms of species composition, though the industrial vessels target mainly swordfish, yellowfin tuna and bigeye tuna are the main tropical tuna species landed by the industrial fleet. On the contrary, yellowfin tuna and bigeye tuna are the main tropical tuna catches from the artisanal fishery. In both fisheries, the number of skipjack tunas landed is minimal. In terms of spatial distribution, while most of the artisanal catches are from the territorial waters, the industrial catches are mainly form the EEZ and high seas. The sizes of yellowfin tuna species fish caught differ with industrial catches being larger (AvFL 131 cm) while the artisanal catches mainly compose of fish below 100 cm FL (AvFL 79cm). In terms of seasonality, most artisanal catches were caught between October and March while for the industrial catches the May to July season had the highest catches. While all the industrial catches were from longline gear, artisanal tropical tuna catches were from handlines, trolling lines, artisanal longlines and gillnets.

[1]Kenya Fisheries Service

[2]Kenya Marine and Fisheries Research Institute

Introduction

Tropical tuna fishing in Kenya is undertaken by both artisanal and industrial vessels. This report looks at the data reported by the Kenyan longliners between 2019 and 2022 and compares it with the catches reported by artisanal fishery during the same period. The daily catch reports are as per the recording of the skippers in the logbook. During the reporting period, fisheries observers were deployed on board the vessels and were able to collect lengths of different species caught and are also reported here.

Catch Composition

During the period 2019 to 2022, the total catch by the longliner was 1,742 tons. This catch were dominated by swordfish (59%), yellowfin tuna (13%) and blue sharks (12.0%). The other species reported were Bigeye tuna (6%) and while the other species accounted for 10% (Figure 1). ==The catch composition of the artisanal fishers was dominated by yellowfin tuna (29%) and bigeye tuna (42%). The composition of swordfish then was third at 12%. The landings of marlins combined then was 4% (Figure 2).==
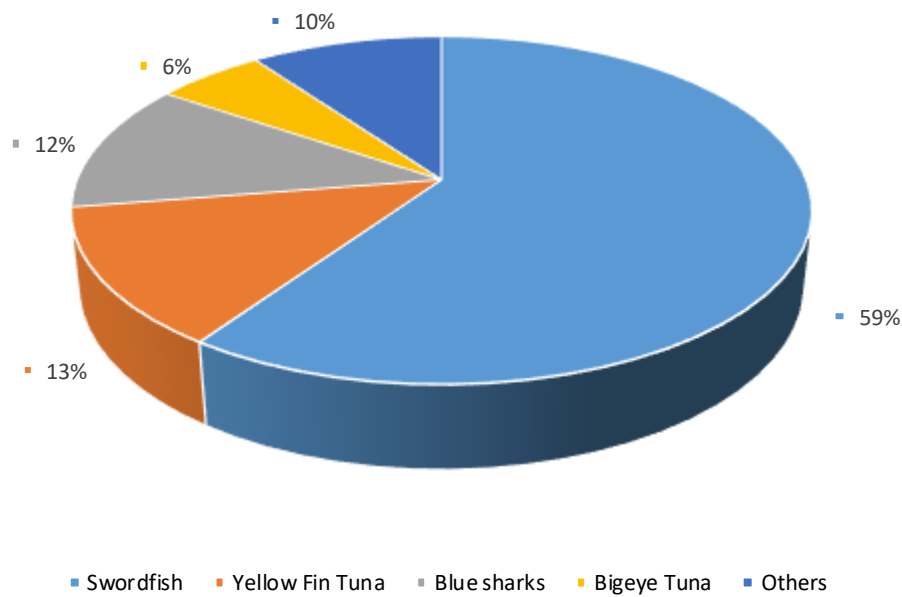

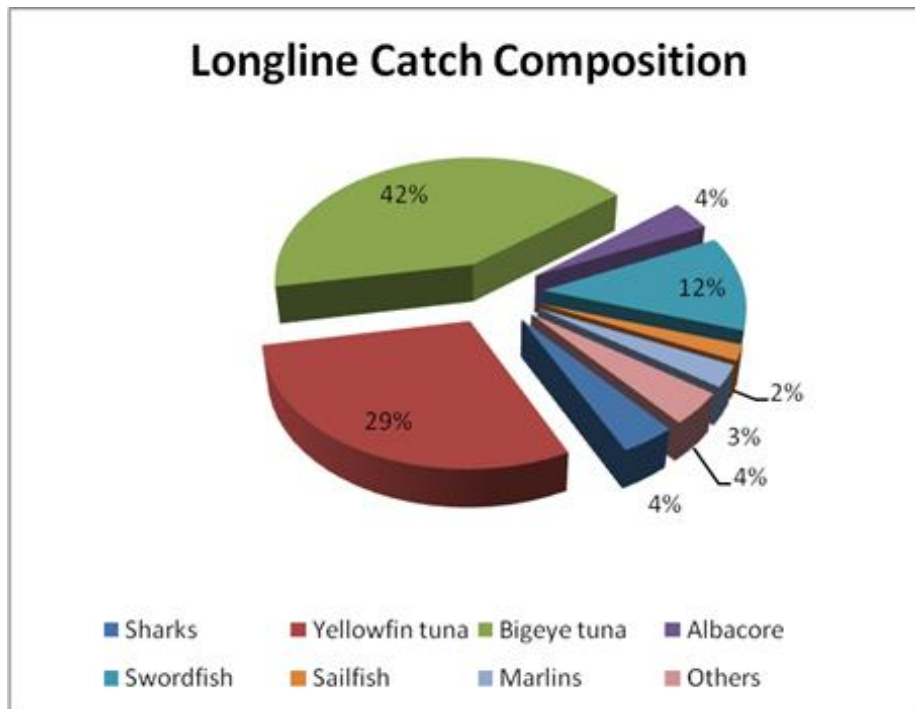Figure 1: Catch composition of the longline between 2019 and 2022

Figure 2: Catch composition of longline vessels in Kenya EEZ

Monthly catches.

The month of July recorded the highest catches ≈ 194 tons followed by May and October ≈ 185 and 179 tons respectively. In the months of November and September were the lowest catches reported as ≈ 65 tons and 109 tons respectively (Figure 3). For the artisanal fishery, 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 (Figure 4).
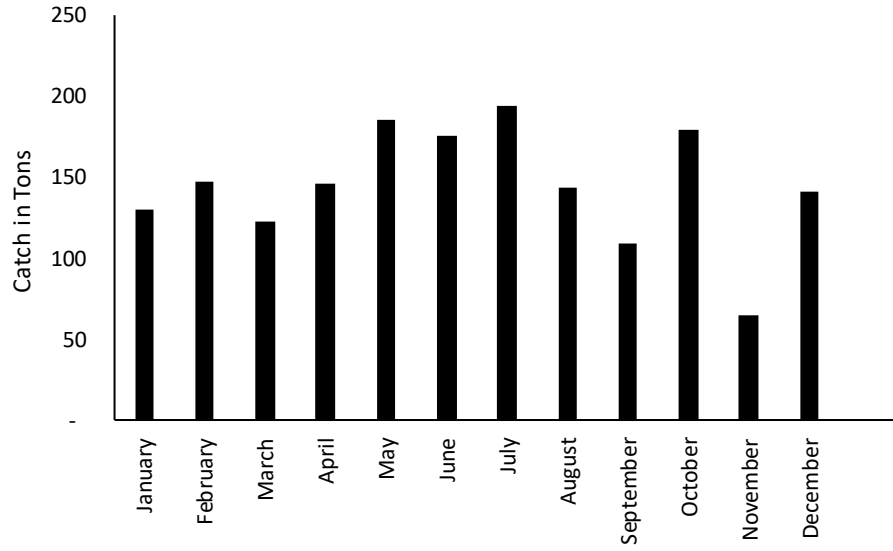
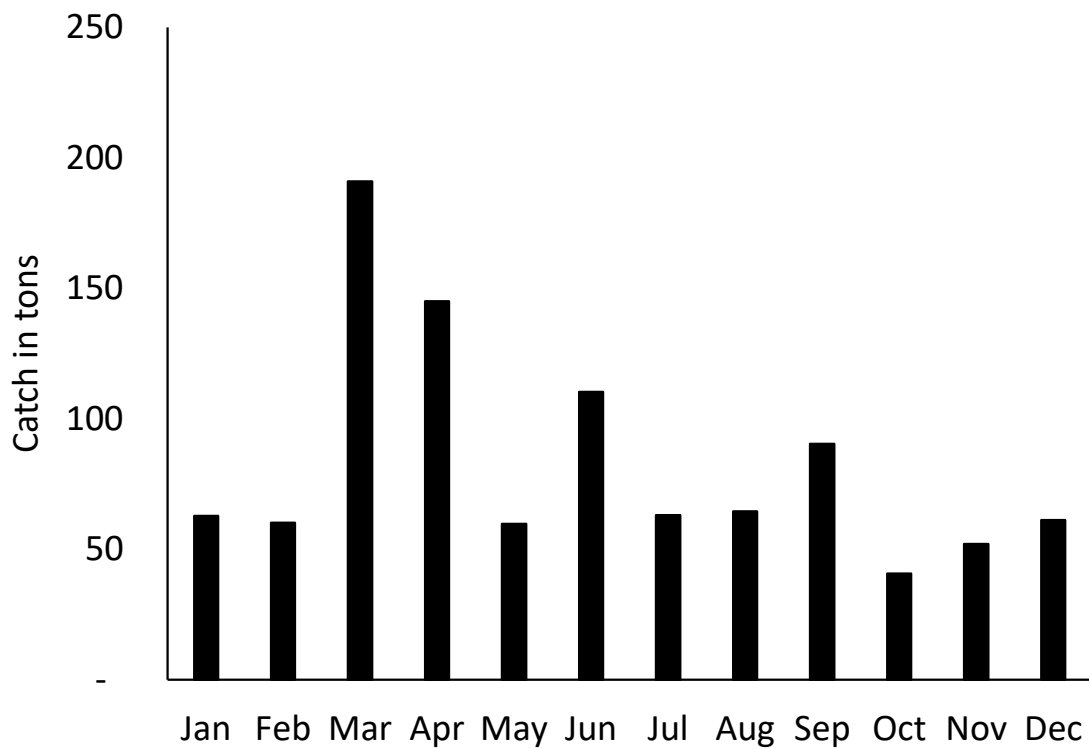Figure 3: Monthly catches between 2019 and 2022

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 was lowest during the month of February at 1,161 with the highest reported in November with an average of 1,547 hooks (Table 1). The average number of hooks deployed per day is shown in figure 5.

Table 1: Effort in terms of average hooks per day and total catches per month

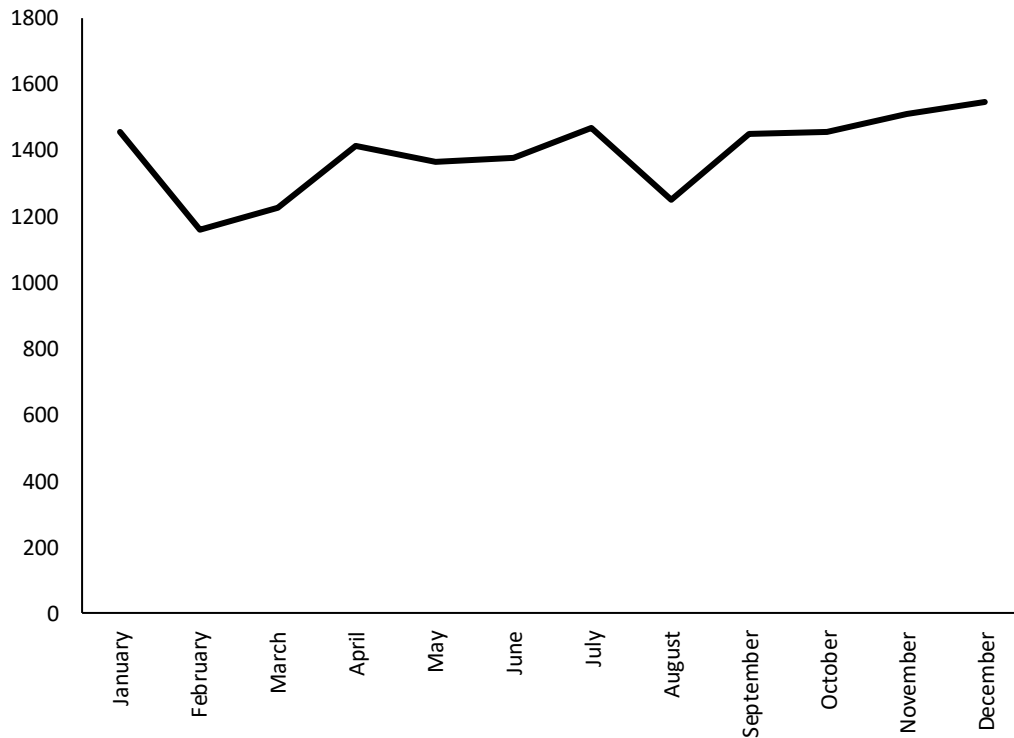| Month	Av. No. of hooks per day	Total catch (Tons)
January	1,459	130
February	1,161	148
March	1,229	123
April	1,413	146
May	1,364	185
June	1,377	176
July	1,468	194
August	1,249	144
September	1,449	109
October	1,455	179
November	1,513	65
December	1,547	141
Total		**1,742**

Figure 5: Monthly average number of hooks per vessel

Catch per unit effort

The monthly average catch of fish in numbers per 1000 hooks was mainly below 10. The highest number of fish caught per month was during the month of August at 13 fish per 1000 hooks while the lowest catches were recorded during the months of November, December and January with an average of 7 fish per 1000 hooks (Figure 6).
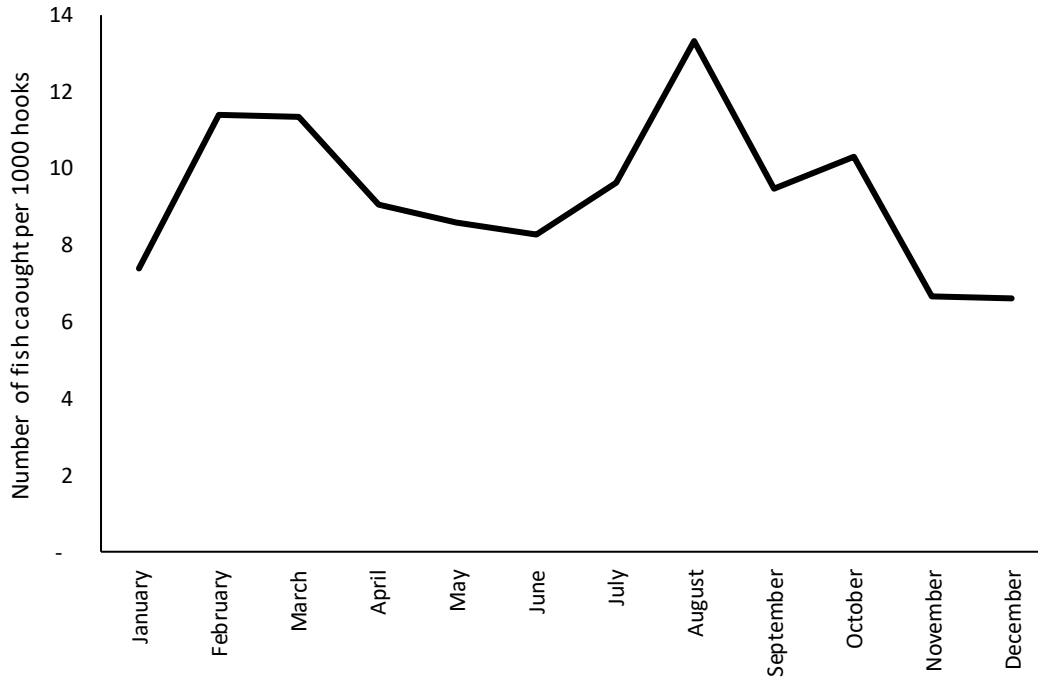
Figure 6: Catch in number of fish per 1000 hooks

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.
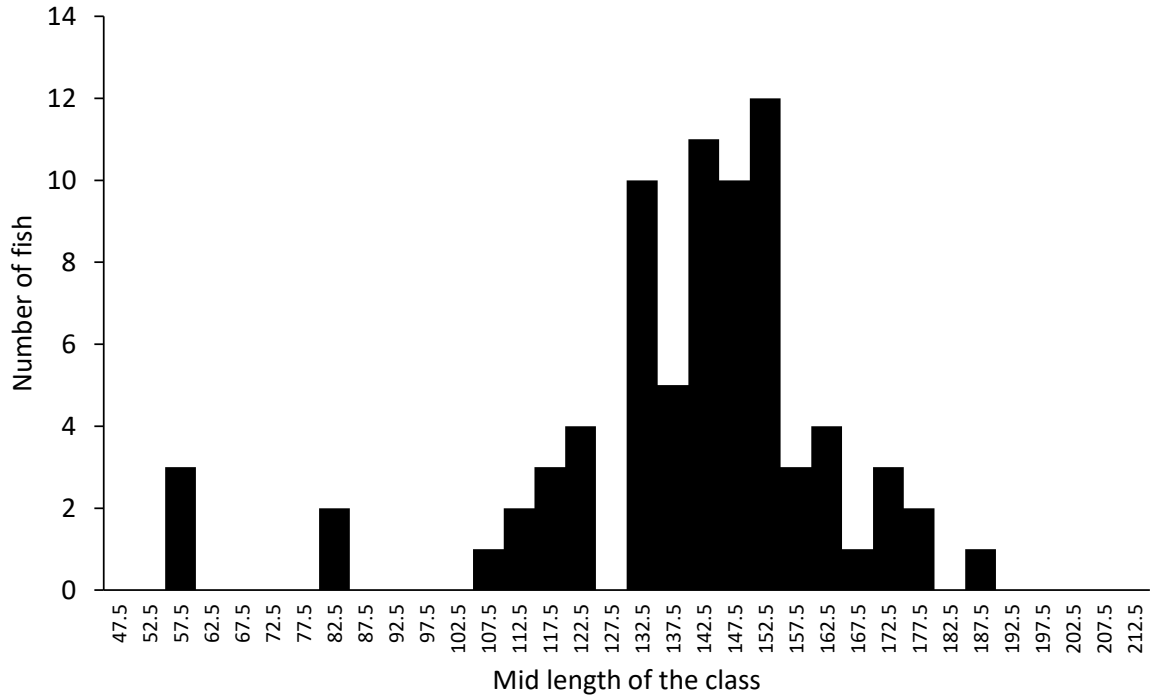
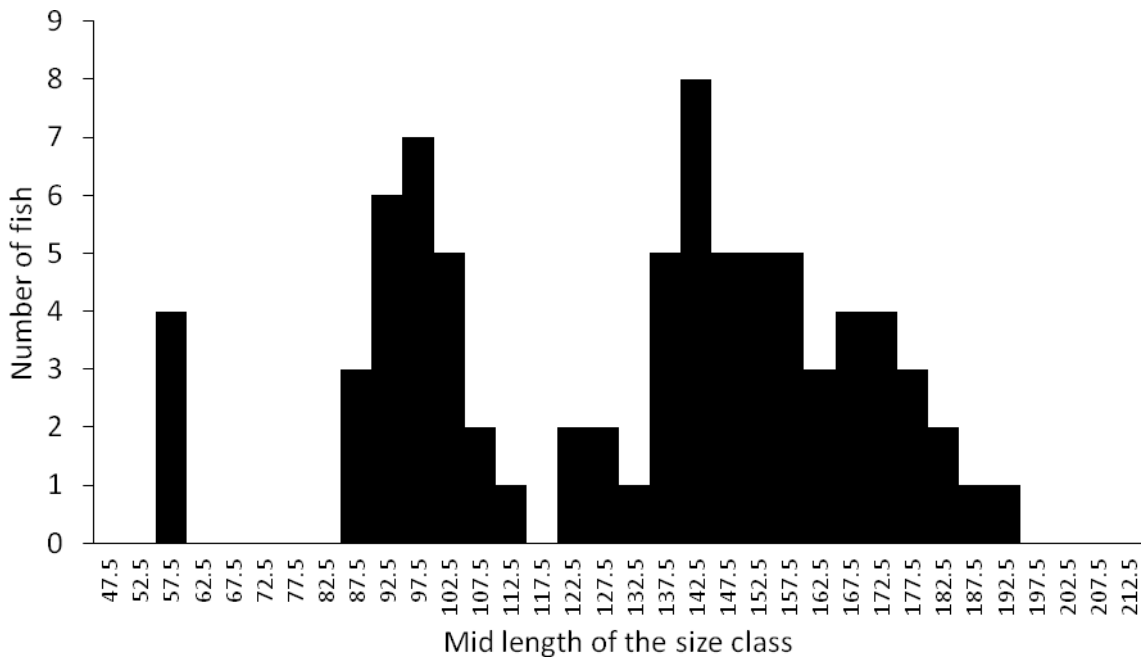Figure 7: Length frequency distribution of *Thunnus obesus*

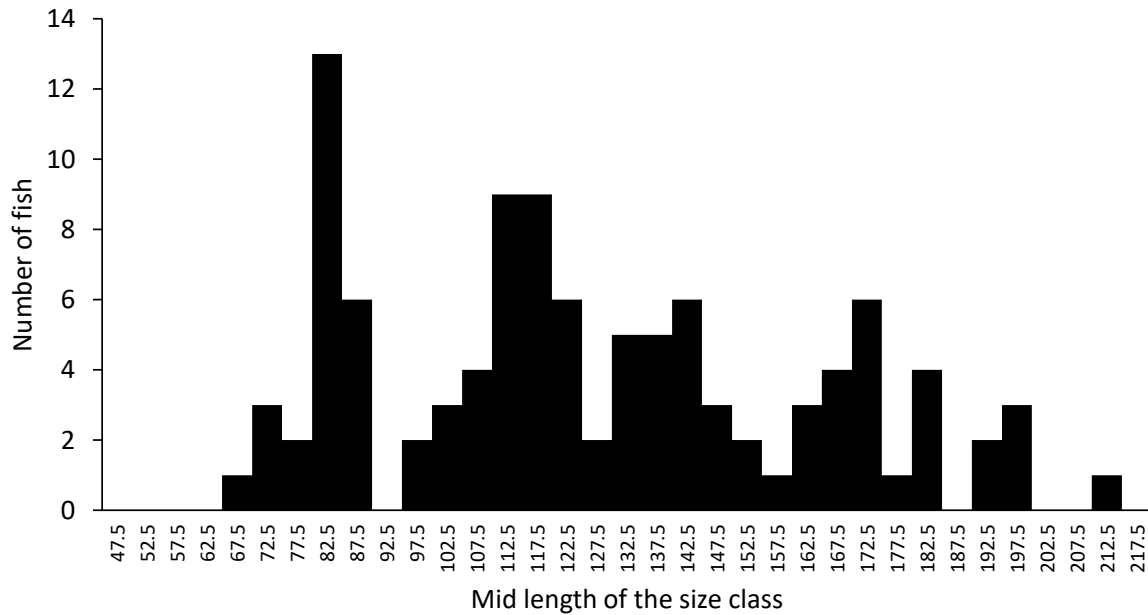Figure 8: Figure 8: Length frequency distribution of *Thunnus albacares*

Figure 9: Figure 8: Length frequency distribution of *Xiphias gladius*

Spatial distribution of the catches

The catches from longliners were spread between the the EEZ and the high seas. The highest recorded catches were from the EEZ while the catches from the high seas were less. The catches from the EEZ were high because most of the time the fishing vessels were fishing in the Kenyan or Tanzanian EEZ (Fig 10). The artisanal fishers on the other hand fished mainly within the territorial waters with few vessels fishing above 15 nm.
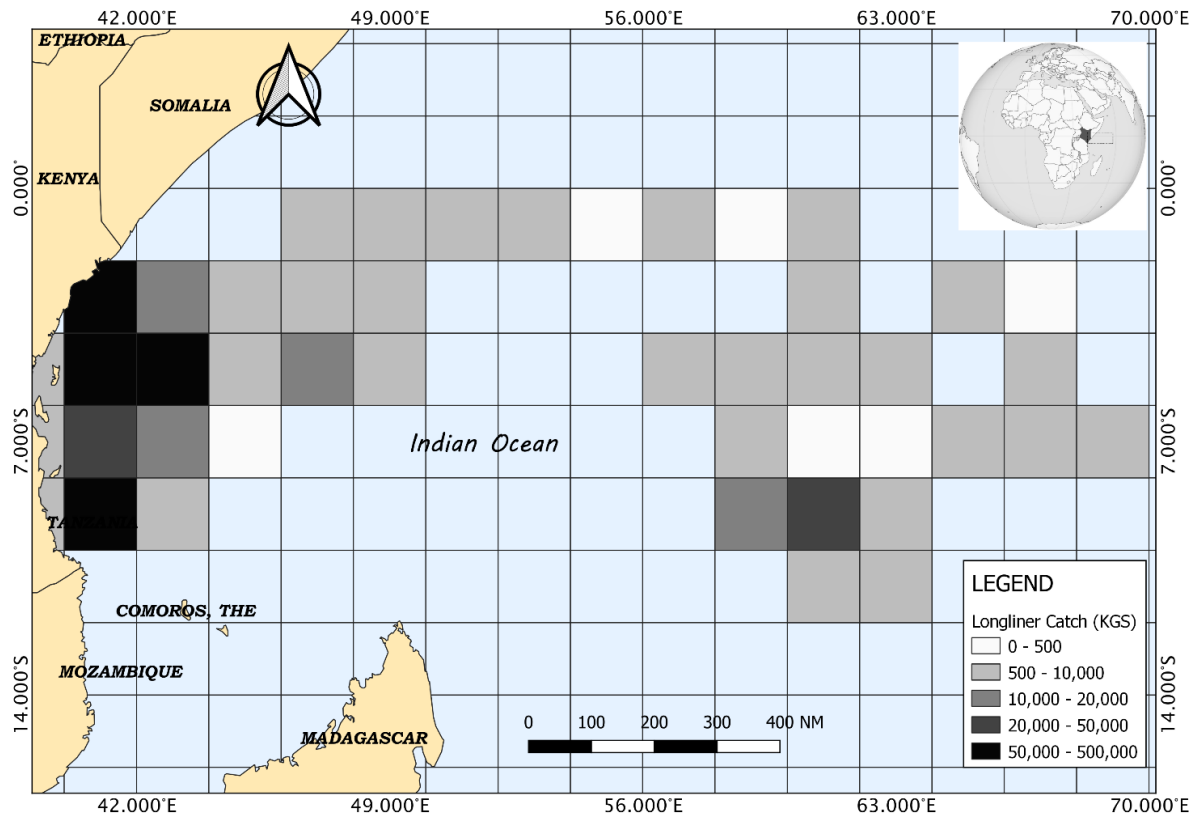
Figure 10: Annual distribution of the longline catches

Discussion

The longline catches were dominated by swordfish, yellowfin tuna, blue sharks and bigeye tuna which combined composed of 90% of the total catches. For the small scale fisheries, Yellowfin tuna and bigeye tuna composed most of the catches. The catches for artisanal fishers were mainly from the coastal waters while the longline catches were recorded in the EEZ and high seas.

The monthly landings were highest for the industrial vessels for the months of May to July while for the artisanal fishery, the highest catches were between October and March.. 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.

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.