Analysis of catch and effort data of tropical tuna from purse seine and longline fishery in Mauritius (2014-2018)

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ABSTRACT

Catch and effort data obtained from fishing logbooks of the purse seine and longline fisheries were analysed from 2014-2018. It could be observed that there was an increasing trend in the catch of the national purse seiners from 8557t in 2014 to 22405t in 2018. This trend is mainly due to an increase in the fishing effort. The fishing effort was high in 2014 as the active fleet number recorded was highest with a total of 7 purse seiners. The catch composition showed a remarkable increase for yellowfin tuna when compared to skipjack and bigeye tuna. Yellowfin tuna was the dominant species (52.3%), followed by skipjack (39.2%) and bigeye tuna (8.0%). Majority of the catch was made on log school (64.7%) compared to that effected on free school (35.3%). The percentage catch of yellowfin tuna in free school was higher (81.1%) than in log school (36.5%). The spatial distribution for log school was spread between latitudes 14 degree North to 15 degree South. Whereas fishing on free school was effected between latitudes 7 degree North to 14 degree South. From the landings and fishing logbooks of local surface longliners (semi-industrial fishing boats), it was observed that there was a rise in the catch of tropical tuna (yellowfin and big eye) from 2014 to 2017 though a decrease was noted in 2018. The overall percentage of Yellowfin and bigeye tuna landed was 29.4 % and 12.4 % respectively. An analysis of the catch data of foreign licensed longliners for the past five years revealed an increasing trend in the catch of yellowfin and bigeye tuna from 13.7% in 2014 to 34.2% in 2018 though these vessels targeted mainly albacore tuna. The average CPUE (kg/hooks) ranged between 0.3 and 0.4 during the past five years.

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1. Introduction

With an Exclusive Economic Zone (EEZ) of 1.9 million square kilometres together with an extended continental shelf area of 396,000 square kilometres, jointly managed with the Seychelles, Mauritius continues to develop its seafood industry. The Seafood Hub at Port Louis is also considered as an efficient and attractive environment for the supply of value added processes and services related to the sourcing and marketing of sea food products**.** Among the different fisheries available in Mauritius, the tuna fishery is an important resource and tuna is also a vital raw material of two processing plants. The export of tuna represents about 90% of the total export of fish and fish products and contributes about 1.5 % in the GDP

Strategically located at the crossroads of Asian and African sea routes, the port of Mauritius continue to serve as an important transshipment base to tuna longliners since 1965. The longliners originates mainly from East Asian countries. Each year about 600 to 700 calls of these longliners are noted at Port Louis.Tuna transshipment is a valuable related activity since several decades.Tropical tuna landed by licensed and non licensed foreign vessels amounted to 18347 tonnes in 2018.

The tuna fishing industry consists of the purse seine and longline fishery. In Mauritius there are also some boats less than 24m operating in the semi-industrial fishery which targets swordfish and tuna.

The foreign licensed longliners target mostly albacore tuna though their catch also comprised of yellowfin, bigeye and skipjack tuna. From 1994, Mauritius had set up a licensing system and the number of licences issued to foreign vessels has increased since then. In 2018, a total of 196 licences was issued to foreign longliners to operate in the EEZ of Mauritius.

Mauritius has been involved in the purse seine fishery since 1979. Actually, there are three purse seiners operating under Mauritian flag. Since 2014, an increasing trend in the landing of tropical tuna has been noted from 12.2 % in 2014 to 31.9 % in 2018. It could also be observed that there has been an increasing trend in the catch of yellowfin tuna from 2014 to 2018. This was mainly due to large yellowfin caught in free school and an increasing number of sets in log school.

This paper gives an overview of the tropical tuna landings from licensed longliners and purse seiners for the past five years from 2014 to 2018. Moreover, catch data collected from semi-industrial fishing boats are also depicted. The data source of the different fisheries emanate from fishing logbooks submitted by masters of vessels while landing process is carried out at the port.

2. Catch and effort from national semi-industrial surface longline fishery

This fishery started in 1999 when only two boats were operating. Since then, this fishery was further developed and there has been a gradual increase in the number of fishing boats and fishing effort. It is important to note that in this fishery, all the boats are of less than 24m and their LOA ranged from 16.0m to 23.8m. The spatial distribution of these boats extended from latitudes 10^0 S – 21^0 S and longitudes 54^0 E – 66^0 E. Some boats under Mauritian flag also operate in the waters of Mozambique.

An analysis of the catch data from figure 1 below reveals that there was an increasing trend from 42.6 t in 2014 to 891 t in 2017 though a slight decrease was noted in 2018 (820.8t). The increase in the catch could be explained by the fact that the number of boats in this fishery fluxed from 3 in 2014 to 13 in 2018. Obviously, there was a rise in the fishing trips and fishing effort.

The total number of hooks deployed in 2014 was 105120 compared to 1 445 477 in 2018. The slight decrease in the catch in 2018 was due to a decrease in the number of effort (hooks). The overall CPUE ranged from 0.40 to 0.59 for the past five years.

The species composition of this fishery shows a dominance of swordfish (38.1%) followed by yellowfin (29.4 %) and bigeye tuna (12.4%). There was also a substantial increase in the catch of yellowfin and bigeye tuna combined from 19.2 tonnes in 2014 to 346 tonnes in 2018.

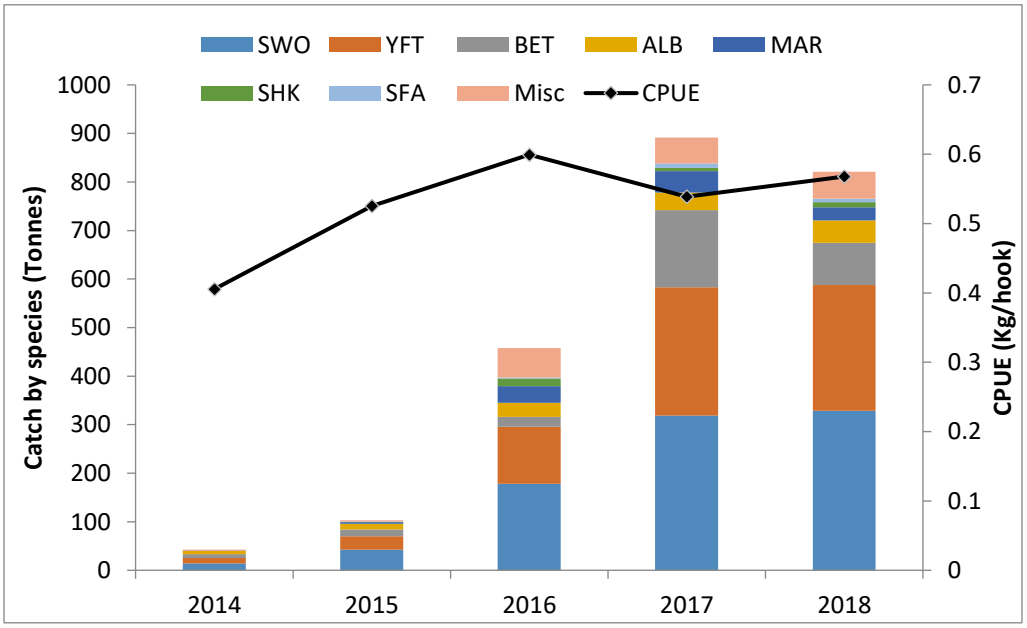

Figure.1 Catch/species composition of the semi-industrial surface longline fishery (2014-2018)

3. The foreign longliners operating under Mauritian licence

Fishing licences are issued to foreign vessels mainly from Asian origin to operate in Mauritian waters since 1994 to fish for tuna and associated species. There was an increase in the number of foreign licences since 2014 from 175 to 196 in 2018. As per licensed condition, these vessels have to submit a dully filled fishing logbooks while landing their catch at Port Louis. The logbook data are analyzed and cross checked with the vessel monitoring system prior to be considered for data entry.

The spatial distribution of these vessels was mostly concentrated in the EEZ of Mauritius from latitudes 01 S^0 – 24^0 S and longitudes 46^0– 66^0 E.

It could be observed (from figure 2) that catch in tonnes for the past five years ranged from 5686.4 tonnes in 2014 to 10079 tonnes in 2018. The highest catch was recorded in 2018. The species composition showed that the dominant species in the catch was albacore tuna (41.9%) followed by bigeye (20.8%) and yellowfin tuna (17.7%). The catch also consisted a small amount of skipjack tuna (1.1%). The CPUE for the past five years ranged from 0.3 to 0.4.

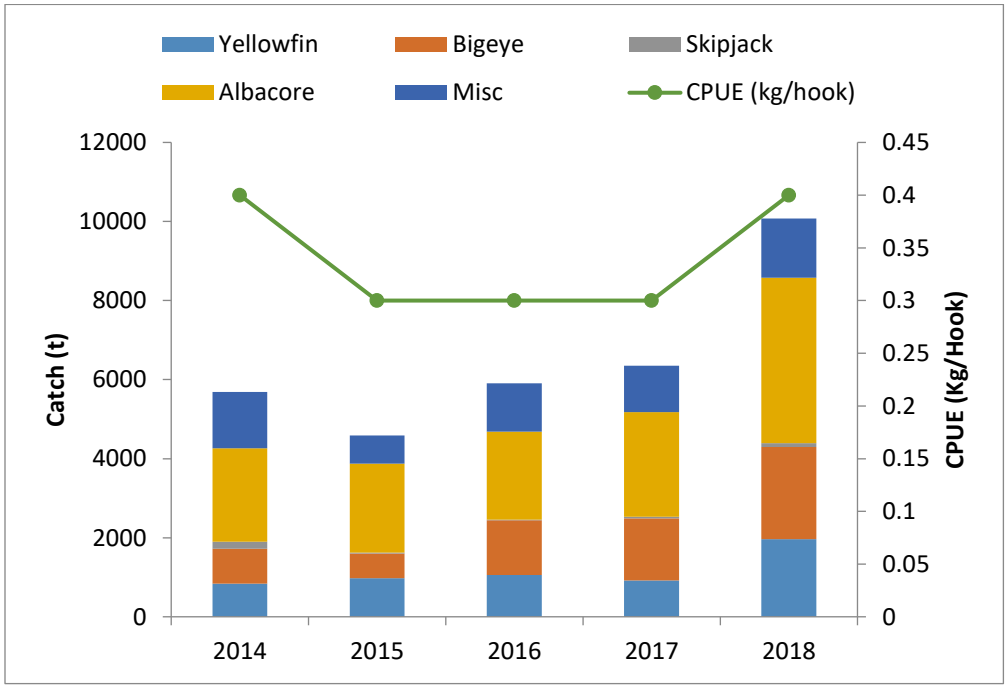

Figure 2. Catch/species composition of foreign licensed longliners (2014-2018)

Since 2014, it could be observed that the catch of the three tropical tuna (yellowfin, bigeye and skipjack) has increased from 1901 tonnes in 2014 to 4390 tonnes in 2018. The increase in the catch of tropical tuna in 2018 was due to a rise in the number of foreign vessels licensed to fish in the Mauritian EEZ.

Most of the fishing licences are issued as from September to February and an increase in the fishing activity of foreign tuna longliners is more pronounced in the summer months. This is probably due to the increase in the abundance of albacore tuna the summer months.

4. The national purse seine fishery

4.1 Catch and effort

The total catch landed by the national purse seiners for the past five years amounted to 70216 tonnes. Moreover, there is an increasing trend in the total catch from 8557 tonnes in 2014 to 22405 tonnes in 2018. This is explained by an increase in the fishing effort of the national purse seiners in log and free school. The CPUE was lowest in 2014 (13.2t /set) and highest in 2018 (34.4t /set).

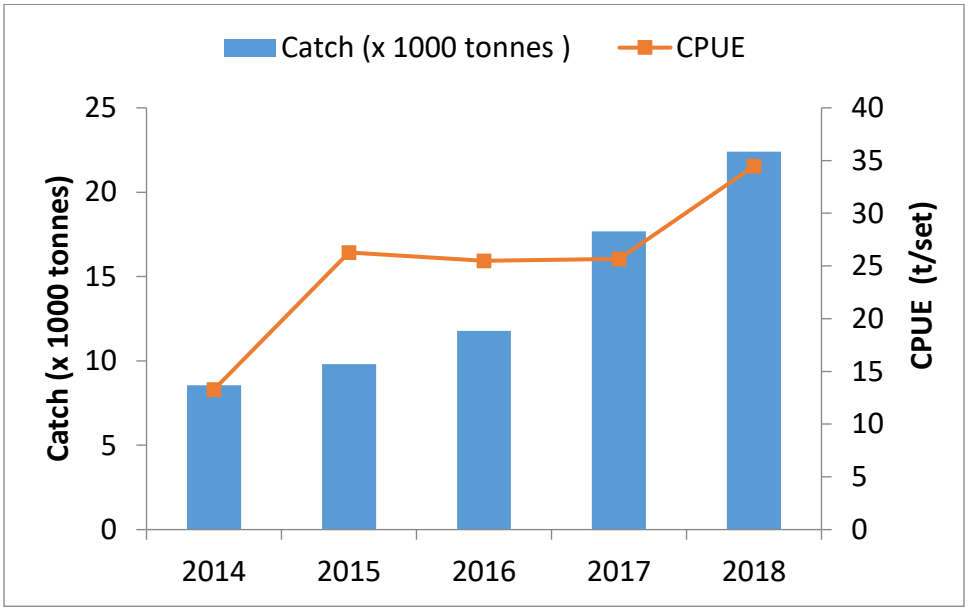

Figure 3. Catch and CPUE of national purse seiners

The fishing effort is measured in terms of number of sets deployed by the national purse seiners. The number of sets carried out on FAD was superior than free school. Moreover, the total number of sets deployed increased from 373 in 2015 to 688 in 2017 though a slight decrease was noted in 2018 (650). In 2014, the number of sets deployed was higher (644) compared to 2015 as apart from two large seiners, five small purse seiners were operating during this period. It is to be noted that in 2015, only two of these small purse seiners were operational. The total number of positive sets represented 95 % compared to 5 % for negative sets. The percentage of positive sets in FAD was higher than in free school.

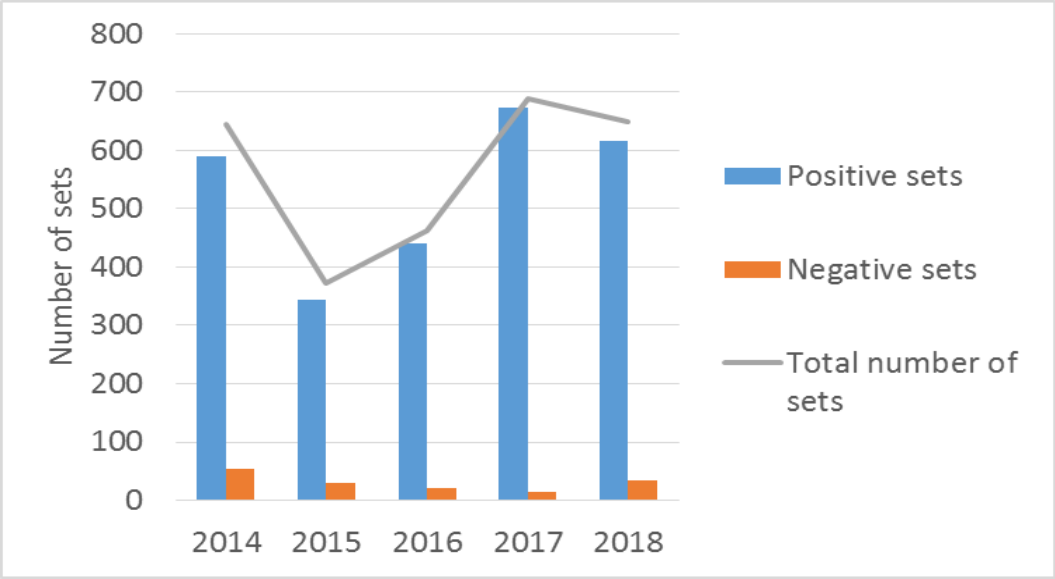

Figure 4. Percentage of positive and negative sets (2014-2018)

4.2 Species composition of national purse seiners

The species composition consisted of yellowfin, skipjack, bigeye and albacore tuna. Yellowfin tuna forms major part of the catch (52.3) followed by skipjack (39.2) and bigeye (8%). A very small percentage (0.5%) of albacore tuna was present in the catch. There was also an increasing trend in the catch of yellowfin tuna from (13%) in 2014 to (31%) in 2018.

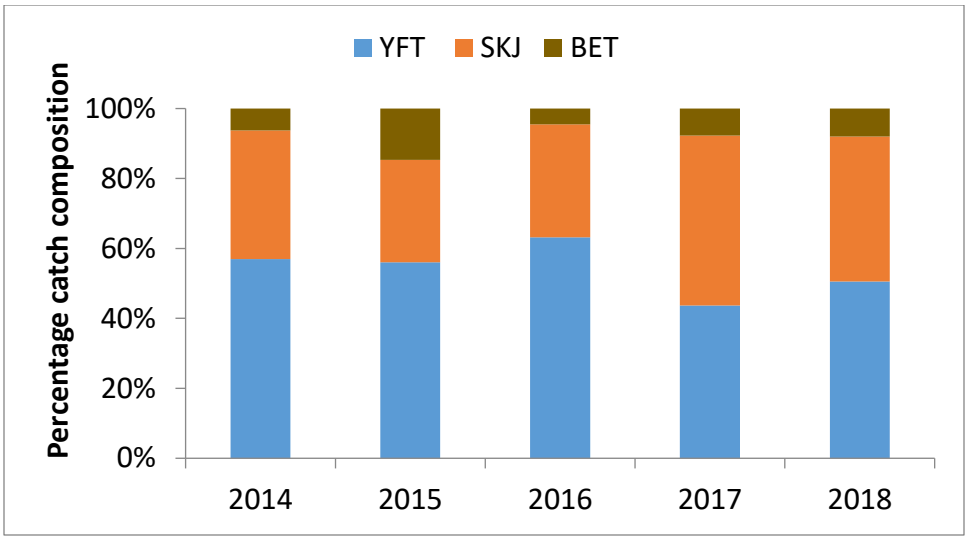

Figure 5. Species composition of national purse seiners (2014-2018)

4.3 catch from free school and log school

It could be observed that the national purse seiners operated mostly in log school (overall 65%) when compared to free school (35%). From 2014 to 2016, the catch per set of free school was higher than log school ranging from ((15.1 t/set) to (29.6t/set). The catch per set in free school declined in 2017 to 22.7t and increased in 2018 to reach 32.5t. For the past five years, the catch per set in FAD showed an increasing trend from 11.8t/set in 2014 to 35.2t/set in 2018.

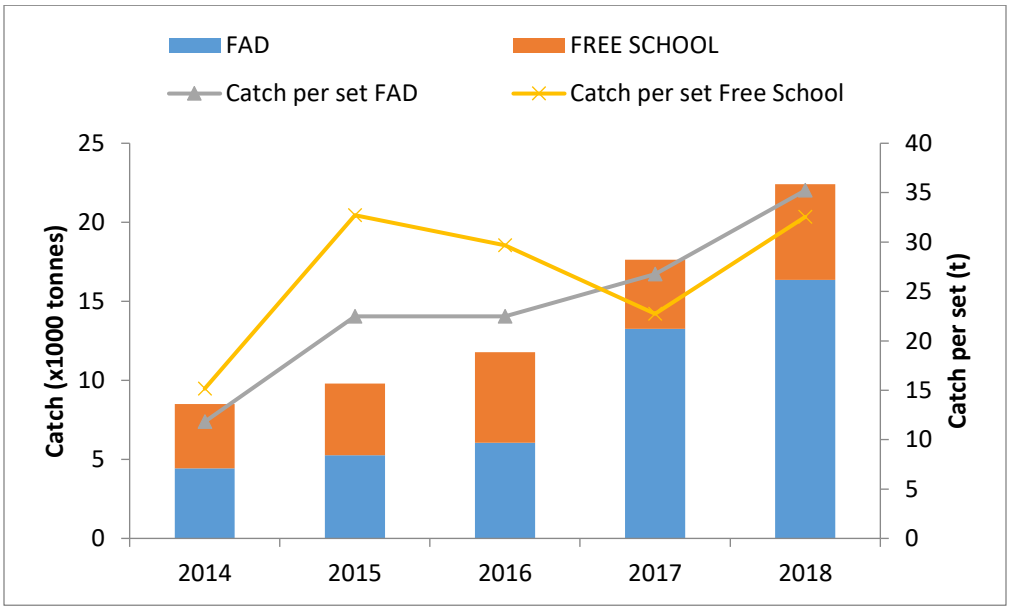

Figure 6. catch per set from free and log school (2014-2018)

4.3 Species composition of catch from free school and log school.

A remarkable difference in the species composition was observed from the catch of free and log school throughout the years. The dominant species in free school was yellowfin (81%) followed by bigeye (9.6%) and skipjack tuna (8%). Whereas the dominant species differed in log school whereby it was noted that skipjack tuna represented (56%) followed by yellowfin (36.5 %) and bigeye (7 %).

The size composition also showed a significant difference as in free school, larger yellowfin tuna were present when compared to log school, small yellowfin and bigeye tuna were more apparent in the catch. This is typical of catch made on log school which has the tendency to attract smaller fish as yellowfin and bigeye tuna are mainly caught as juveniles of 40 to 60 cm (Fonteneau 2013), that is to say before they reach their size at maturity (about 80-100 cm, Sun et al., 2013; Zudaire et al., 2013).

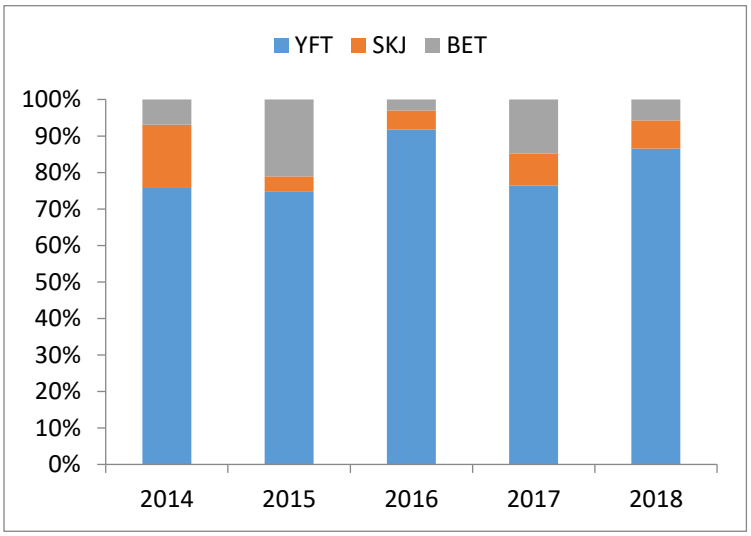

Figure 7. Species composition of catch from free school (2014-2018)

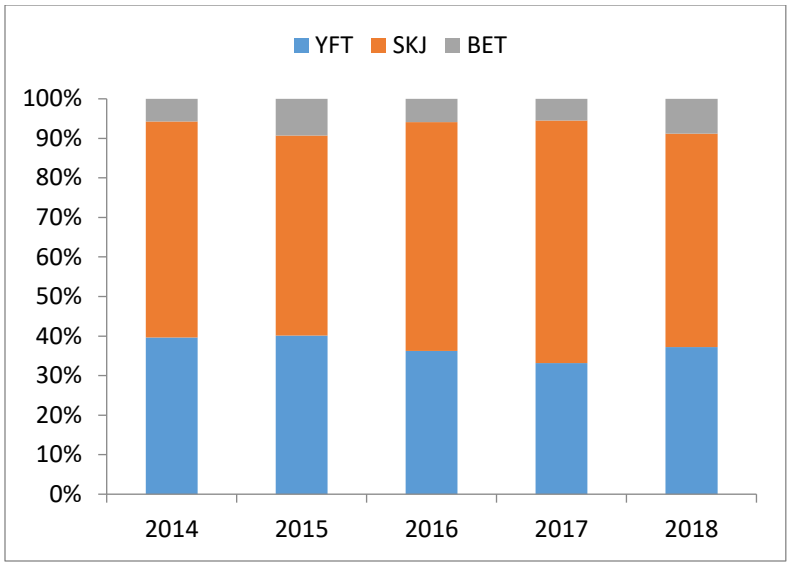

Figure 8. Species composition of catch from log school (2014-2018)

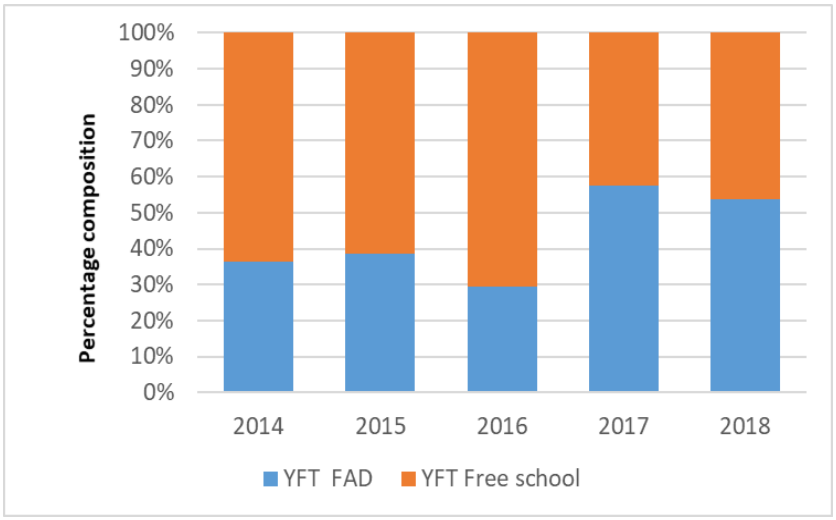

Figure 9. Percentage of yellowfin tuna on FAD and free school (2014-2018)

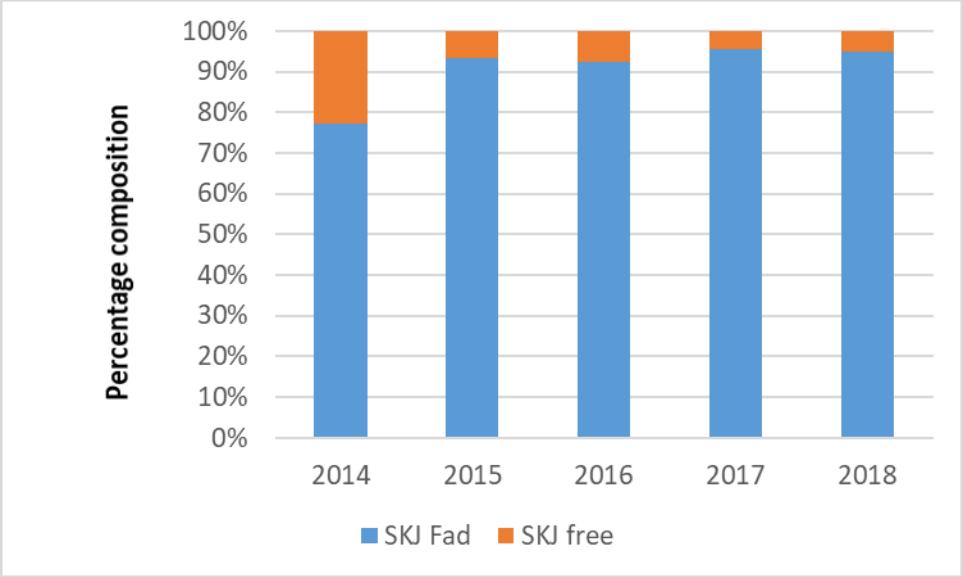

Figure 10. Percentage of skipjack tuna on FAD and free school (2014-2018)

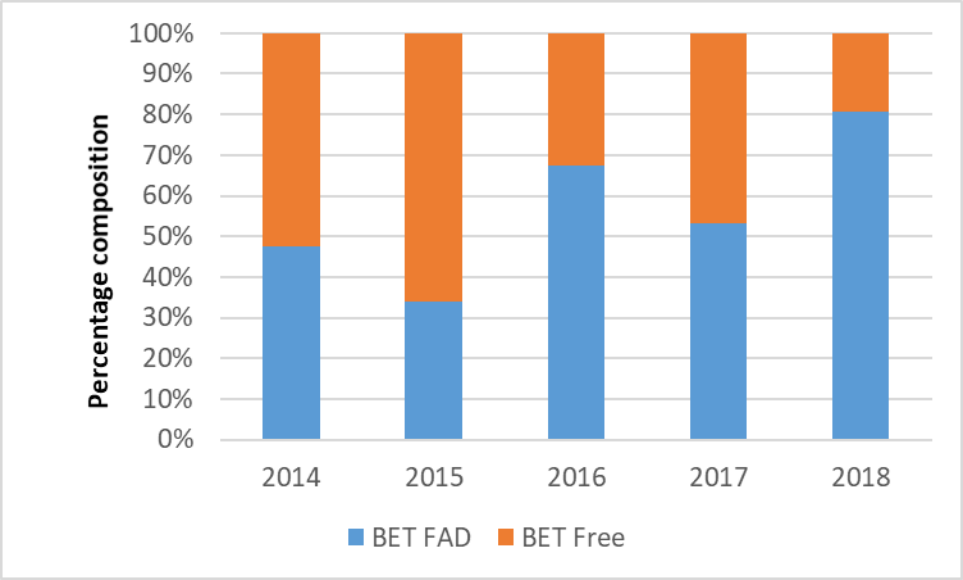

Figure 11. Percentage of bigeye tuna on FAD and free school (2014-2018)

4.5 Comparison of catch made on natural and artificial log

The national purse seiners fished mainly on artificial log (Fish Aggregating Device). The catch from log school was higher in artificial log (90 %) when compared to natural log (10 %).

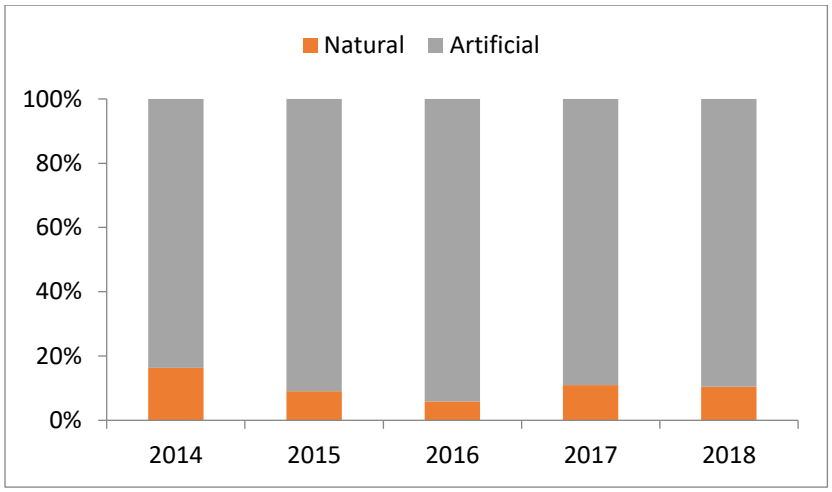

Figure 12. Percentage catch from natural and artificial log

4.6 Spatial distribution of national purse seiners

The figure 10 below shows the fishing areas of the national purse seiners on log school for the past five years. It could be observed that fishing activity was spread between latitudes 14^0 N – 15^0 S and longitudes 40^0 E – 85^0 E. The catch level was high in log school as artificial log are more abundant in the northern part (north of 7^0 S) (Fauvel et al.., 2009).

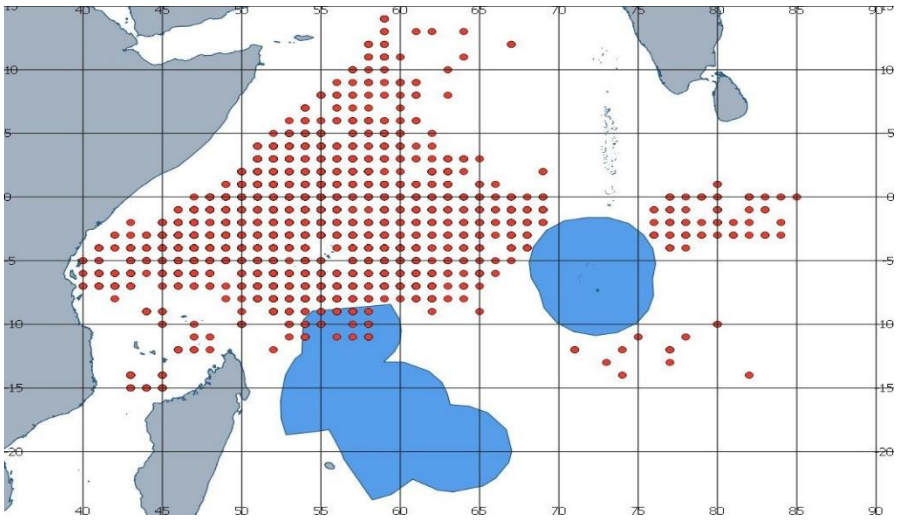

Figure 13: Spatial distribution for log school (2014-2018)

In figure 11 below, the fishing areas of the national purse seiners on free school for the past five years is depicted. Fishing activity was extended in the zone bounded by latitudes 7^0 N – 14^0 S and longitude 41^0 E – 69^0 E

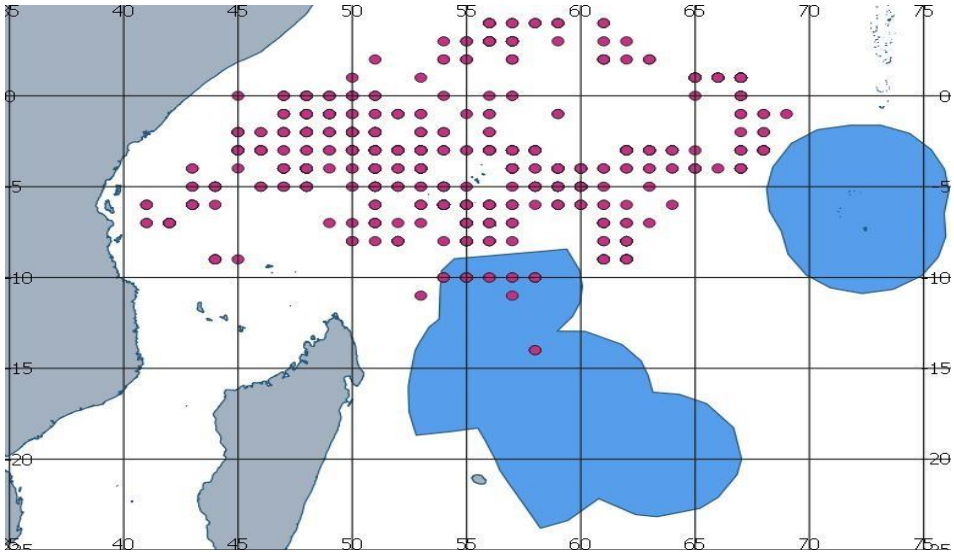

Figure 14: Spatial distribution for free school (2014-2018)

References

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