

SPATIAL AND TEMPORAL DISTRIBUTION OF KINGFISH (*Scomberomorus commerson*) CATCHES IN KENYAN WATERS BY ARTISANAL FISHERS**BY: STEPHEN NDEGWA & BENSON MACHARIA****ABSTRACT**

The Kenyan coastline administratively consists of five Counties namely Kilifi, Kwale, Lamu, Mombasa and Tana River County. Records of Kingfish (*Scomberomorus commerson*) catches were collected from June 2013 to May 2014. Spatially, Kilifi County recorded the highest sampled landings estimated to be 10,900 kgs followed by Kwale County (6,306 kgs), Tana River County (1,321), Mombasa County (371 kgs) and Lamu (47 kgs) respectively. On temporal scale, the two peak seasons were in March to April and November to December, while the month of May recorded the lowest catch. The catches were reported throughout the year with January to February and September to October recording average catches. Gear wise, gillnets, handline and ringnets were the main fishing gears targeting kingfish contributing about 92% of the sampled catches. The recorded landings per gear were highest from handline with 246 positive trips while ringnet recorded the highest average catch per fishing trip.

Introduction

Catch Assessment Surveys are dedicated surveys aimed at harvest sector to generate information relating to both fish catches and fishing effort. Other sources of catch data include the post harvest sector and markets, but these sources tend to be less accurate and precise and cannot provide reliable effort data. CAS design typically requires frame surveys data to raise samples to total catch estimates. Catch, effort and frame survey data are important for supporting the management process. If catch data is combined with information on fish prices, it can be used to estimate the gross value of production (GVP). This provides an indication of the economic importance of the fishery relative to other fisheries or sectors. This is important for helping shape policy and for development planning purposes.

The State Department of Fisheries (SDF) in Kenya had been operating a routine fisheries data collection system based on total enumeration, whereby all fishing trips were expected to be recorded at all coastal landing sites. Due to the staff shortages, and the costs involved the

SDF recognised that, this system was no longer viable. From the perspective of the statistical validity of routine catch/effort data, full enumeration offers relatively minor advantages over a sampling approach. Furthermore, full enumeration of busy fish landing sites is practically impossible to achieve and therefore there are significant questions as to the accuracy of the data that are collected.

The current system was further challenged as the SDF realised that the profile of actual information provided, i.e. total catch and value, was of relatively limited value for making useful management decisions. There was now also recognition of the need to steer the SDF towards a more ecosystem-based approach to resource management, including improving the understanding the human dimension of the fisheries (social and economic issues).

In order to achieve this, the SDF therefore proposed to improve the performance of its sampling programme. The first step involved conducting training for District Fisheries Officers (DFOs) on data collection modules by the department in conjunction with FAO. After the training, KMFRI and fisheries department through the support of ReCoMaP developed a training program for data collectors. A total of 55 data collectors covering the entire coastline were trained. In the planned data collection strategy, the sampling programme was streamlined by reducing sampling effort and by modifying the sampling protocol to target between 20 and 25 landing sites along the coast, where it is estimated that 70% of the total catch is landed. The FAO also developed pocket fish identification guides which were distributed to the enumerators.

Catch Assessment Surveys may also be used together with Frame Surveys (FS) to generate important information required both for management planning purposes and for helping design Fishery assessment surveys by providing the sampling framework. Frame Surveys involve direct enumeration of all fish landing sites on a regular or ad hoc basis to provide information on:

1. Important landing sites, their location, patterns of fish distribution.
2. Numbers and types of fishing crafts including details of their size, propulsion, gear types...etc
3. Fishing activity and landing patterns of different fishing craft-gear combinations including seasonal, diurnal and geographical operations

4. Supply centres, infrastructure and markets
5. Fish distribution routes, utilization, processing centres and methods...etc

DATA COLLECTION

The data for this report was collected in 22 landing sites along the coastline from June 2013 to May 2014. Sampling took place on ten days per month with dates selected based on the lunar cycle. Catches from boats are randomly sampled and recorded to the lowest taxonomical level possible.

FISHING TRIPS

During the June 2013 to May 2014 period, a total of 18,023 fishing trips were sampled. The months of April and May had the highest trips sampled, (2,042 and 1,927 respectively) while January and February had the lowest coverage (973 and 886 respectively). On average 1,502 fishing trips were sampled per month (Table 1).

Table 1: Total fishing trips sampled per month

| MONTH | FISHING TRIPS SAMPLED |
|--------------|----------------------------------|
| January | 973 |
| February | 886 |
| March | 1,150 |
| April | 2,042 |
| May | 1,927 |
| June | 1,347 |
| July | 1,749 |
| August | 1,804 |
| September | 1,826 |
| October | 1,466 |
| November | 1,563 |

| | |
|----------|--------|
| December | 1,290 |
| Total | 18,023 |

BOAT ACTIVITY COEFFICIENT

As sampling was carried out on 10 days per month, it was important to collect data on how many fishing days took place per week. The enumerator asked the boat captain how many days he had been fishing for the last seven days. The number of days was then divided by 7 to generate the boat activity coefficient (BAC) for that boat. The average BAC for the boats was lowest at 0.68 during the month of February and highest at 0.79 during the month of September (Figure 1).

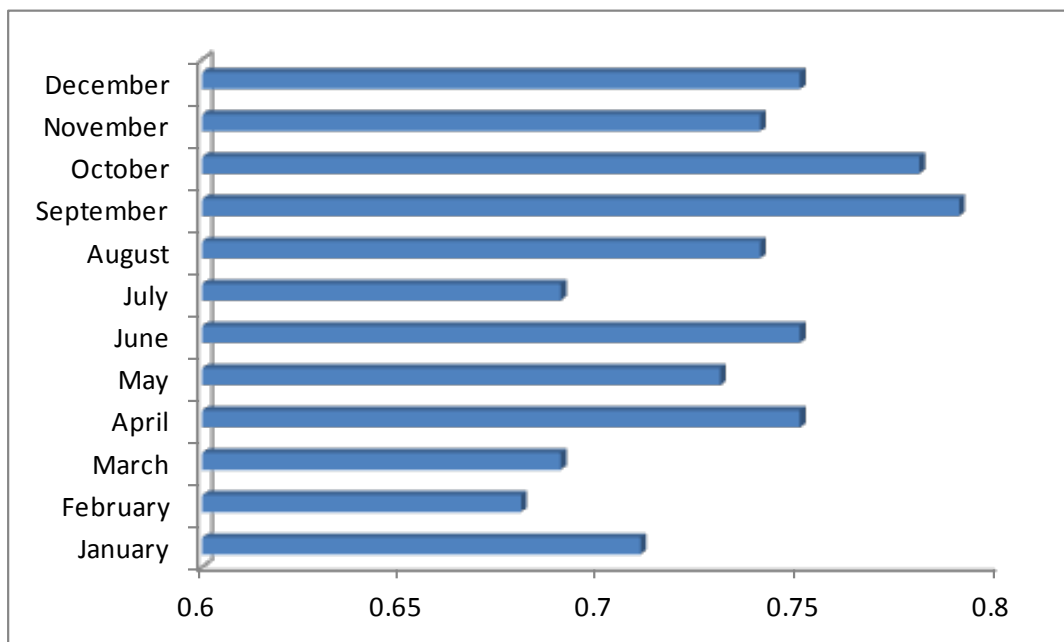


Figure 1: Average Boat Activity Coefficient per month

Catch Per Unit Effort (CPUE)

The Catch Per Unit Effort (CPUE) was recorded as the number of kgs of *Scomberomorus commerson* per boat per day. The CPUE of *S. commerson* clearly indicated a seasonal trend. The lowest CPUE was 0.3 kg/boat/day recorded during the month of May while the highest CPUE was 2.1 kg/boat/day recorded during the month of March. The rough sea condition

season between April and September recorded the lowest CPUE while November to March recorded the highest CPUE. The average catch per boat per day during the November to March season was 1.6 kgs while April to October recorded 0.8 kgs. The catches of *S. commerson* during the calm season were double those during the rough sea season (Figure 2).

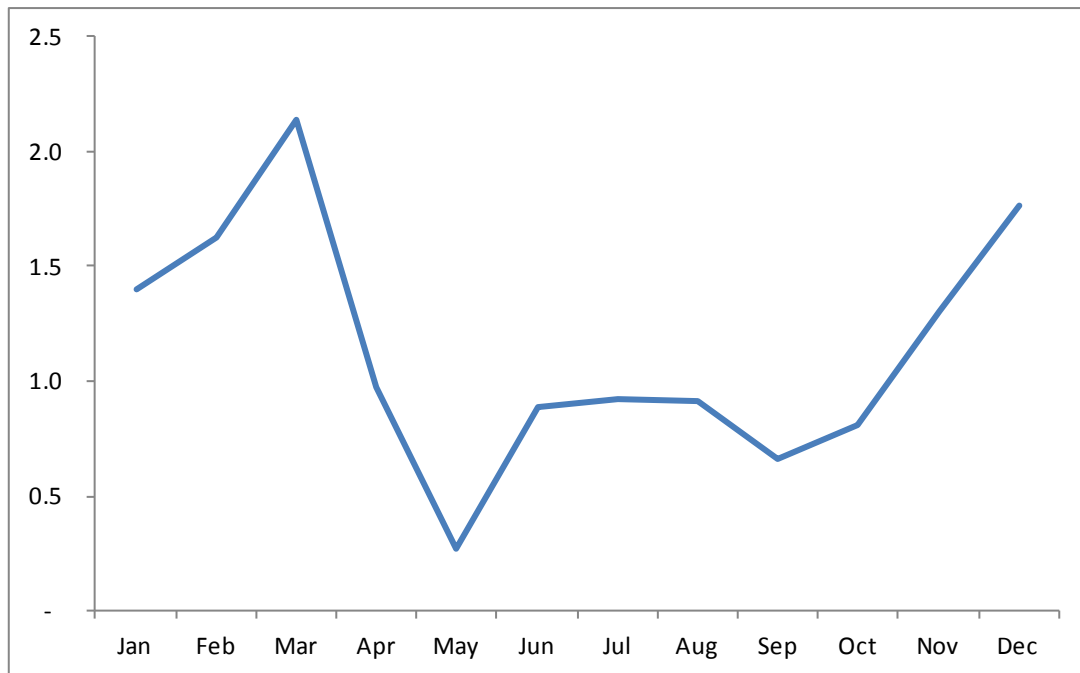


Figure 2: Monthly Catch Per Unit Effort of *S. commerson*

SPATIAL DISTRIBUTION OF KINGFISH

Of the five coastal Counties in Kenya, Kilifi and Kwale recorded the highest number of *S. commerson* catches throughout the sampling period. In Kilifi County, 10,900 kgs of *S. commerson* were sampled which represented 58% of the total sampled landings. Kwale County recorded 6,306 kgs which was the second highest landings and represented 33% of the landings. Both Counties accounted for 91% of the species landings. Tana River, Mombasa and Lamu Counties recorded 1,321, 371 and 47 kgs respectively. The catches from the three Counties accounted for a mere 9% of the total *S. commerson* sampled (Figure 3).

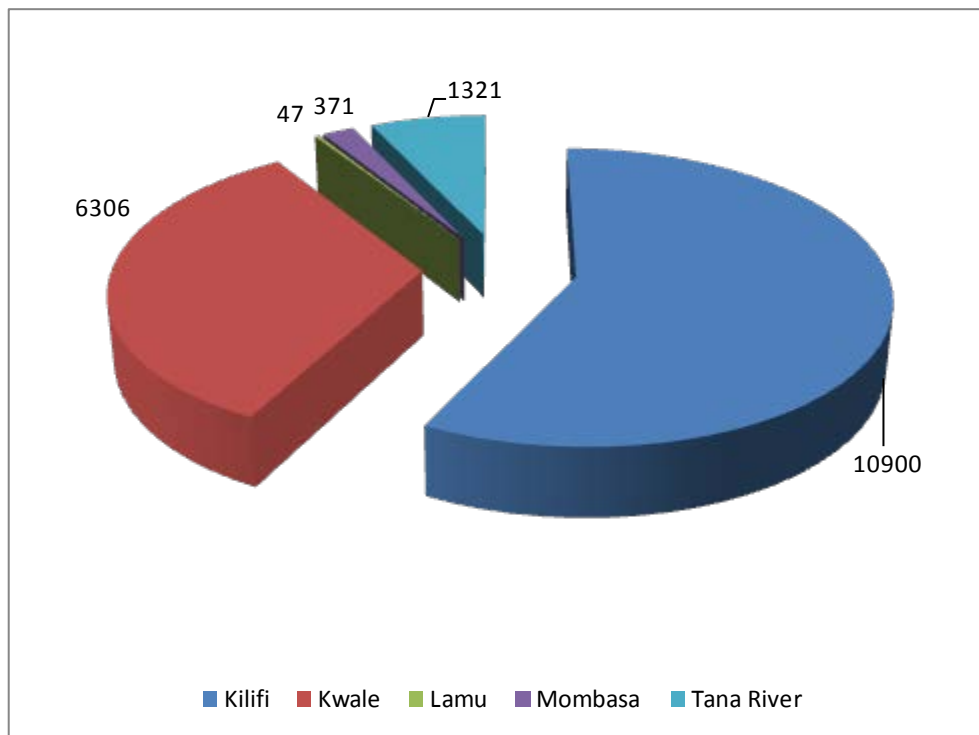


Figure 3: Landings of *S. commerson* based on Counties

TEMPORAL DISTRIBUTION OF KINGFISH CATCHES

The monthly records of *S. commerson* catches depicted a presence of the species in the Kenyan waters throughout the year. There however were two peak periods when the catches were higher than the rest of the year. March to April and November to December were the periods when the highest catches of the species were recorded. The month of May recorded the lowest catches of *S. commerson*. The catches during the other months were on average about 1,400 kgs (Figure 4).

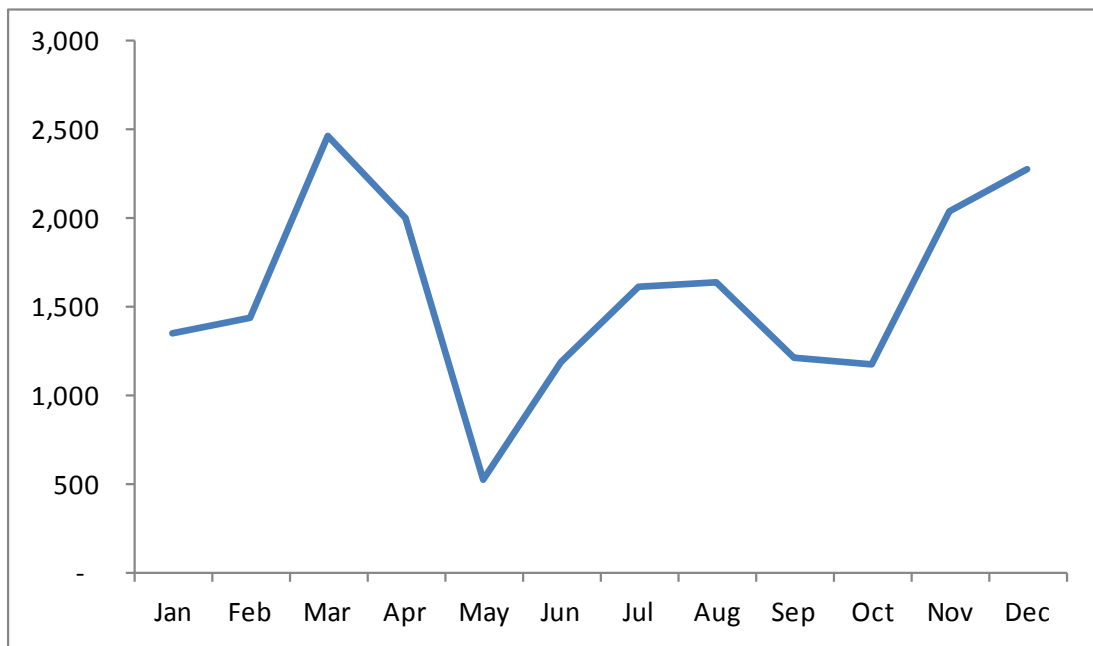


Figure 4: Monthly catches of *S. commerson*

TOTAL CATCHES OF KINGFISH BY GEAR

Fishing gears play an important role in catching of fish. In the Kenyan waters, gillnet was the main gear targeting *S. commerson*, landing a total of 8,069 kgs of the sampled catch. The other main gears were handline and ringnet each landing above four tons of the sampled catch. The rest of the gears combined landed slightly above 1.5 tons (Figure 5). Based on these findings, we can conclude that the three gears targeting *S. commerson* are gillnets, handline and ringnet.

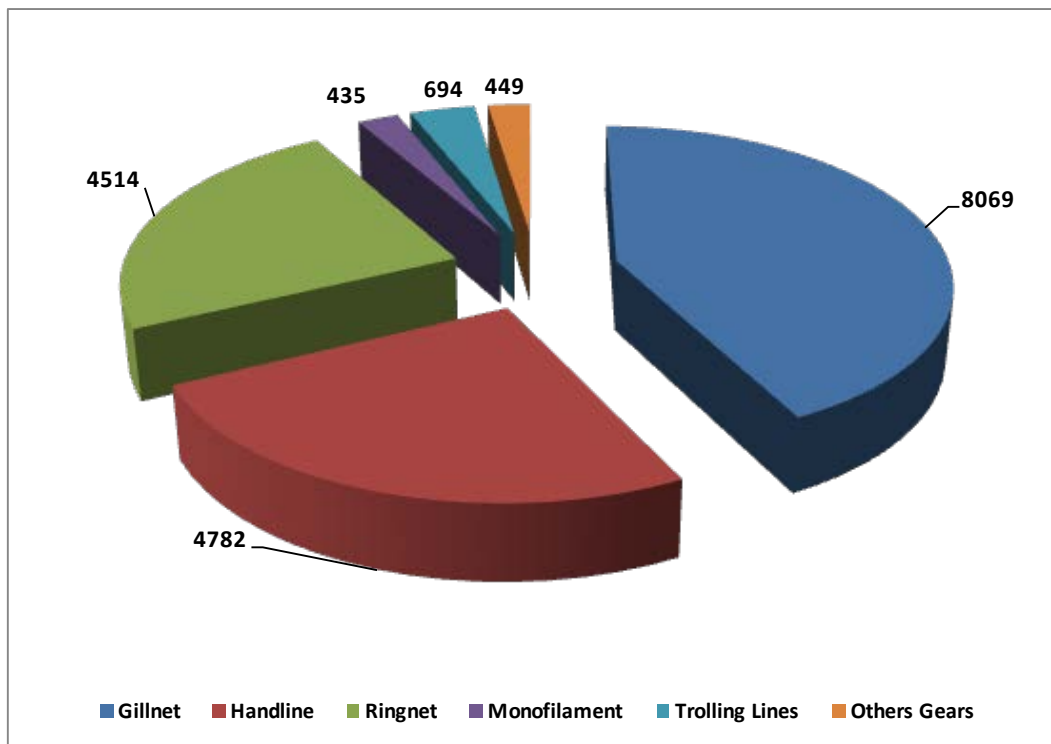


Figure 5: Total catches of *S. commerson* by gear type

GEAR PREVALENCE AND AVERAGE CATCH PER GEAR

The number of times landings of *S. commerson* by a gear were recorded to show how prevalent the catches were by gear type. In total, the species was mainly landed by handline with 246 positive fishing trips, followed by gillnet recording 221 fishing trips. The other gears with substantial trips landing kingfish were monofilament, ringnet and trolling lines recording 65, 43 and 34 positive fishing trips. The rest of the gears reported 13 or below positive fishing trips. The average catch per fishing trip was highest from ringnet landing 105 kgs per trip. Gillnet, longline and trolling lines recorded 36.5, 25.8 and 20.4 kgs per trip respectively. The lowest average catches were 3.1 and 1.2 kgs recorded from beach seine and prawn seine respectively.

Table 2: Gear prevalence and average catch of *S. commerson* per gear

| GEAR | NUMBER | AVERAGE CATCH |
|----------|--------|---------------|
| Handline | 246 | 19.4 |
| Gillnet | 221 | 36.5 |

| | | |
|---------------|----|------|
| Monofilament | 65 | 6.7 |
| Ringnet | 43 | 105 |
| Trolling line | 34 | 20.4 |
| Cast net | 13 | 11.6 |
| Spear gun | 8 | 13.1 |
| Longline | 4 | 25.8 |
| Beach seine | 2 | 3.1 |
| Traps | 2 | 4.3 |
| Prawn seine | 1 | 1.2 |
| Reef seine | 1 | 62 |
| Scoop net | 1 | 13 |

CONCLUSION

S. commerson is available in the Kenyan waters throughout the years though with peak seasons. The landings are highest during the NE monsoon when the sea is calm. Kilifi and Kwale Counties are the main places where most of the landings are recorded. The main three gears harvesting the species are gillnet, handline and ringnet with the highest average catch per gear recorded from ringnets.