SEASONALITY, SIZE FREQUENCY AND GEAR IMPACT ON KAWAKAWA (*Euthynnus affinis*) CAUGHT BY ARTISANAL FISHERS IN KENYA

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ABSTRACT

This paper looks at the seasonality, length frequency and the impact of gear selectivity on kawakawa (*Euthynnus affinis*) caught between May 2014 and June 2015. During the sampling period, a total of 4,457 fish were recorded with lengths ranging between 10 and 96 cm. The period between October and March was to the peak season for the kawakawa catches. Most of the fish were caught using monofilament nets while handline, trolling lines and ringnet were the other main gears with all the four gears representing 88% of the sampled catch. Kawakawa catches from gill nets, trolling lines and ringnet were larger with average sizes of 60.3±4.1 cm, 56.5±4.0 cm and 55.0 ± 2.8 cm for standard error respectively while handline and monofilament nets caught smaller sized individuals with average lengths of 44.5± 6.1 cm and 27.0±3.0 cm respectively. Most of the small sized kawakawa were caught using monofilament nets and small sized hooks and mainly were reported from the creeks. To mitigate against catches of juvenile kawakawa in the creeks, removal of monofilament nets and hook size restriction in the marine fishery is important. A study on the maturity of kawakawa in the Kenyan waters is relevant to determine the length at massive maturity and can assist in the improvement of gear management in the marine waters.

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 lengths of fish caught, gears used and other biological parameters, it can be used to provide more information relevant to fisheries managers in helping shape policy and for management 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 biological and gear characteristics of the fishery.

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 and gear type etc.
3. Fishing activity and landing patterns of different fishing craft-gear combinations including seasonal, diurnal and geographical operations
4. Supply centers, infrastructure and markets
5. Fish distribution routes, utilization, processing centers and methods etc.

Data Collection

The data for this report was collected in 22 landing sites along the coastline from June 2014 to May 2015. 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. The daily records from the catches was used to generate information on the seasonality of the catch while the spatial distribution of the catches were recorded as the fishing grounds in the source County. The lengths of fish caught by different gears were recorded to the nearest centimeter using measuring boards to assess the gear impact on the fishers' catches.

Results

During the June 2014 to May 2015 period, a total of 12,355 fishing trips composed of the four gears were sampled. The lowest number of trips were recorded in June while the highest number of trips were recorded in March. On average 1,030 fishing trips were sampled per month (Figure 1). Handline and monofilament nets recorded the highest sampling season.

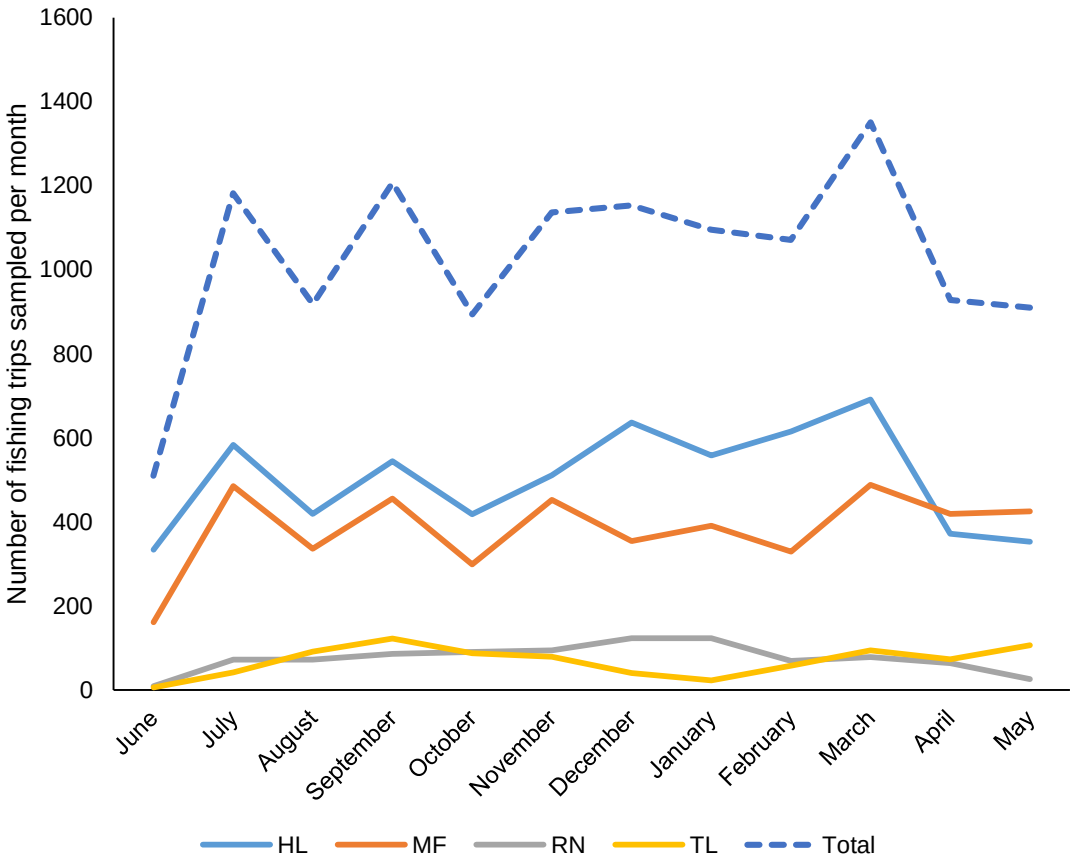

Figure 1: Number of fishing trips by gear

The period between October and March was the peak season for the kawakawa catches while catches was generally low between June and August (figure 2). The total number of kawakawa fish sampled and whose lengths were recorded were 4,457. There was a sharp rise in the number of kawakawa landings between August and October, conversely, a sharp drop in landings was observed between March and May.

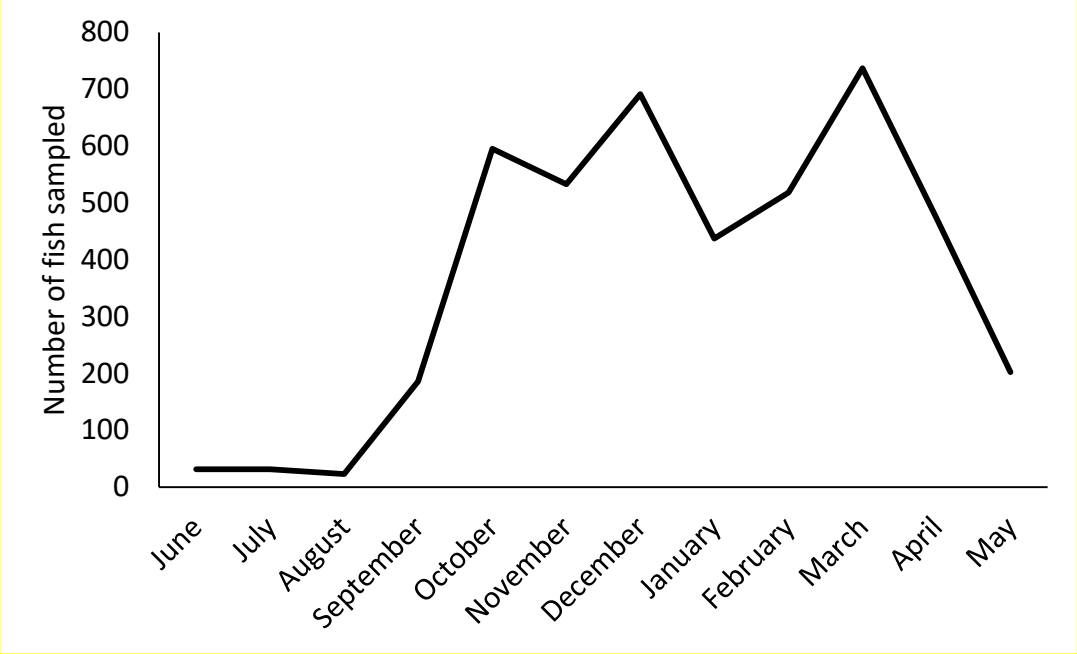

Figure 2: The numbers of kawakawa landed between June 2014 and May 2015 along the Kenyan coast by artisanal fishers

Most of the fish were caught using monofilament nets while handline, trolling lines and ringnet were the other main gears with all the four gears representing 88% of the sampled catch (figure 3). Other gears which were involved in harvesting Kawakawa include gillnet, longline, castnet, reef seines, spearguns and traps.

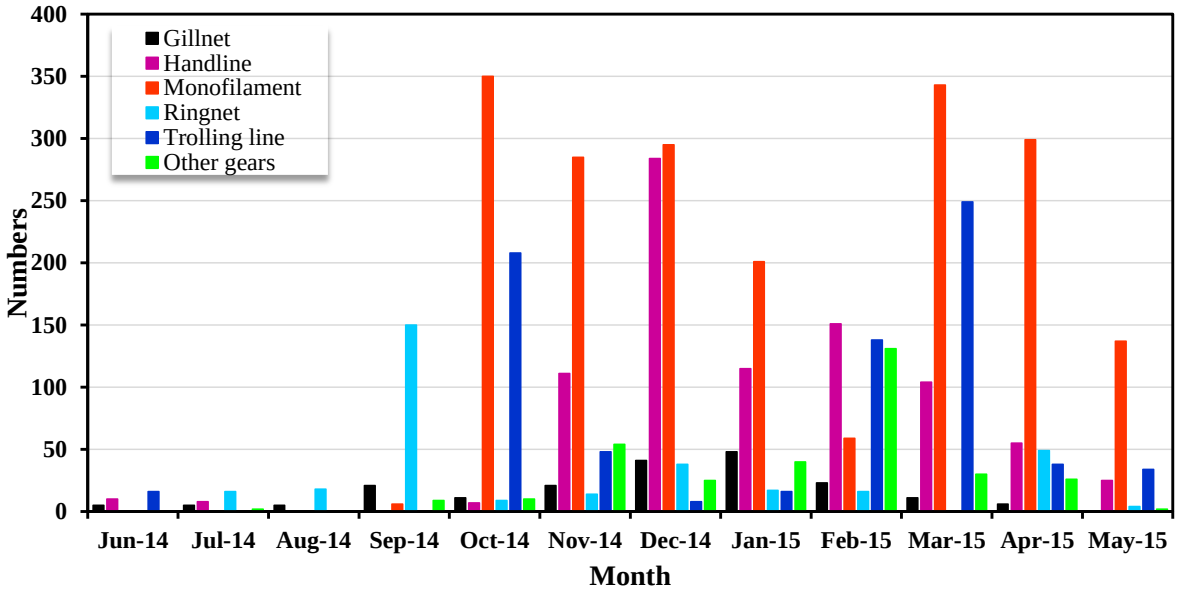

Figure 3: Number of fish caught by gear per month

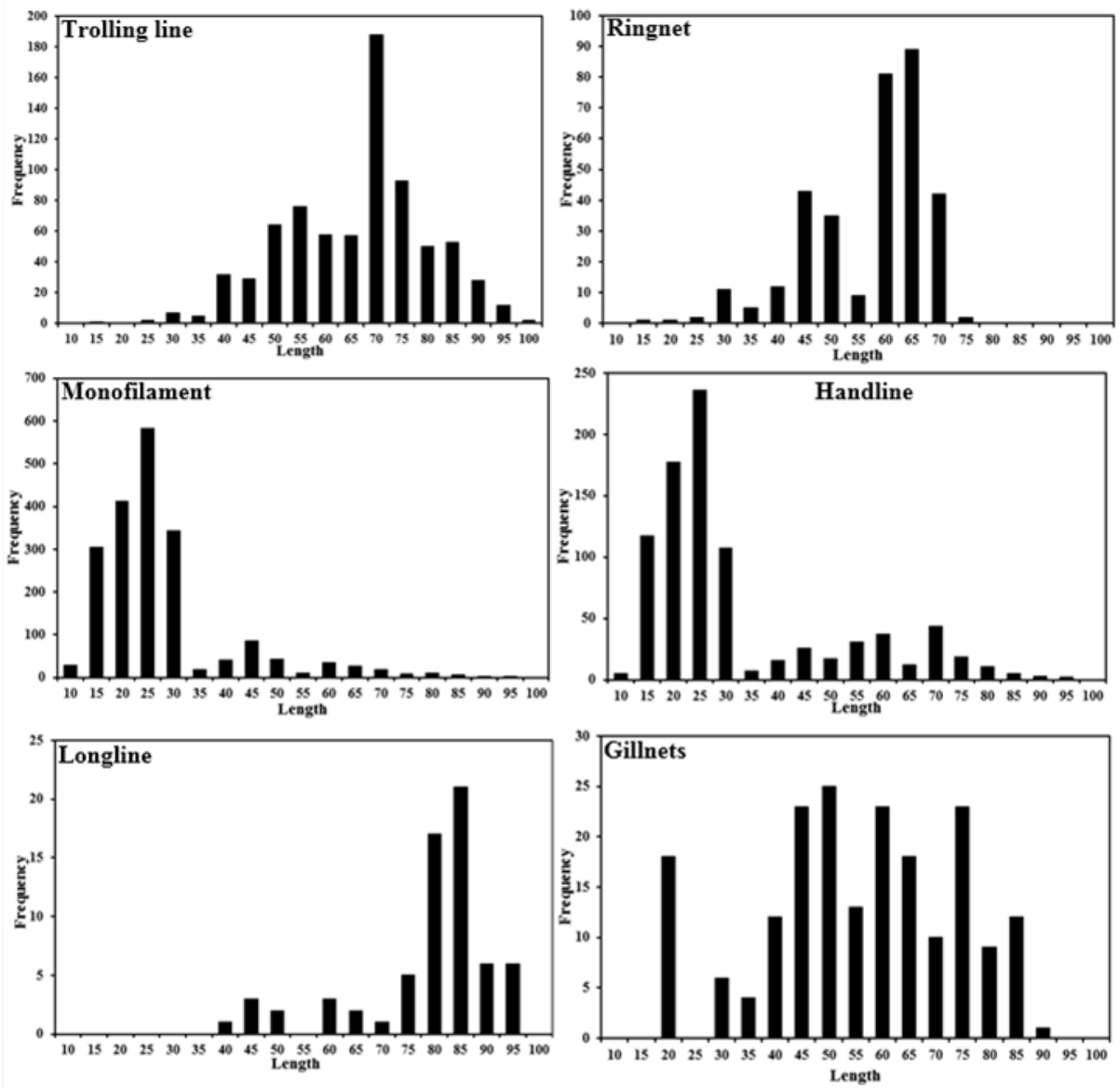

Figure 4: Length frequency of kawakawa caught by different gears deployed by artisanal fishers between June 2014 and May 2015 along the Kenyan coast

Among the main gears, kawakawa catches from gill nets, trolling lines and ringnet were larger with average sizes of 60.3±4.1 cm, 56.5±4.0 cm and 55.0 ± 2.8 cm for standard error respectively while handline and monofilament nets caught smaller sized individuals with average lengths of 44.5± 6.1 cm and 27.0±3.0 cm respectively. Most of the small sized

kawakawa were caught using monofilament nets and small sized hooks and mainly were reported from the creeks. In addition, large sized kawakawa were caught using longline, trolling line, ringnet and gillnets.

Discussion

Kawakawa clearly demonstrated seasonality. It is important to note that although kawakawa were caught throughout the year, they were found to be characterized by two clear seasons in a year i.e. peak and low seasons coinciding with North East monsoon season and South East monsoon season respectively. North East monsoon season had enhanced kawakawa catches (figure 2) while South East monsoon season was characterized by reduced catches. The same trend of catches for kawakawa has previously been reported for the year 2013 to 2014 for the artisanal catches and also for the sport fishing (Ndegwa and Collins 2014).

Artisanal fishery in Kenya is a multi-gear fishery where numerous gear type are deployed in fishing areas found in the inner and outer shallow water reef areas, sheltered tidally-dominated channels and tidal creeks, sea grass beds and sheltered lagoons. Monofilament and handlines were the main fishing gears between October and May while ringnet contribution was evident between July and September (figure 3).

The length frequency distribution (figure 4) shows that most kawakawa caught from gill nets, trolling lines and ringnet were larger while handline and monofilament nets caught smaller sized individuals. The relationship of different fishing gears and the resultant size of kawakawa catches landed could be attributed to the position of fishing grounds inhabited by kawakawa. For instance, monofilaments are mainly deployed along the creek and inner

shallow water reef areas and sheltered lagoon, habitats which are fertile nursery grounds highly populated by juveniles fishes such as kawakawa. Conversely, gill nets, trolling lines and ringnet are mainly deployed in the outer shallow water reef areas highly populated by large sized kawakawa catches.

As a management tool in fisheries, it is important to continue to ban monofilament nets used in Kenyan waters and also restrict the use of small sized handline hooks in the creeks by so as to protect the juvenile kawakawa that feed in the sheltered areas.