Success, challenges and lessons learnt in changing of data collection system in Kenya

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ABSTRACT

Due to inadequacy in the total enumeration data collection system previously undertaken by the State Department of Fisheries and Blue Economy in Kenya, a sampling data collection system was undertaken in 2013 to improve on the deficiencies of the previous system. This report looks at the outputs for the first year where 9,063 tons were reported from the routine data collection compared to 15, 795 tons from the sampling system. Despite routine data collection showing a drop in the catches during the rough sea season, the sampling system showed a great difference in catches between the two seasons. Total catches by families between the two systems also differed with the sampling system including catches by gears and included length data from the artisanal fishery catches previously not collected. Spatial distribution of fishing effort was also more elaborate from the sampling system with catches attributed to the fishing grounds and not by region as per the previous system. The main challenges encountered with the introduction of the new system included lack of a database, massive paper work, added cost of data collection, species identification, lack of georeferenced data on fishing grounds and data entry workload. Proposed solution included database development, use of mobile technology, mapping of fishing grounds and continuous training of data collectors. Electronic data trial has already been tried and proven to work with the data collectors. We are requesting for technical assistance from IOTC to improve on the work so far conducted.

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. Collection of data on the size frequency distribution of harvested species also assists in evaluation of the status of exploitation of that particular species. Such assessments are important for helping shape policy and for development planning purposes.

The State Department for Fisheries and Blue Economy (SDF&BE) 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&BE 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&BE 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.

DATA COLLECTION

The data for this report was collected in 22 landing sites along the coastline from June 2013 to March 2016. 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 total catches of landings were recorded while a sample was taken to disaggregate the catches for taxonomic identification. Samples of species previously identified as key ones had their lengths recorded using measuring boards provided to the data collectors.

RESULTS

The data collection was undertaken from June 2013 to March 2016. Below is a snapshot of the results for the first year ending May 2014 which has already been analysed.

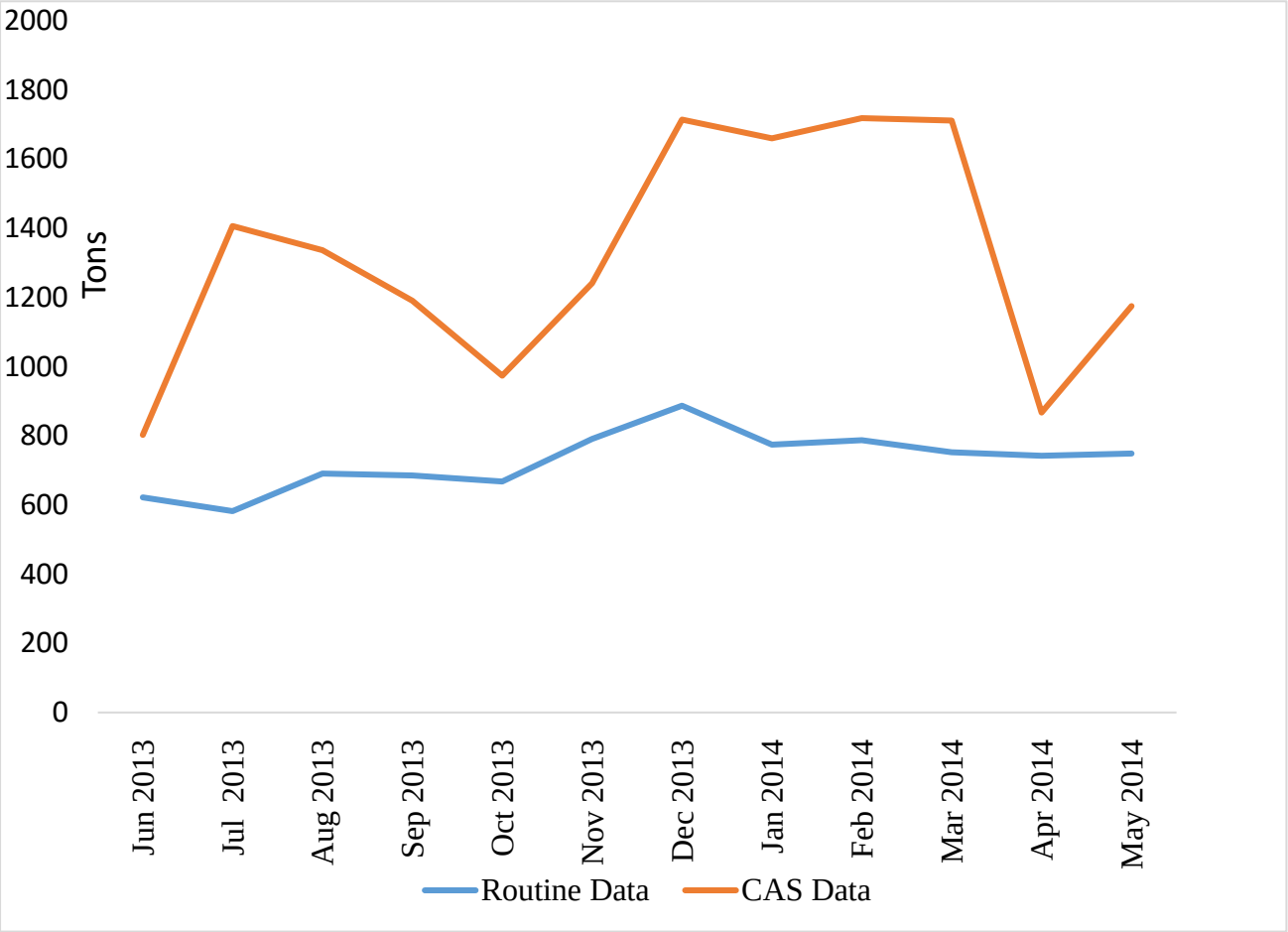

Figure 1: Landings reported the first year of sampling

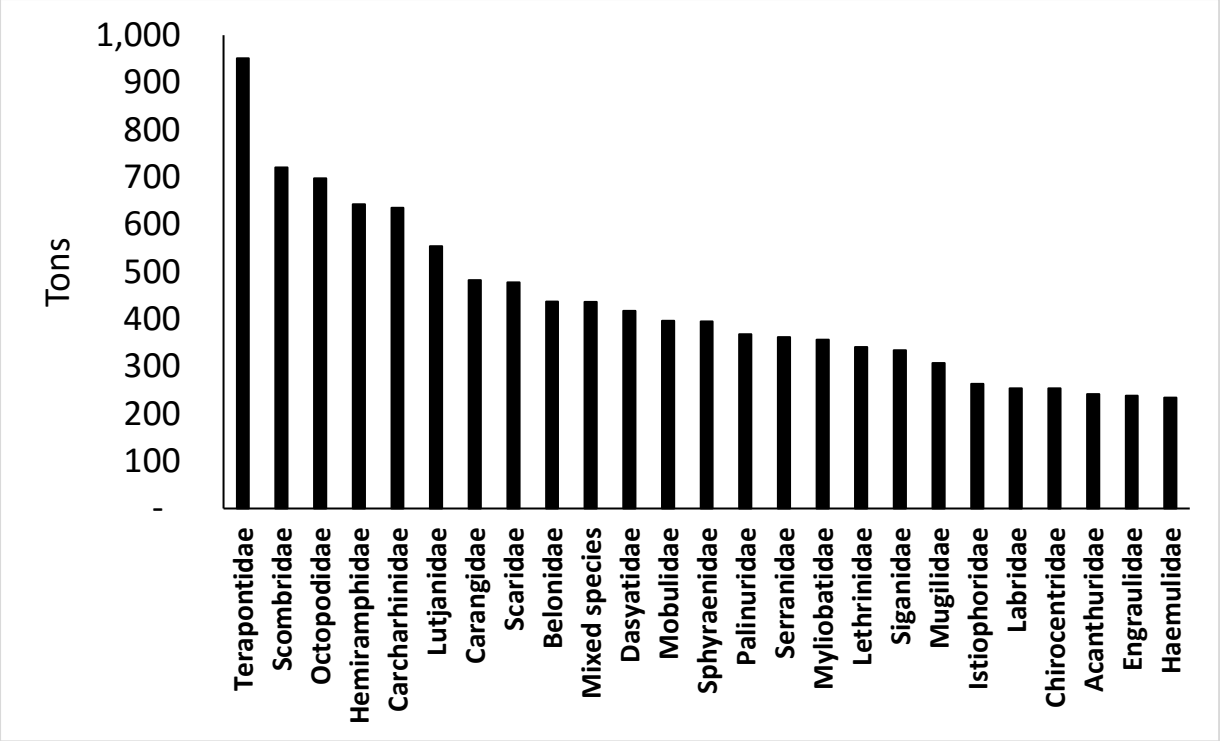

Figure 2: 25 most landed fish by family

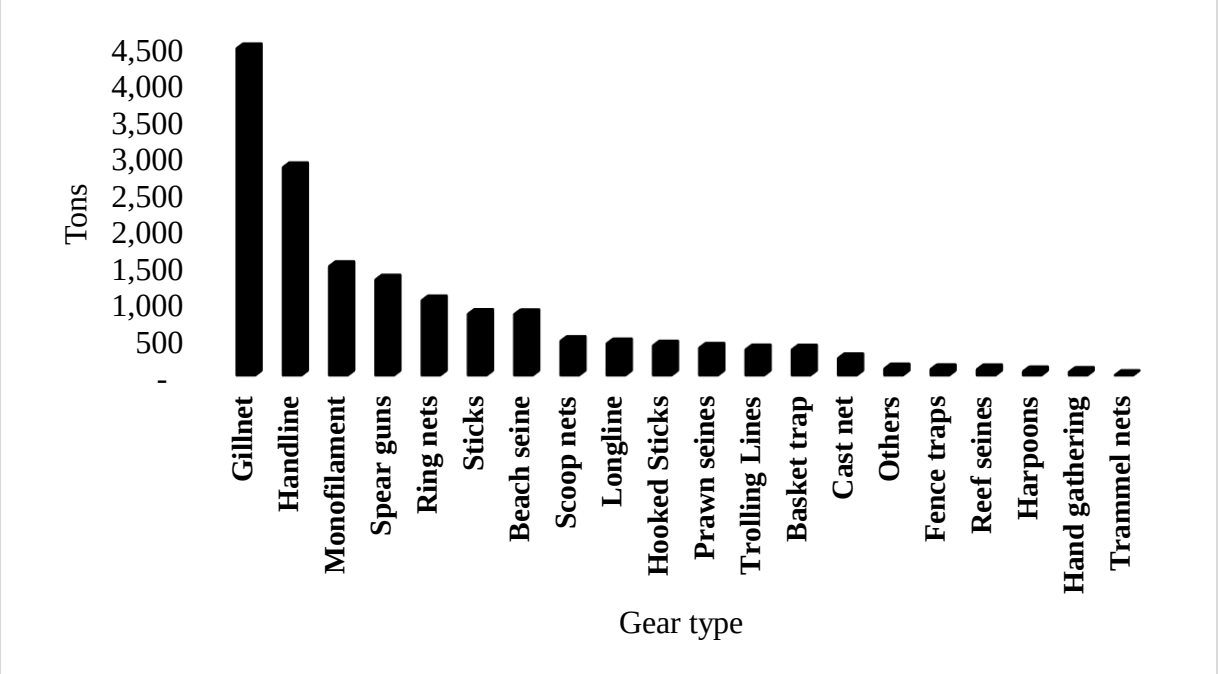

Figure 3: Landings by gears type

Table 1: Number of sampled lengths for key species

Family	**Species**	**Common name**	**Number**
Siganidae	*Siganus sutor*	Shoemaker spinefoot	29,011
Lethrinidae	*Lethrinus nebulosus*	Spangled emperor	14,194
Scaridae	*Leptoscarus vaigiensis*	Marbled parrotfish	10,887
Octopodidae	*Octopus vulgaris*	Common octopus	9,323
Lutjanidae	*Lutjanus fulviflamma*	Dory snapper	7,020
Palinuridae	*Panulirus ornatus*	Lobster	4,542
Penaeidae	*Fenneropenaeus indicus*	Indian white prawn	3,594
Carangidae	*Carangoides ferdau*	Blue trevally	2,597
Haemulidae	*Plectorhinchus schotaf*	Minstrel sweetlips	2,361
Portunidae	*Scylla serrata*	Crab	1,036
Mullidae	*Mulloidichthys flavolineatus*	Yellowstripe goatfish	969
Scombridae	*Euthynnus affinis*	Kawakawa	919
Serranidae	*Epinephelus fuscoguttatus*	Brown-marbled grouper	865
Mullidae	*Parupeneus macronemus*	Long–barbel goatfish	662
Sphyrnidae	*Sphyrna lewinii*	Hammerhead shark	392
Pomacentridae	*Amphiprion allardi*	Two bar anemonefish	60
Holothuridae	*Holothuria scabra*	Sandfish	47
Acanthuridae	*Naso unicornis*	Bluespine unicornfish	11
Loliginidae	*Uroteuthis duvauceli*	Indian squid	6
Total sample size			**88496**

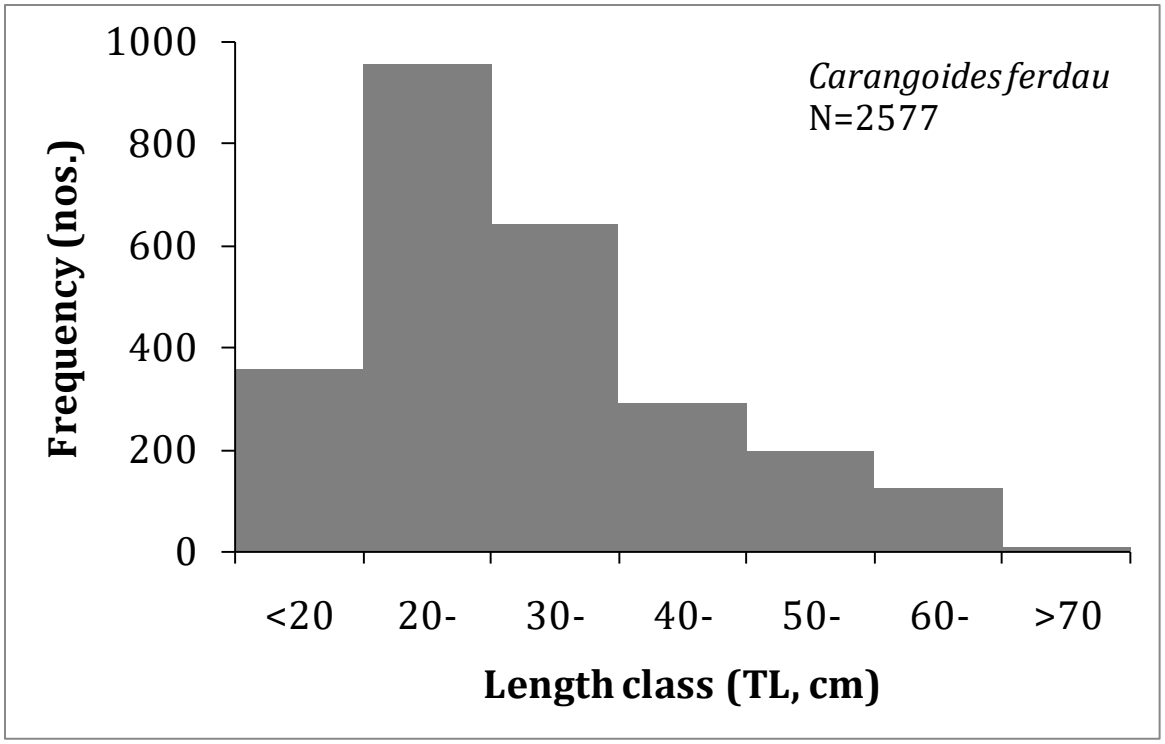

Figure 4: Length frequency distribution of *Carangoides ferdau*

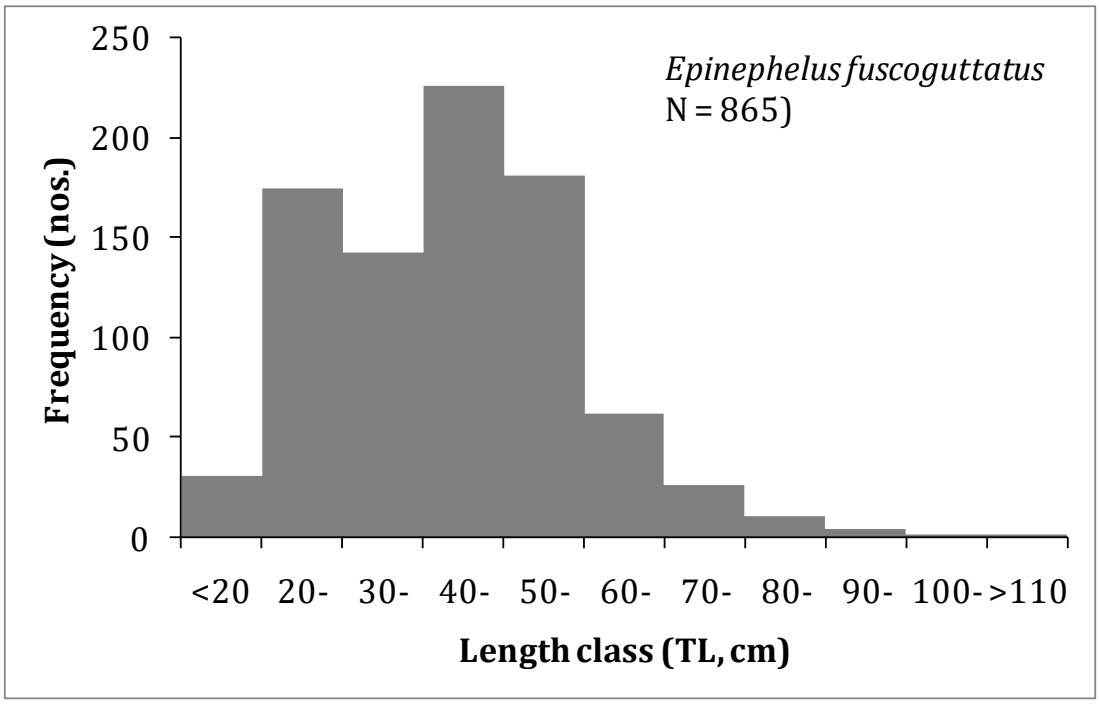

Figure 5: Length frequency distribution of *Epinephelus fuscoguttatus*

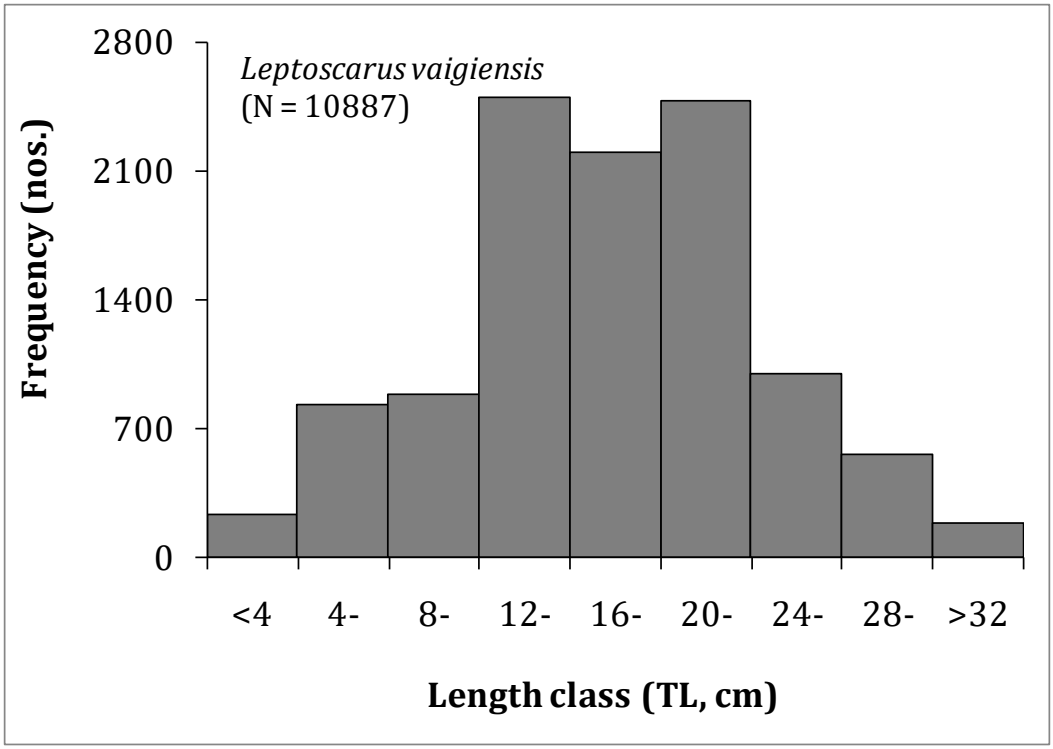

Figure 6: Length frequency distribution of *Lepscarus vaigiensis*

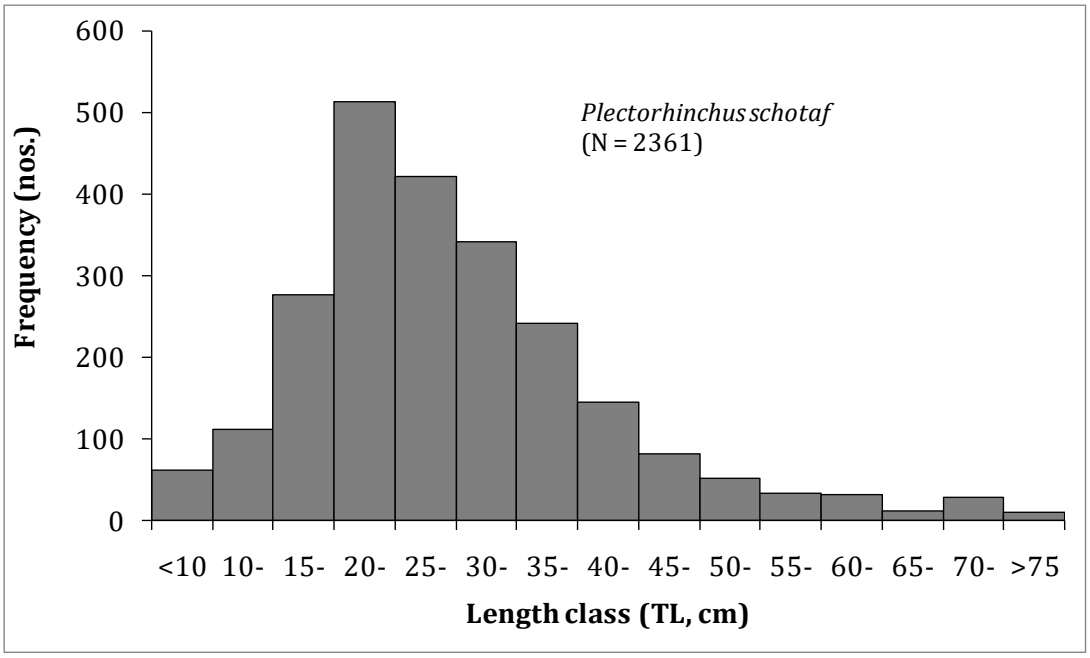

Figure 7: Length frequency distribution of *Plectorhinchus schotaf*

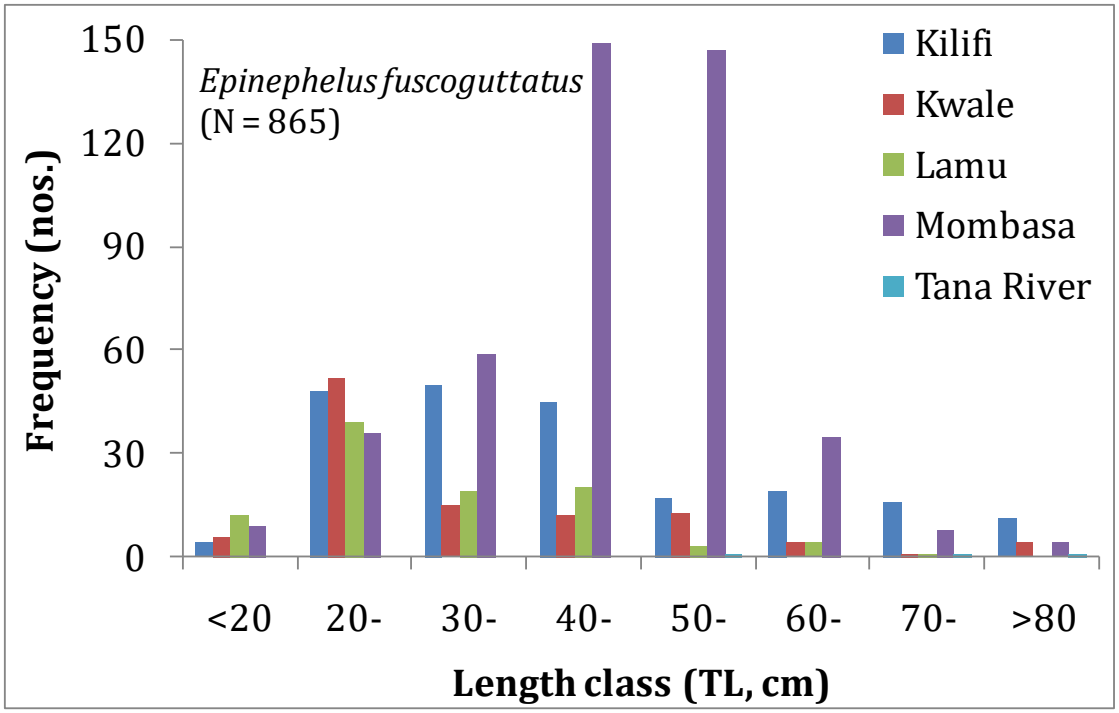

Figure 8: Length frequency and spatial distribution of *Epinephelus fuscoguttatus*

From the results of the two data collection systems, it was apparent that the routine data collection was underestimating the catches by artisanal fishers in Kenya. The fishing activity is affected by the rough monsoon season which from the CAS results is manifested clearly while in the routine data collection is somehow subdued (Figure 1). Landings by families were also clear with the *Scombridae* family where tuna are represented being the second most landed family. The catches of all sharks were initially recorded as *Carcharhinidae* representing the fifth most landed family, but might need further separation to the actual families. Previously the sharks and rays were reported together but from the CAS, it was easy to separate them with two families of rays, *Dasyatidae* and *Mobulidae* represented (Figure 2).

Gear wise, gillnet, handline and monofilament nets caught most of the artisanal fish landed. Other important gears were spear guns, ringnets, sticks and beach seines in order of importance

(Figure 3). The sticks are mainly used in the intertidal areas for crabs and also getting octopus out of their hidings.

During the first year of data collection, a total of 88,496 length samples were collected. *Siganus sutor, Lethrinus nebulosus* and *Leptoscarus vaigiensis* were the most sampled species with 29,011, 14,194, 10,887 lengths captured respectively (Table 1). The length frequency distribution of various species are shown in figures 4 to 7. Figure 8 shows both lengths and spatial distribution of catches for *Epinephelus fuscoguttatus*.

ELECTRONIC DATA COLLECTION TRIAL

Due to the challenges encountered by during data collection where some data was lost, late submission of data forms lack of personnel to digitise the data and wrong entries, SDF&BE embarked on an electronic data collection trial that used an open source mobile technology. This was undertaken in 13 landing sites as shown in figure 9 below. The trial was successful though a lot of training for the data collectors and provision of data collection equipment is important or else an incentive for use of personal phones be provided to the data collectors. The submission of data was immediate and easy for data management. Apart from being quick, it was also possible to verify whether an enumerator went to the site as it provides the coordinates of the data collector and the time the data was captured. In case a data collector was unable to identify a species, a photo was uploaded alongside the data for later identification. The photo capture and dissemination system can also be used for size data capture. In line with that, SDF&BE is developing a database for CAS data capture.

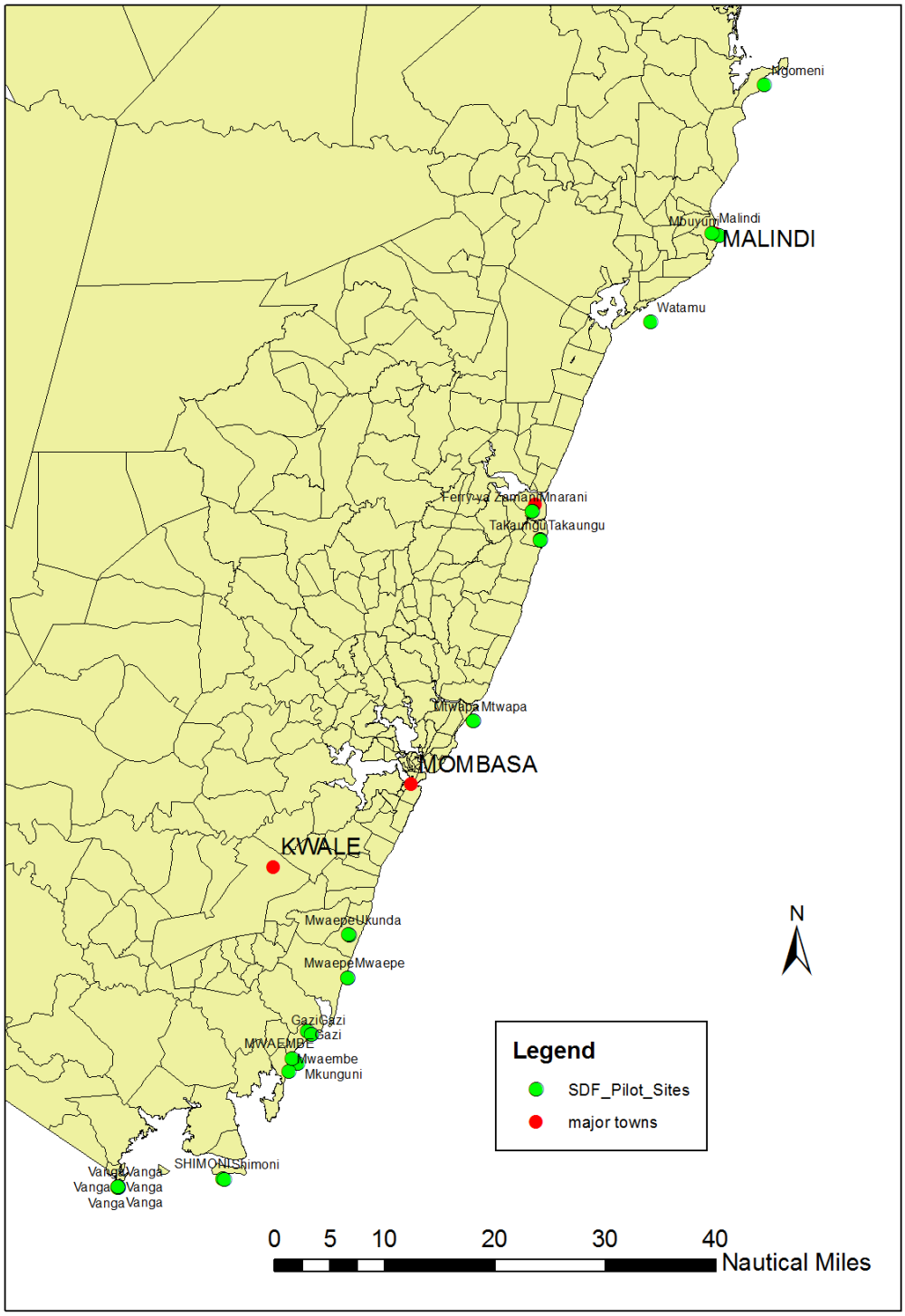

Figure 9: Pilot sites used for electronic data capture

CHALLENGES ENCOUNTERED

- Lack of database
- Huge amount of paperwork
- Loss of data three months data forms from Kiunga
- Increased cost involving data collection and supervision
- Fish identification challenges
- Lack of data entry personnel
- Cheating in data entries
- Many fishing grounds yet to be mapped

PROPOSED INTERVENTIONS

- Electronic data capture
- Development of database
- Mapping of identified fishing grounds
- Training of data collectors
- Encouragement of County Government and BMUs in data collection

Since the technical knowhow from SDF&BE in this line is limited, we are requesting the IOTC to visit Kenya, evaluate the new data collection system and provide technical assistance. This would supplement the effort so far provided by the ministry as far as data collection is concerned. The success of such a trial can be replicated in other areas where artisanal data capture has been poor and would help in improving assessment of IOTC stocks as artisanal datasets so far provided to the commission have been said to be poor.