Spatial and Temporal Size of Kawakawa (Euthynnus affinis) caught by artisanal gears.

Isaac Wafula Barasa.
Division of Marine and Coastal Fisheries
Kenya Fisheries Service.

Stephen Ndegwa
Head of Statistics
Kenya Fisheries Service.

Abstract:

The overall objective of the Catch Assessment Survey (CAS) data collection system is to test if data collection through CAS would generate data for monitoring trends in fish catches, fishing effort for use in management planning, policy formulation and decision making. A survey was conducted to determine the impact of different gears on the size structure of Kawakawa (*Euthynnus affinis*).

Methodology; CAS employs a two-stage sampling design. Within each county, a sample of Primary Sampling Units (PSU)was established, in this case landing sites were first selected, and then, at each PSU, samples of Secondary Sampling Units (SSU) (fishing craft gear) were selected based on total number of fishing crafts per landing site and the spatial distribution along the coastline was also considered. Ten sampling days per month were allocated according to the moon phase and tidal cycles.

Results; The mean length for Kawakawa (*Euthynnus affinis*) was 65.8±0.3 (SE) cm, while the length at which 50% of *E. affinis* were mature (L50) was 47.1. The minimum and maximum lengths were 22 cm and 98.1 cm respectively during the sampling period. The plot revealed that the targeted cohort had a peak length of 60 – 64 cm (TL). The species was targeted by numerous gears such as gillnet, handline, longline, monofilament, reef seine, ring net and trolling line.

Conclusion;

It is noted that the gears catching kawakawa do not have Management plans while Monofilament and reef seines are illegal gears. The results means that most of the fish caught had attained maturity.

Objectives of the Catch Assessment surveys

The overall objective of the Catch Assessment Survey data collection system was to test if data collection through CAS would generate data for monitoring trends in fish catches, fishing effort, and economic value for use in management planning, policy formulation and decision making. Specifically, the aims of the CAS were to:

1) Estimate annual total catch by weight of operating fishing fleets (craft- gear combination)

2) Estimate spatial and temporal trends in fish catch rates (catch per unit effort) by gear type of the different units of fishing effort

3) Estimate spatial and temporal trends in the species group composition of fish catches by family for the different fishing craft-gear types

4) Determine the impact of different gears on the size structure of selected priority species

5) Estimate the value of the fisheries in terms of ex-vessel price/kg(i) total value of the fisheries (ii) key species group.

METHODOLOGIES.

Catch Assessment Survey Process

Standard Operating Procedures (SOP) and Training Manual for CAS

Data enumerators trained revised CAS Standard operating procedures (SOPs) and manual. The manual contains training modules that covers species identification, morphometric measurements and sampling design and the data recording during interviews. A sampling form was developed and transformed into electronic mobile data format.

The Catch Assessment Survey Design

The CAS employs a two-stage sampling design. Within each county, a sample of Primary Sampling Units (PSU), in this case landing sites is first selected, and then, at each PSU, samples of Secondary Sampling Units (SSU) (fishing craft gear) are selected based on total number of fishing crafts per landing site and the spatial distribution along the coastline is also considered. Ten sampling days were allocated according to the moon phase and tidal cycles per month.

Table 1. Fishing craft-gear types selected for Catch Assessment Survey sampling

		Main Gear Type								
Fishing Craft Type	**Code**	**BS**	**GN**	**LL**	**RN**	**HL**	**MF**	**TL**	**BT**	**RS**
Hori (Flat bottomed fishing boat pointed at both ends)	**HR**	X	X	X		X	X	X	X	X
Ngalawa (Is a craft pointed on both end and have outriggers)	**NG**		X	X		X	X	X	X	X
Dau (Flat bottomed fishing craft)	**DA**	X	X	X		X	X	X	X	X
Mashua (A craft pointed on one end V-shaped bottom)	**MS**	X	X	X	X	X	X	X		X
Mtumbwi (Is a craft curved out of a log of wood)	**MT**		X			X	X	X	X	X
Foot-fisher (A fisher fishing without use of a fishing craft)	**FF**	X	X			X	X		X	

Gear Types Key: BS- Beach seine, GN- Gill net, LL- Long lines, RN – Ring net, HL- Hand line, MF- Monofilament, TL - trolling lines, BT- Basket traps, RS- Reef seine.

Selected landing sites by county for Catch Assessment Survey

Thirty-three (36) landing sites for Catch Assessment Survey selected from the five counties namely Lamu, Tana River, Kilifi, Mombasa and Kwale. The spatial distribution illustrated in Fig 1. Fishing gears in table 1. While landing sites for biological sampling based on specific fishery; basket trap; deep water snapper, octopus, tuna and tuna-like; ring net and prawn indicated in table 1.2 and priority species in Table 1.3.

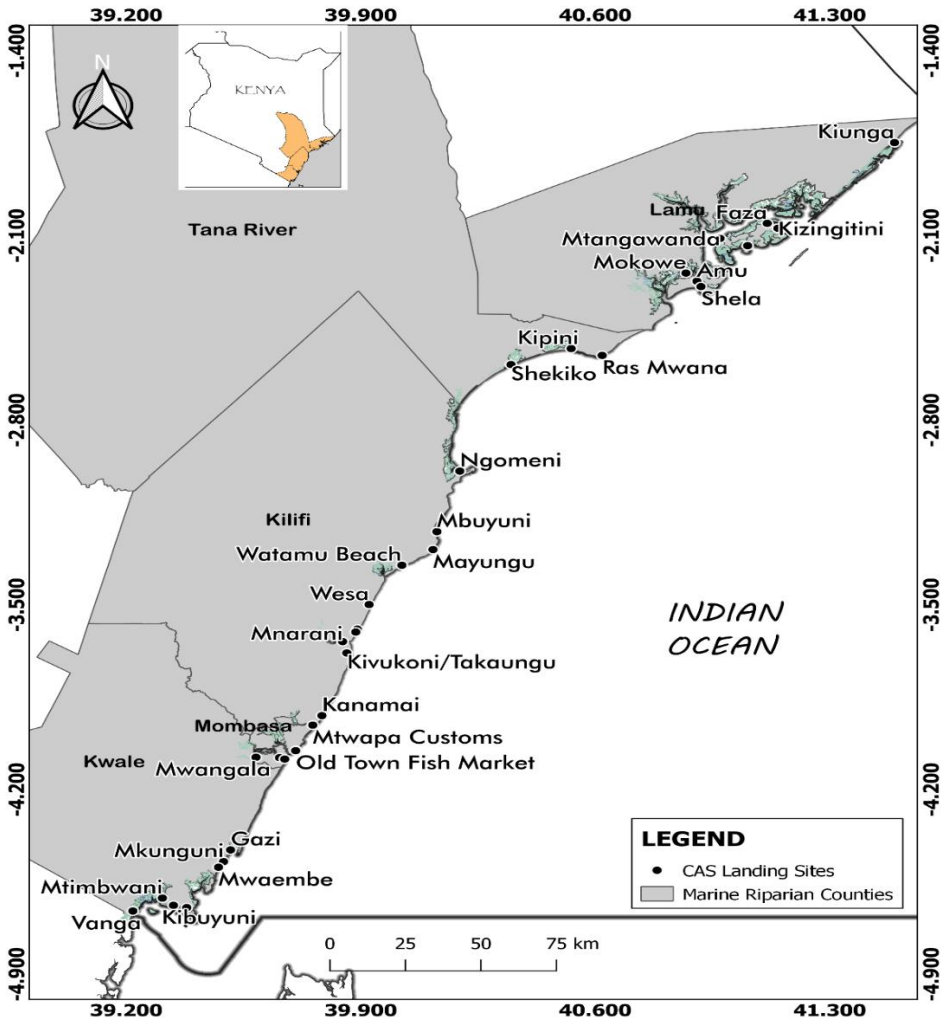

Figure 1 Map showing distribution of selected coastal CAS landing sites

Table 1.2: Distribution of selected landing sites by county for Catch Assessment Survey

County	**No. of Landing sites selected**
Tana River	2
Mombasa	6
Lamu	7
Kwale	6
Kilifi	11

Table 1. 3 Table Key priority species

Fishery	**Basket trap (demersals)**	**Deep water snapper**	**Octopus**	**Tuna**	**Ringnet**	**Prawn**
Priority species selected	*Siganus sutor* *Leptoscarus vaigiensis* *Scarus ghobbon* *Lutjanus fluviflamma*	*Etelis coruscons* *Etelis cobareus* *Pristeomoides filomentosus* *Aprion virescons* *Pristiomoides deniotes*	*Octopus vulgaris* *Octopus cyanea*	*Euthynus affinis* *Thunnus obesus* *Thunnus albacares*	*Sphyraena abrusato* *Sphyraena flavicaucio* *Sardinella gibboso* *Spratelloides gracillis*	*Paneus indicus* *Paneus monodon* *Paneus monoceros*

Catch Assessment Survey (CAS) Data Collection and Analysis

A hybrid method of physical and electronic data collection forms were used in collecting data at the selected landing sites. The data items collected included catch weight, composition by species and size, fishing gears and methods, craft type and length and value of catch as well as fishing frequency. The catch weight was measured using weighing scales while tapes were used in measuring craft lengths. All Survey data was captured using electronic mobile app and analyzed using the Microsoft Excel (Microsoft Corporation, 2018) and Minitab software (State College, 2010) by CAS team and use of the database.

Estimation of fishing effort

Fishing effort per time unit = Fishing capacity*activity level

or

Fishing effort = F*BAC x A

where,

i) **F= no of boats from frame survey**
ii) **BAC= average no of active boats/no of boats from frame survey,**
iii) **A=no of fishing days**

Table 1.4 Species sampled for the length-frequency assessments

Family	Species	English (common) name (Swahili names)	Numbers	range	mean TL (cm)	L50	% mature
Scaridae	*Thunnus albacares*	Yellowfin tuna (Jodari/Kiboma)	1079	40-200	86.3 ± *0.6*	97.4	31
Scombridae	*Thunnus obesus*	Bigeye tuna (Jodari/Kiboma)	1227	45-230	90.7±	94	22
	Euthynnus affinis	Kawakawa (Jodari/Kiboma)	330	24-100	65.8±	47.1	87.3

Kawakawa, Euthynnus affinis

The mean length was 65.8±0.3 (SE) cm, while the length at which 50% of *E. affinis* are mature (L50) was 47.1. The minimum and maximum lengths were 22 cm and 98.1 cm respectively during the sampling period. The plot revealed that the targeted cohort had a peak length of 60 – 64 cm (TL). The species was targeted by numerous gears such as gillnet, handline, longline, monofilament, reef seine, ring net and trolling line.

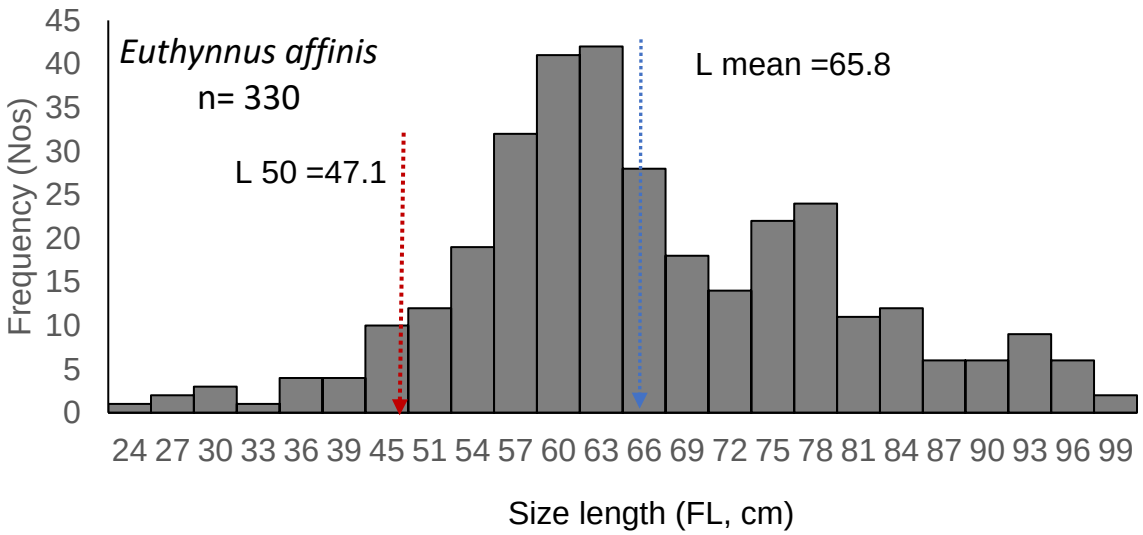

Figure 2. Length-frequency distribution for Euthynnus affinis in the coastal and marine fisheries of Kenya, (90% of E.affinis caught were more than the L50).

Conclusion;

It is noted that the gears catching kawakawa do not have Management plans while Monofilament and reef seines are illegal gears. The results means that most of the fish caught had attained maturity.

ACKNOWLEDGEMENTS

Sincere gratitude to the Kenya Marine and Fisheries Socio-Economic Development (KEMFSED) Project for facilitating the Surveys, Kenya Fisheries Service (KeFS), the Kenya Marine and Fisheries Research Institute (KMFRI), Coastal County Government staffs for insights and expertise during the workshop, data analysis and reporting process.

Special appreciation to all the Beach management units for dedication and cooperation during the surveys especially on data collection and reporting