

## Overview of Tanzania Neretic Tuna Fisheries

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### ABSTRACT

The most commonly landed neritic tuna in Tanzania are the Kawawaka, Frigate tuna, Kingfish as well as juvenile of Yellow fin and Big eye tuna. By far the main gear used to catch the fish are ring nets and gill nets even though troll lines are sometimes used. There is limited updated information concerning the composition of neritic tuna species in surface gill net fisheries but past studies have shown that their composition can reach up to 80% of the total catch. This signifies their importance in the pelagic artisanal fisheries of Tanzania. The fishery take place within sheltered areas throughout the Tanzanian coast with less fish being caught in the Southern part of the country.

## BACKGROUND

### Artisanal Fisheries in Tanzania

The coastal area of Tanzania stretches for over 800 kilometers and includes the Islands of Zanzibar, Pemba and Mafia and numerous catchment areas. The average width of the continental shelf is around 6 kilometers except in the Zanzibar and Mafia channels where the continental shelf reaches a width of about 62 kilometers.

Artisanal fishery is practiced throughout the near shore waters and is comprised of different types of fishing boats that varies from un-motorized dugout canoes of 3 m to wooden boats of 12 meters with inboard engines<sup>1</sup>. Fishing gear and methods ranges from seining, gill netting, ring netting, trapping, trolling and to some extent simple collection by hands for less mobile gastropods and bivalves.

### Pelagic Fisheries

Most of the fishing within the artisanal fishery is taking place around reef areas but a significant number of motorized vessels are involved in pelagic fisheries. However, this number is not known as frame surveys do not categorize fishing vessels according to the fishery they are involved in. The pelagic fisheries can further be subdivided in small and large pelagics fisheries.



Figure 1: Coastline of Tanzania

<sup>1</sup> According to the last nationwide survey (2008) the artisanal fleet is comprised of 4259 dugout canoes, 6815 outrigger canoes, 2905 boats powered by outboard engines and 219 boats powered by inboard engine.

### Small Pelagics Fishery

The small pelagics fishery is mainly composed of Mackerels and Sardines. The commercially important species of Mackerel include *Rastrelliger spp.* and *Decapterus spp.* and are found in different habitats which include bays, harbors and deep lagoons in turbid plankton rich waters, usually forming large schools. The commercial important species of sardine are *Sardinella neglecta*, *S. leiogaster*, *S. sirm*, *S. melanura*, *S. albella*, *S. gibbosa*, *S. neglecta*, *Dussumieria acuta*, *Etrumeus teres*, *Herklotsichthys punctatus*, *H. quadrimaculatus*, *Hilsa kelee*, *Pellona ditchela*, *Spratelloides delicatus*, and *S. gracilis*. They are usually found in large concentrations along the coast particularly in Tanga, Dar es Salaam Zanzibar and Mafia areas. Both Mackerel and Sardine are fished using light attracting method using purse seines and to a lesser extent scoop nets.

### Large Pelagics Fishery

The fisheries for large pelagic involve billfish, tuna and tuna like species. The main gear used are surface rigged gillnets, ring nets and to a lesser degree trolling lines. The use of trolling lines is mostly conducted on an *ad hoc* basis but a few dedicated troll fishermen use it during the most favorable weather months of August-September and November-February. The most common gear deployed in this fishery is gill nets that comprise several lengths of nets forming a single net of 300 - 1000 m and 7 - 15 m drop. These are rigged for surface use and are attached to the bow of the boat.

There is limited updated information concerning the composition of tuna species in the large pelagic fisheries but past studies have shown that their composition can reach up to 80% of the total catch. The same studies have shown that within this general group 52% were frigate tuna (*Auxis thazard*), 21% Kawakawa (*euthynnus affinis*) and 8% yellow fin tuna (*Thunnus albacores*).

The following chapter gives account of recent studies regarding the fisheries and biology of two species of neritic tuna namely the Kawakawa and Narrow-barred Spanish mackerel.

## NERITIC TUNA

### KAWAKAWA (*EUTHYNNUS AFFINIS*)

#### Distribution and Fisheries

Kawakawa is known to live in open waters of temperature ranging from 25° to 29°C. Adults form large schools in coastal waters on the continental shelf and often aggregate on reefs. Large quantity of landed kawakawa is reported in Dar es Salaam, Tanga, Kilwa Somanga, Pangani and Saadani. Other areas include Mafia, northern Unguja as well as Southern part of Pemba Island. The catch is higher during northeast monsoon following an increase in water temperature and less during the southeast monsoon season when there is a drop in temperature. Furthermore the catch is highest during the time when rainfall and wind speed are at their lowest mark during the northeast monsoon season (Johnson, 2010).

Fisheries of Kawakawa is mainly conducted during the day using surrounding nets, but mixed catch with king fish have been reported in gill nets deployed mainly during the night. Studies have observed a difference in size between the individuals caught during the day and those caught during the night. The total length of the ones caught during the day ranged from 34 cm to 55 cm while for those reported to have been caught during the night, individuals ranging from 56 cm to 85 cm were dominant. This observation suggests that the species undergo a diet shift with ontogenic development, which is a strategy for avoiding food competition (Johnson, 2010).

Both diet analysis and isotope studies have shown that kawakawa feed primarily on small sized fishes, crustaceans, cephalopods and gastropods (Johnson, 2010).

#### Stock Structure and Migration patterns

There are no studies conducted on the stock structure and migration patterns of kawakawa along the coastal waters of Tanzania. However, a recent oceanographic and biological study by Johnson (2010) suggests the existence of both migratory and resident individuals, but acknowledges that “*this needs to be justified using molecular and otolith chemistry techniques*”. Experienced local fishermen believe that migration of this species does exist on seasonal basis.

#### Reproduction

The sex ratio of Kawakawa has shown that males are found in large numbers than females in all developmental stages. On the other hand, Female Kawakawa attain maturity ( $L_{m50} = 47$  cm) earlier than males ( $L_{m50} = 52$  cm). Monthly variation in gonad – somatic index (GSI) of Kawakawa has shown a peak for males in July and January, in the southeast and north east monsoon seasons respectively. While for females the GSI

peaked in January for the northeast monsoon and June for the southeast monsoon seasons. The extended spawning period has been reported to start in November and end in February while a short spawning period was registered from June to July. It has also been observed that shading of gonads takes place between January and April and July and September when there is a sharp drop in the GSI of both male and female Kawakawa (Johnson, 2010).

## **KINGFISH (*SCOMBEROMORUS COMMERSON*)**

### **Distribution and fisheries**

The narrow-barred Spanish mackerel or kingfish is found in the coastal waters of Tanzania with its distribution extending from north to southern parts of the country. The landed artisanal catch of the species is higher during southeast monsoon when water temperature decreases and rainfall increases and lower during the northeast monsoon season when the temperature increase and rainfall decreases. Large landed catches are reported in Dar es Salaam, south and northern Zanzibar Island, Pangani, Mafia and Mtwara. Kingfish is mainly targeted during the night using gill nets but to a much lesser extent are also caught during the day together with schools of Kawakawa by ring nets. Fishing is conducted in sheltered coastal areas at depth ranging from 10m to 40m. The size of landed individuals ranges from 69cm to 120cm total length (Johnson, 2010).

There is a lot of interest in the recreational Kingfish fishing around Dar es Salaam, Kilwa and Pangani but no information on catch is available.

Both diet analysis and isotope studies have shown that kingfish feed primarily on small and large sized fishes, crustaceans, cephalopods and gastropods (Johnson, 2010).

### **Stock Structure and Migration patterns**

There are no studies conducted on the stock structure and migration patterns of kawakawa along the coastal waters of Tanzania. However, fishermen believe there exist a seasonal migration of the species. Furthermore as it was for the case of Kawakawa the same study of Johnson (2010) suggests an existence of both migratory and resident individuals while again commenting on the need for the use of the molecular and otolith chemistry techniques to justify the claim.

## Reproduction

The sex ratio of Kingfish population has shown more numbers of males than females in all developmental stages. Studies have also reported that female Kingfish attain maturity ( $L_{m50} = 79$  cm) earlier than males ( $L_{m50} = 83$  cm). Monthly variation in the gonad – somatic index (GSI) for male peaked in February during the northeast monsoon and May during the Southeast monsoon. The peak GSI for females was in May, September and December while the lowest GSI was observed in July (Johnson, 2010).

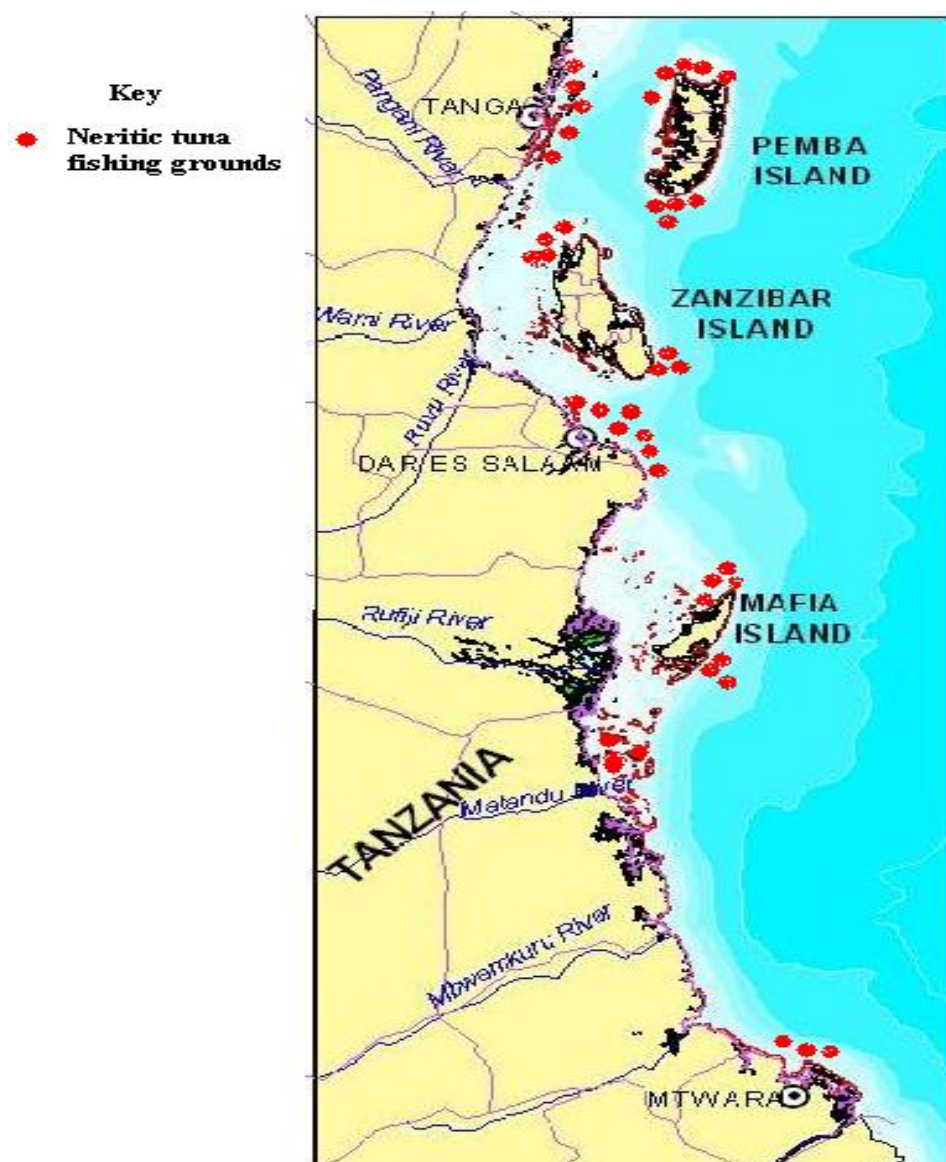


Figure 2: Map of Tanzania showing neritic tuna fishing grounds

## ONGOING STUDIES

A Phd study on ‘Analysis of Population Genetic Structure and Migration Patterns of *Euthynnus affinis* and *Scomberomorus commerson* in the Coastal waters of Tanzania’ is currently being undertaken by the second author at the University of Dar es Salaam.

## REFERENCES

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