Gut Contents Of Indian Mackerel, *Rastrelliger Kanagurta* (Cuvier 1817) Off Uttara Kannada Coast,Karnataka

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Abstract: The Indian mackerel, *Rastrelliger kanagurta* (Cuvier 1817) exploited by mechanised gears like trawlers, purse seines and non-mechanised or traditional gears like yendi along Uttara Kannada Coast, Karnataka. The investigation of gut content is used to assure the food and feeding behaviour of fish species of high commercial value such as the Indian Mackerel exemplifies many vital ecological components like habitat behaviour and specific interactions. A study on the gut contents of Indian mackerel ,*Rastrelliger Kanagurta*) Curvier 1817 off the Uttara Kannada coast was done from January 2017 to January 2018 for a peirod of 13 months. A total of 1299 fishes were dissected and their food contents were investigated. Fishery occurred throughout the year with teemingness in pre-monsoon and post monsoon season. The Indian mackerel, *Rastrelliger kanagurta* feeds on plankton (phytoplanktons and zooplankton),the one or the other dominating at different periods of the year visible, Noble(1961) and George (1962).Planktons provide a crucial source of food to many aquatic organisms (Shekshmi,et,al 2018). A good quality food in the food web is a simple and healthy scheme that endures larger and more diverse fish populations. The Indian Mackerel ,*Rastrelliger kanagurta* has special significance in the economy of the tropic, where the species is considered as important source of inexpensive protein and also commonly used as bait (Zacharia 2011).The present study aims to generate a base line data for feeding habits of Indian Mackerel, *Rastrelliger kanagurta* off Uttara Kannada coast source since it plays a major role in fisheries and food web in marine ecosystem.

Keywords : Indian Mackerel, voraciously, full, abdominal cavity.

Fig1

Fig 2

Introduction

Indian Mackerel, *Rastrelliger kanagurta* is a pelagic, shoaling and commercially important fish. It is cosmopolitan in Indian waters both along the East and West coasts. Few of the distinguishing characters of Indian Mackerel ,*Rastrelliger kanagurta* are , the body is generally silvery with narrow dark to golden stripes on upper side of the body with a double longitudinal row of small dusky spots on upper back.A prominent black spot is present under the pectoral fin, dorsal fins are yellow with black tips but the caudal and pectoral fins are yellowish in colour. It has two dorsal fins .The first dorsal fin is triangular with 8 to 11 spines,the second dorsal and anal fins with 12 rays,pectoral fins very short with 19 to 20 rays,5 finlets present, gill rakers very long,eye covered by adipose eyelid,cycloid types of scales cover the entire body but are more conspicuous behind the head and pectoral fins.It is highly preferred table fish along the West coast of India and Karwar is considered as mackerel coast in the fishing atlas. Thus according to CMFRI, Annual Report, 2018, Karnataka was in the fourth position in the marine landing with 4.52 lakh

tonnes. The total estimated marine fish landing in Karnataka had registered a decrease during 2018 as compared to previous year. In 2018, Indian Mackerel, *Rastrelliger kanagurta* became the major resource with a contribution of 2.84 lakh tonnes (8.1%) towards the total landings of this resource reduced by 1.4% compared to its landings in 2017.A total of 1299 fishes were disserted for a period from Jan Jan 2017 to Jan 2018 for a period of 13 months . Of these total fishes, 734 fishes were females, 435 were male and 130 were indeterminate.. Significantly the length and total weight of Indian Mackerel, *Rastrelliger kanagurta* was found to be linear and the Pearson's correlation was 0.913 ($P<0.005$).The phytoplankton like coscinodiscun dominated in all the seasons. The observation of diet of fishes is a authoritative to know the functioning of fish accumulations which are necessary for exploiting Ecosystem Based Fisheries Management (EBFM) model. Hence the canvas of feeding habits serves as a crucial purpose in fisheries.

RESEARCH METHODOLOGY

The fishes samples were collected from the fish landing centers and brought to the laboratory and further analysed by Hyslope (1980) ,Selvem,et al (2015). The morphometric measurements like total length, standard length, fork length were taken to the nearest centimetres(cm) ,total body weight were measured to the nearest grams before dissecting the fish. Later the fish were dissected,the stomach was removed and weighed with digital balance. Identification of food content was done visually and microscope by employing occurring method (recording the number of stomach containing one or more individuals of each food category and expressing it as percentage of all stomachs), gravimetric method (set weight of stomach per fish is recorded and total is expressed as a percentage), volumetric or displacement method. (Submersion or dunking method) is used to measure the volume of irregular things. The things are submerged in a liquid and the volume of liquid that is displaced is measured. The stomach fullness was estimated as ¼th full, ½ th full, ¾ th full or full.The food diversity index was calculated using PAST software version 3.

Site Location: Uttara Kannada (North Canara) district lies between 13.9220° N to 15.5252° N latitude and 74.0852° E to 75.0999° E longitude and covers an area of 10,291 km^2. It extends from North to South a maximum of 180 km, and from west to east a maximum width of 110 km. Uttara Kannada has 13 fish landing centres i:e,Karwar (Karwar,Majali & Amdalli), Ankola (Harawada & Keni),Kumta (Kumta, Gangavali & Tadadi),Honnavar (Honnavar, Manki) and Bhatakal (Bhatkal,Murdeshwar & Shirali).

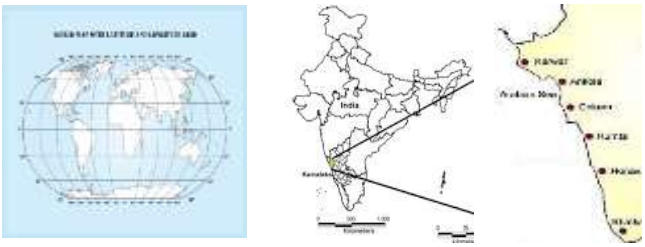

Fig 3

RESULTS AND DISCUSSION

The food and feeding of Indian Mackerel ,*Rastrelliger Kanagurta* was enquired grounded on the scrutiny of stomach contents of of dissected fishes in the study period. The fishes which were smaller in size longer had their intestine longer in length which had more of plant content in their diet and the fishes which were larger had their intestines shorter n length.This signalizes that larger fishes are carnivores.

The pre monsoon period from Feb to May the fishes ranging from size 14 cm to 20 cm were observed. Maximum fishes stomach conditions here was almost full and 3/4th full and the fishes were with maximum length size were spent fishes and the minimum size one were immature and maturing fishes.

The monsoon period from June to September the fishes ranging from 14cm, 15cm 16cm, 17cm, 18cm, 20cm and 21cm were observed. The fishes which had advanced stage IV and stage V gonads had only ½ and ¼ full stomach and the fishes with I,II, III, stages had stomachs with full full, ¾ th full stomach. The male and the female fishes had the same stomach condition.

The post monsoon period lasted from October to January. The catch here showed a maximum range size of 14cms, 15cms, 16cms, 17cms, 18cms , 19cms, 20cms. There fishes had a variety of stomachs as empty, 1/4th full, ½ full, ¾ full and full full condition. The male to female ratio was 1:1 and fully matured fishes dominated during this period.

Table 1- Descriptive Statistics

Descriptives Statistics

Wt of food

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Pre Monsoon	60	1.3852	.99288	.12818	1.1287	1.6417
Monsoon	40	.6603	.35501	.05613	.5467	.7738
Post Monsoon	50	.7062	.46803	.06619	.5732	.8392
Total	150	.9655	.78351	.06397	.8391	1.0919

Table 1 displays mean, standard deviation, lower bound, upper bound value of the weight of foods in pre monsoon,monsoon and post monsoon periods during the study period. The descriptive statistics indicated that the mean values of weight of food in pre monsoon,monsoon and post monsoon were 1.3852,0.6603,0.7062 respectively. The standard deviations for each variable indicated that data were widely spread around their respective mean.shows that at 5 % level of confidence, The descriptive statistics showed that the values were normally distributed about their mean and variance.

The below Fig 4 is the box plot which is being plotted for weight of the food in different seasons and it clearly indicates that the fishes in the pre monsoon season have stomach contents heavier then the post monsoon and monsoon season.

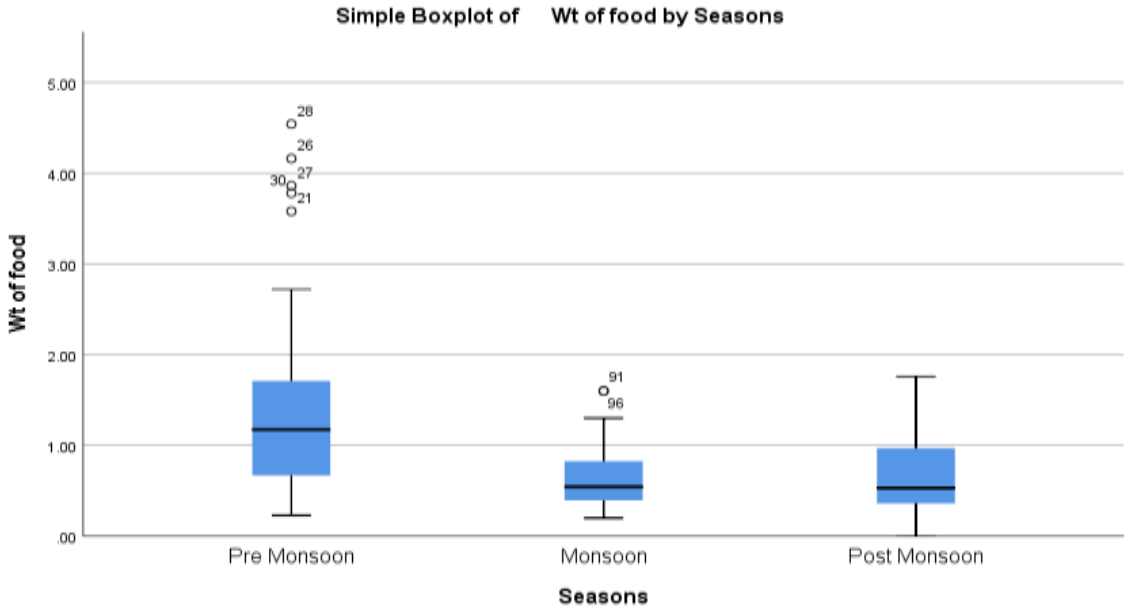

Fig 4

The bar graph (Fig 5) reveals that the stomach condition in most of the fishes in the post monsoon season had empty stomach and 1/4th full stomachs compared to the fishes in the pre monsoon and monsoon period.

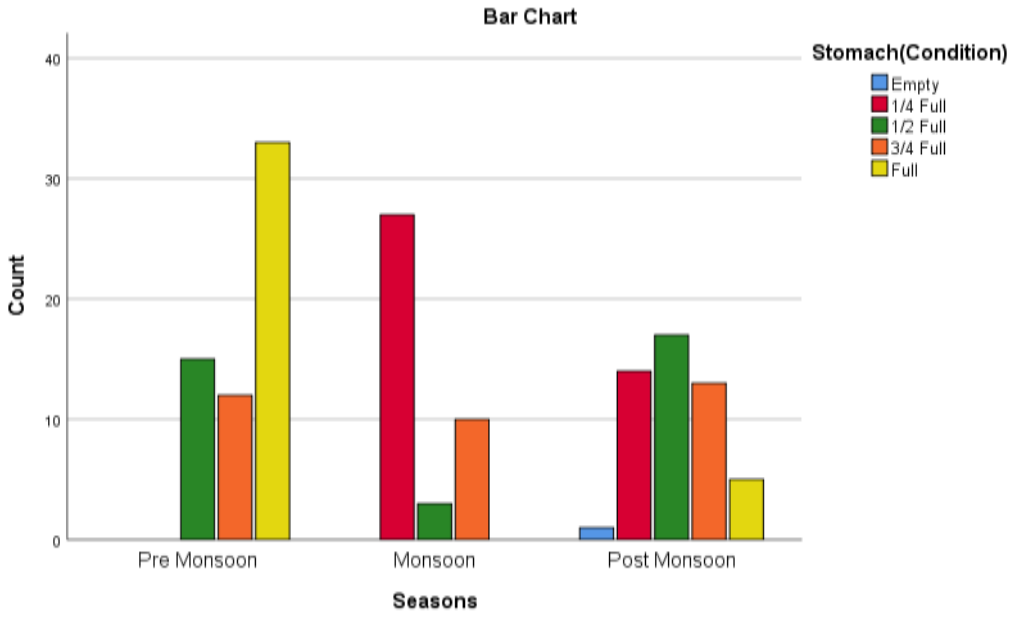

Fig 5

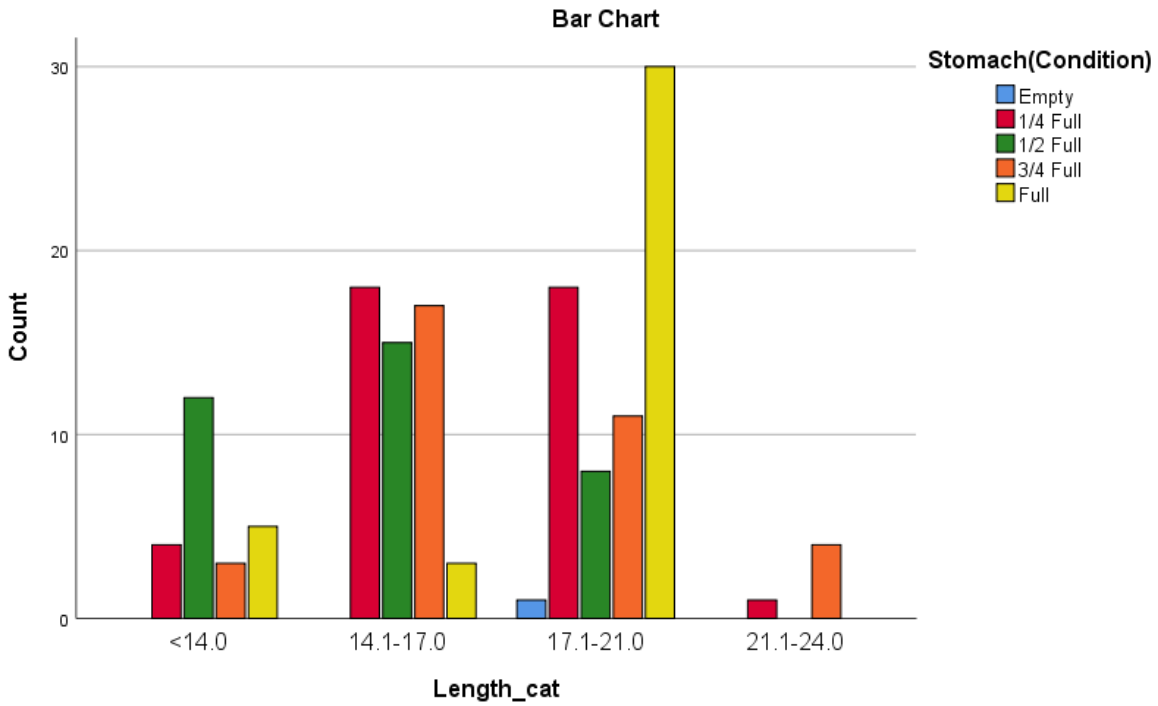

Fig 6

The above (Fig 6) bar graph is plotted for fish length against weight of the stomach.The fishes which ranged between 14 cms to 17 cms had maximum of full,3/4th full,1/2 full stomach ,as these fishes were immature and maturing fishes and the growing fishes.But the fishes which were ranging between 21cms to 24cms had maximum of 1/4th full and empty stomachs,which were probably the matured and ripe fishes in advanced stages having the gonads occupying the maximum of abdominal cavity.Few of the fishes which were more than 21 cms and above also had full and 3/4th full stomachs but these were the spent and resting fishes having smaller gonadal size.

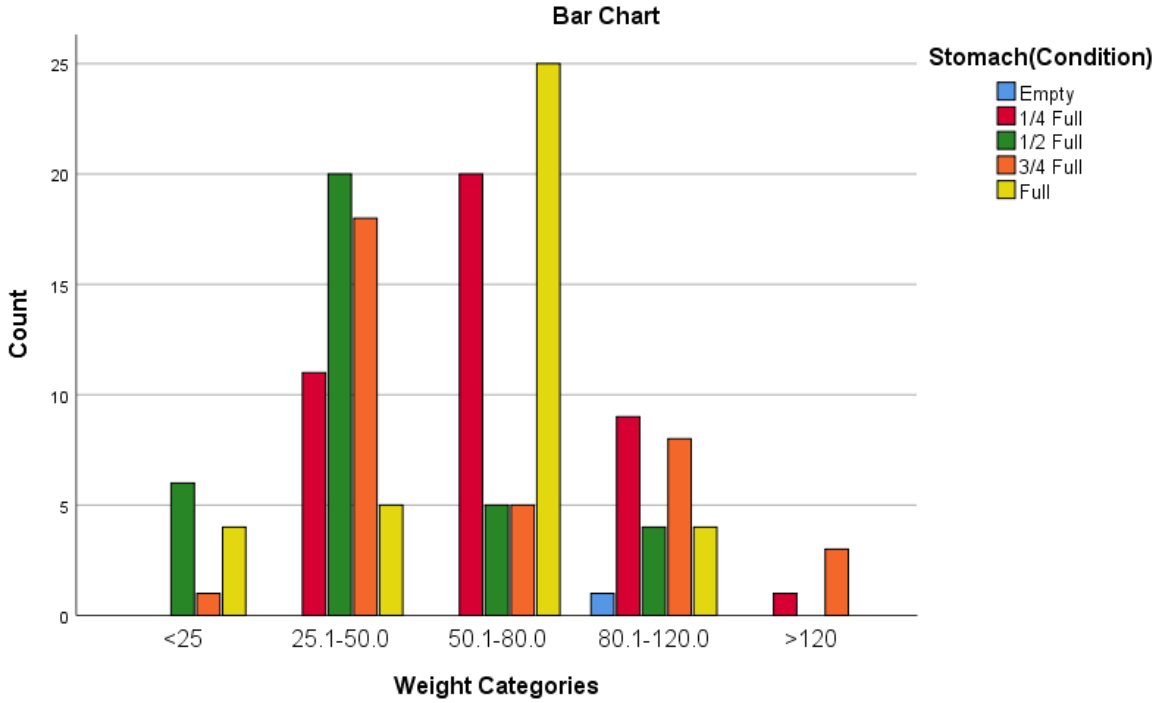

Fig 7

The above (Fig 7) bar graph is plotted for fish total body weight against weight of the stomach.The fishes which weighed between 25gms to 80 gms had combinations of all stomachs like full,3/4th full,1/2 full stomach ,as these fishes were immature and maturing fishes and the growing fishes.But the fishes which were ranging between 80gms to 120gms and above in weight had 1/4th full and empty stomachs,which were probably the matured and ripe fishes in advanced stages having the gonads occupying the maximum of abdominal cavity.But there were fishes which were more than 80 gms and above had full and 3/4th full stomachs but these were the spent and resting fishes having smaller gonadal size in regenerating mode.

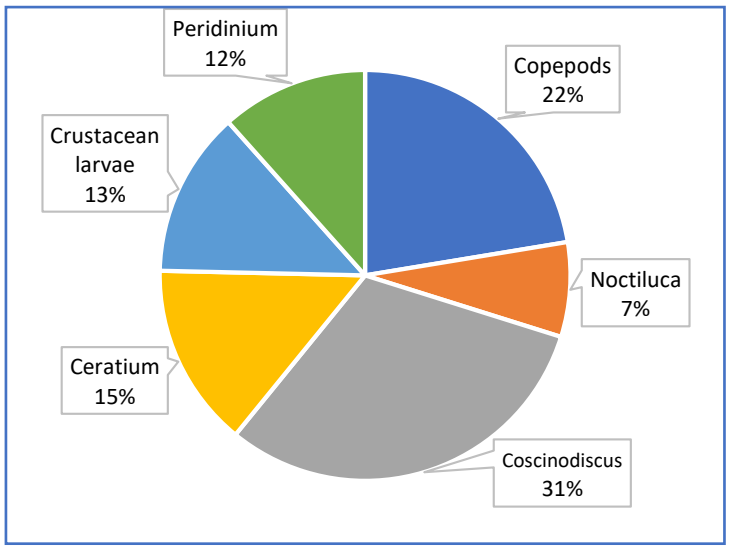

Fig 7

The fishes which ranged from 25 to 80 gm in weight had all types of stomach like ¼ th, ½, ¾ th and full full. But the fishes which ranged from 80.1 grms to 120 gms in weight had ¼ th and 1/2 full stomachs. In phytoplankton category, diatoms like Coscinodiscus, Peridinium, Ceratium occurred throughout the study period.Copepods under the zooplankton was the major food item of Indian Mackerel.

The pre monsoon season withnesed domination of Coscinodiscus, Copepods, followed by Pleurosigma, Ceratium, Melosira, Peridinium, Hemidiscus, Skeletonema, Rhizosolenia, Gyrosigma, Favella, Crustacean larvae, Unidentified partially digested pieces of food.

Concinodicus was the most common food in the monsoon period which was followed by Peridinium, Copepods, Appendages, Polychaetes, Fish scales, Sand particles, Melosira, Planktionella, Ceratium, Dinophysis, Crustacean larvae, Favella, Fish egg, Sagitta, Dinophysis, Salpha, Doliolum, Dentalium and unidentified partially digested pieces.

In post-monsoon season the Coscinodiscus was the most preferred food which was followed by Hemidiscus, Asterionella, Peridinium, Copepods, Pleurobrachia, Fish eggs, Appendages, Bivalve larvae, Dictyocha, Noctiluca, Pleurosigma, Melosira, Unidentified partially digested pieces of food.

The below (Fig 8) is been showing the microscopic images of gut contents of Indian Mackerel,*Rastrelliger kanagurta*

FIG 8

ACKNOWLEDGMENT

My sinciere thanks to Dr J.L Rathod,Chairman and Administrator,Marine Biology,KUPG Centre,Kodibag,Karwar for providing all the facilities for this study and Dr Shivkumar B Haragi,Assisstant Professor ,Marine Biology,KUPG Centre,Kodibag,Karwar for his guidance and encouragement. I am also thankful to all my well wishers for their respective support.

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