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RESEARCH ARTICLE

Food and feeding habits of goat fish *Upeneus sulphureus* from Nizampatnam Coast, Andhra Pradesh, India.

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Abstract

A detailed study of the food spectrum and feeding habit of goat fish *Upeneus sulphureus* which habitat the coast of Nizampatnam revealed that this fish is predominantly omnivorous nature, and abundant and important food fish in this area. The spectrum of different food items in the different water bodies depends on many environmental factors and selection mechanism of fish and available food items in the environment. The stable food item for this fish was crustaceans and their larvae, small fishes, polychaetes worms, miscellaneous matter and digested food. The monthly Gastro somatic index ranged from 3 to 12 and the higher values were recorded in the months of June and July months.

INTRODUCTION

The study of food feeding habits of fishes is very important in fishery biology as it relates to various activities of the fish like shoaling behaviors, migration and even entire fishery. Feeding ecology is an important aspect of the life history strategy of a species to understand its functional role of the fish with in their ecosystem (Blaber, 1997; Abdel-Aziz and Gharib, 2007). Without knowledge of the food requirements, feeding behavior pattern and predators prey relationships is not possible to understand the predicted changes that might result from any natural or anthropogenic inter vision (Hajisamae et al., 2006). Nutrition and feeding influence growth, reproduction and health of fish from their response to physiological and environmental stresses (Lall et al., 2009). Studies on the food and food habits indicate the species niche in the ecosystem, their food preferences and food spectrum overlaps depends on their abundance, mode of feeding and abiotic conditions (Gido, 2001).

Fishes directly depend upon their surroundings aquatic environment for their food requirement and are highly adapted in their food and feeding habits, utilizing most of the readily available food. The magnitude of fish population in a region is a function of its food potentialities. The knowledge of the food and feeding habits of fish helps in finding out the distribution of fish population and a through survey of literature indicates that such knowledge is highly essential for successful management of a fishery and such studies are undoubtedly important in any fishery program. The Mullidae (goat fishes) are widely distributed in many temperate, subtropical and tropical marine waters. They are equipped with two long whiskers (barbells) that extend from the chin. These whiskers contain chemosensory organs and can detect even extremely well camouflaged and carefully hidden prey in the sand (Golani and Gali, 1991). In the present study goat fish *Upeneus sulphureus* was selected for the food and feeding habits of the Nizampatnam coast.

Materials and Methods:

Samples of the present study were collected over a period of two years from different stations of in the Nizampatnam. The data of fish length, weight are recorded. The gut content was dissected and preserved 5% formalin. The content each stomach was examined using binocular microscope. A weight of the stomach of the individual fish was recorded, based on the weight of the stomach and body weight of the fish. Gastro somatic index of individual fish was calculated using the following formula.

$$\text{Gastro Somatic index (GSI)} = \frac{\text{Weight of the Stomach}}{\text{Weight of the fish}} \text{ X } 100$$

Gut contents are analyzed both qualitatively and quantitatively (Hynes, 1950). The volume of food in each gut of fish was measured Pillay, (1952) and various food items are identified. The food content found in the stomach was divided into five groups.

1. Gorged: Stomach was heavy food
2. Full: Stomach was full with food
3. ½ full: Stomach was ½ full and slightly distended
4. ¼ full: Stomach was ¼ food
5. Empty: Stomach without food

Points method: The degree of apparent fullness of the stomach was determined and points was assigned. Gorged (1.25); Full (1.00), ½ full (0.50), ¼ full (0.25), empty (0.00).

Results and discussion:

During the entire period of study, a total 240 guts of *Upeneus sulphureus* and was examined. The average food items of the fishes were presented (Fig.1). The gut content of this fish mainly composed of crustaceans, polycheates, and small fishes along with digested material and unidentified items. Crustaceans mainly shrimp, crab and their larvae. Some of the fish remains are identified as of teleoste fish, but most of the fish remains could not be identified since they are found in advanced stages of digestion with only skeleton remains. The investigation revealed that the fish are carnivores species feeding mainly on crustaceans and polycheates followed by small fishes. One various components of the food spectrum indicate that these species mainly feed on benthic and sub-benthic organisms detected by chemoreceptor rich barbles present on the chin. Goat fish feed on small benthic crustaceans, worms, mollusks, and small fish (Vassilopoulo and Papacostantinou, 1992; Labropoluo et al., 1997). It is apparent that goat fishes feed mainly on invertebrates particularly crustaceans. Shamsan and Ansari (2010) reported that the crustaceans are the most important food items than any food items in stomach of some marine fish. Yeragi and Yeragi (2015), reported that the crustacean including shrimp,crabs,their larvae copepods eggs and larval forms comprised the maximum parts of the food of animal origin. The polycheate worms are second preferential food for both species. Seshappa (1953) reported that there was a rapid recolonisation of the inshore sea bottom by polycheates the bottom fauna continued to be rich during November to April.

It is important to emphasize that the effect of seasonality should always be considered in the studies on feeding of fish, because the temporal changes of biotic and abiotic factors alters the structure of the food web along the year and as a consequence, the fish often shown seasonal diet shift (Kariman et al., 2009). Gastro somatic index values as an indication of fullness of stomach and find out the feeding rhythm. During the course of the investigation minimum numbers of fishes were found with empty stomach. The frequent occurrence of empty stomach or stomachs with little content might be dependent on the ratio between the size of the fish and size of the prey as cited by (Allen, 1935) or on the caloric values of the diet an explained by (Longhrust,1957). The occurrence of empty stomachs of fish does not show any relationship either to seasonal month or to the size of the fish.

The feeding intensity was observed the study period of two years i.e. June 2013 to May, 2015. Maximum intensity of feeding observed in the months of June and July in the two years and remaining months are moderate. As seen from the results, it could be interred that the fish fed on crustaceans, polycheates, and small fishes in addition to unidentified items. The percentage of occurrence of different food items in the diet shows that there fishes select their food from the bottom living organisms and a first preferable food item was crustaceans and followed by polycheates worms. Food and feeding habit of species of fish is intimately associated with the ecological niche that they occupy in the natural environment. Fishes directly depend upon their surrounding aquatic environment for their food requirements and are highly adopted in their food and feeding habits utilizing most of the readily available food.

The study of the feeding intensity of *U.sulphureus* indicated the sign of the omnivorous nature. The stomach of the fishes contains crustaceans, worms, small fishes along with semi digested unidentified material. Further it was observed in each months revealed that the empty stomach was more in number followed by ¼ or ½ full stomachs.

Kurian and Inasu (2001) reported in Horabagrus brachysoma goes to 64.39 % of fishes were empty stomachs, 32.94% medium and only 2.67% were found with heavy stomach. Krishna (2008) reported that the snake head fish Channa punctata found 27.06% of fishes were empty, 1/4 full, 20.42%, 1/2 full 18.5%, 13.87% are 3/4 full, 12.66% are with full stomach and only 7.47% are gorged stomach. In the present study goes to 29.56% are empty, 22.46% (1/4 full), 15.05% (1/2 full), 13.25% (3/4 full), 10.04% (full) and only 9.28% was gorged stomachs.

The selectivity and preference of the fish to different food items in different habitats give indicators on the flexibility of the species to adjust to diverse environmental conditions. Gastro somatic index values as an indication of the fullness of stomach and find out the feeding rhythm. Kanna (1993) stated that the Gastro somatic index of several species showed seasonal variations and maximum during post spawning period and minimum during breeding season. The maximum GSI recorded (12) in the month of June (Fig.2). Menzen (1960) reported that the feeding efficiency and growth rate decreased with increase size. Braga (2012), reported that the feeding ecology of a species is thoroughly linked to its population dynamics, know ledge of the feeding ecology, habit preferences, prey selection, predation evolution, competition and energy transfer within and between ecosystems. EI- Drawany and Elnagar, (2015) concluded that the stomach content analysis, should be extended to other native fish species so as to provide the scientific information for their management. Krishna (2004) also reported similar observation in Heteropneustes fossils. Interspecific relations between the fish and food organisms are an important clue for the factors underlying seasonal variations in fishery biology. Seasonal and diurnal abundance of food items influences horizontal and vertical migrations of the fish stocks (Krishna, 2008). Biological aspects like growth, maturity which are important from the management point of view are better understood in the light of adequate knowledge about food and feeding habits of fish and also much of our current understanding of the auto ecology production is derived from studies of food based on analysis of stomach contents. An understanding of the relationship between fishes and their food organisms especially the preferential food items and their distribution may help to locate the potential feedings grounds and it also provides clue of the prediction and exploitation of fish stocks.

Fig: 1 Percentage of food composition items in *Upeneus sulphureus* in the Nizampatnam Cost.

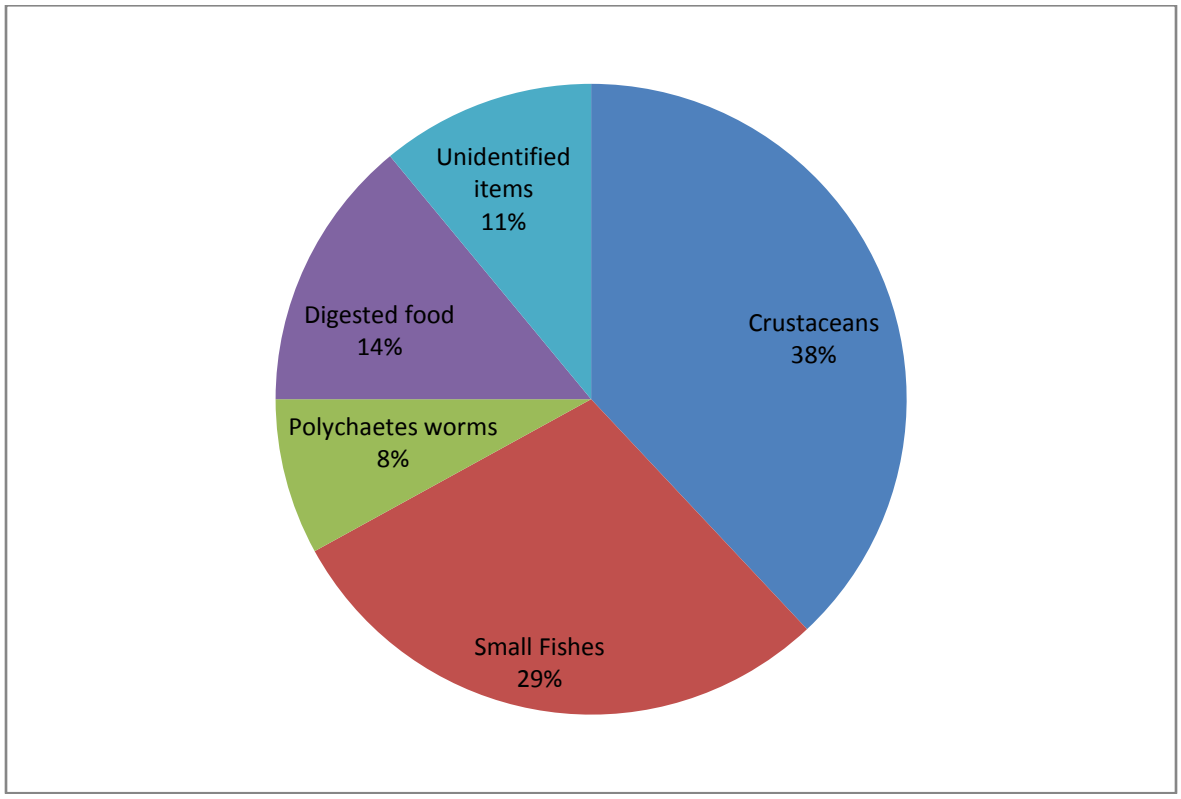
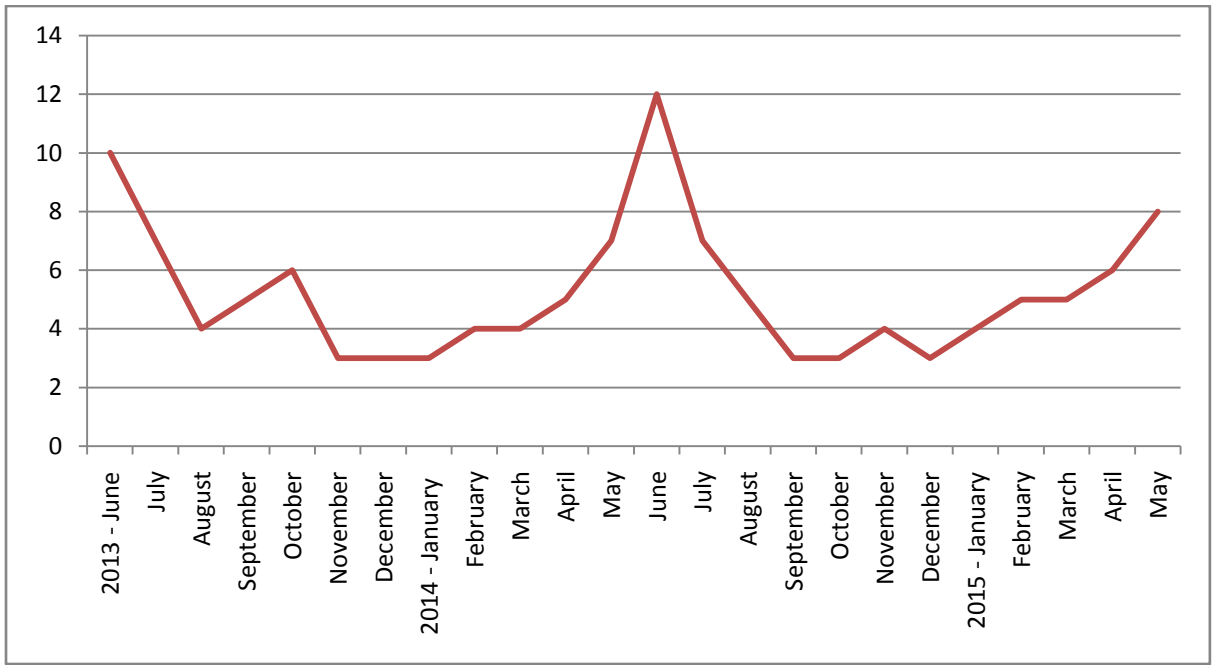


Fig: 2 Monthly variations of the Gastro-somatic index of *Upeneus sulphureus*.



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