EUROPEAN ACADEMIC RESEARCH
Vol. II, Issue 8/ November 2014

Impact Factor: 3.1 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Food and Feeding Habits of *Nibea maculata* from Coastal Waters of Visakhapatnam

RAMANA
V. L. M. RAO
C. MANJULATHA
Department of Zoology
College of Science and Technology
Andhra University, Visakhapatnam
India

Abstract:

The food and feeding habits of Nibea maculata from Visakhapatnam coastal waters were studied. Nibea maculata is a carnivore and its main food is fish and fish larvae next followed by Crustaceans (occasional/Secondary), molluscans (incidental) and the polycheates (might be obligatory). The feeding intensity was observed highest in winter, moderate in summer and lowest in pre-monsoon seasons. Food item wise, the index of preponderance was noticed as high crustaceans in monsoon season, fishes in winter season, molluscans found occasionally but more in monsoon season and the polycheates.

Key words: Food, Feeding Habits, *Nibea maculate,* Coastal Waters of Visakhapatnam

Introduction

The food and feeding habits is an important aspect in the biology of fishes. The importance of the knowledge on food and feeding habits has been well established. Sometimes the rate of feeding has a bearing on the spawning of the fish. The nature of

food composition of a fish species will also throw light on the possible habitat the fish frequents.

The present authors have already published few reports food and feeding habits of fish [1-4]. [5] Classified the feeding habits of some fishes on the basis of food presence in the fish gut. [6] Grouped several fishes of pisciculture into surface feeders, column feeders and bottom feeders. [7] Provided a critical appraisal of the existing knowledge on the food and feeding habits of fishes form Indian waters. Further several workers have been reported on the food and feeding habits of Sciaenid fishes from Camerron [8] from off Varavali [9] from Mumbai [10] from off Cape coast, Ghana [11] from Ratnagiri, Maharastra [12], and along Cochin coast of India [13].

The knowledge of the food and feeding habits of a fish helps in finding out the distribution of a fish population, which is highly essential for successful management of a fishery and such studies are undoubtedly important in any fisheries programme. The present investigation is one such, on the food and feeding habits of a moderately important food fish *Nibea maculata* from the coastal waters of Visakhapatnam.

Material and Methods

Fish samples were collected from the outer harbor during the study period from June 2006 to May 2007 and immediately total length and sexual maturity of the fish were recorded. Then stomachs were carefully taken out, fixed in 5% formalin.

The degree of apparent fullness of stomachs was determined Points method [14] and Gastro somatic index method [15]. For grading the different food items combination of occurrence (Qualitative method) and volume (Quantitative method) of food contents Index of preponderance method [16] is applied and to estimate the feeding intensity has followed.

Results

During the study period a total of 250 guts of *Nibea maculata* are were analyzed to ascertain the food and feedings habits of the fish. The feeding intensity, gastrosomatic index, index of preponderance of various food items and percentage of composition of the fish are presented in Tables 1 and 2 and graphs 1 - 2 respectively. Food compositions of the different items comprising the diet of *Nibea maculata* are as follows:

Food Item	**Foods Composition**
Fishes	Juveniles of Anchovies, *Stolenophorus* spps. *Leiognathus* spps *Nemipterus* spps and fish larvae
Crustaceans	Shrimp species, Amphipods and Shrimp larvae, Mysis, Megalopa, *Squilla* species and Crabs.
Mollusks	*Placophoran* species
Polychaets	*Neries* and *Serpulids*

Apart from these organisms, the digested matter was also encountered in different quantities in the gut content of *Nibea maculata.*

The Gastrosomatic Index

The Table – 1 and Graph – 1 reveals that the gastrosomatic index of *Nibea maculata* is recorded highest (8.500) in the month of December and decreased (8.150) in the month of January then suddenly fall down to least (2.230). From there onwards a little increase and decrease is observed until August and then decreased (3.214) up to November.

Feeding Intensity

The *Nibea maculata* with gorged stomachs were 11, full stomachs were 21, 3/4th stomachs were 27, half stomachs were 42, 1/4 stomachs were 92, and 57 were with empty stomachs (Table – 1). The highest (4.275%) average of feeding intensity was observed in the winter. The moderate feeding intensity (3.42) was observed in the summer season and the lowest

feeding intensity (3.25) was observed during pre monsoon season.

Index of Preponderance

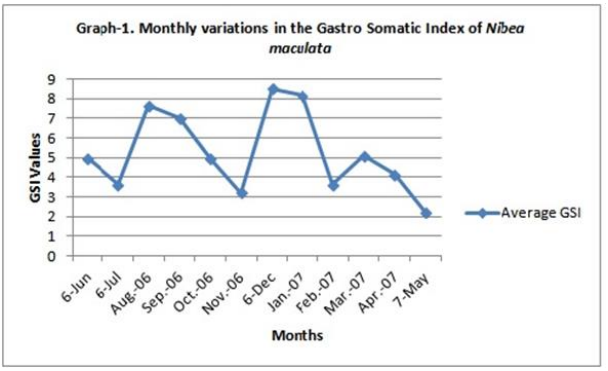
From the table - 2 and graph – 2 it is evident that fishes were formed the main constituent of the food items of *Nibea maculata*. From the index of preponderance it can be understood that fishes are shrimps more dominated and followed by Mollusks and Polychaets in the diet of *Nibea maculata* . According to the abundance of food composition the minimum and maximum were formed in fishes 9.522% to 41.73%, crustaceans 4.45% to 52.52%, Molluscans 0.289% to 17.07% and Polychaets 0.61 to 0.744%. Food item wise the index of preponderance crustaceans are noticed high in September during the monsoon season. Next followed by fishes in January during winter season, Molluscans found occasionally but more in September during the monsoon season and the Polycheates are very negligible. In case of digested food is recorded very high during the summer season.

Table # 1 Month wise feeding intensity and gastro somatic index in the year 2006-07

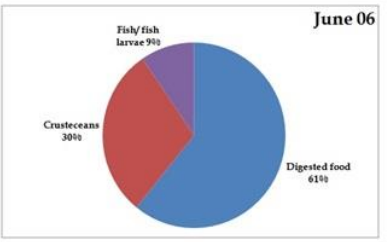
Month	No. of stomachs examined	Average gut content %	Average GSI	Gorged P	Full	3/4 (75)	1/2 (50)	1/4 (25)	Empty 01
June-06	23	2.913	4.955	01	03	-	03	13	03
July-06	20	2.150	3.632	02	02	01	02	07	06
Aug.-06	22	3.852	7.649	02	02	01	06	06	05
Sep.-06	20	3.081	7.015	01	03	03	04	07	02
Oct.-06	24	2.425	4.936	0	01	04	02	10	07
Nov.-06	22	2.077	3.214	0	01	02	02	08	09
Dec-06	21	4.275	8.500	01	02	03	02	06	07
Jan.-07	22	4.255	8.150	01	02	03	06	07	03
Feb.-07	20	2.150	3.632	02	02	01	02	07	06
Mar.-07	18	3.888	5.103	0	01	01	04	07	05
Apr.-07	20	3.555	4.152	02	02	06	04	04	02
May-07	20	1.800	2.230	-	-	02	05	07	06

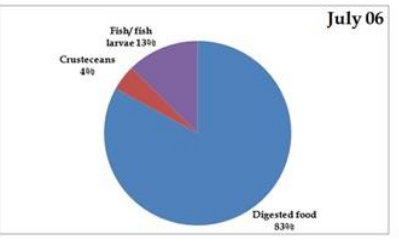
Table # 2 Percentage of occurrences, percentage of volume of preponderance of different food Items of *Nibea maculata* in different months

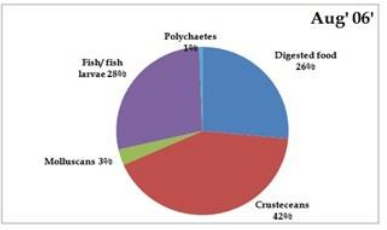
	Polychaets			Crusteceans			Molluscans			Fish/ fish larvae			Digested food		
Months	0! %	Vi %	I.P%	O! %	Vi%	I.P%	0! %	V,%	I.P%	O,%	Vi %	I.P%	0! %	V^/o	I.P%
June-06	-	-	-	8.57	22.85	29.629	-	-	-	9.78	20	9.522	5.881	11.76	60.877
July-06	-	-	-	7.500	15	4.45	-	-	-	8.3	16.6	12.57	6.36	10.90	83.16
Aug.-06	9.09	5	0.61	9.088	22.5	41.92	10.60	10	3.056	9.088	26.66	27.94	7.952	22.55	26.49
Sep.-06	-	-	-	10	32	52.52	17.5	20	2.25	11.42	9.5	24.47	8.18	13.06	21.76
Oct.-06	-	-	-	8.79	32.22	38.03	6.87	16.6	17.07	8.85	35	32.84	6.37	15.38	27.43
Nov.-06	-	-	-	7.787	31.42	38.95	-	-	-	9.09	24	33.33	6.98	21	27.72
Dec-06	-	-	-	11.901	22.5	10.14	-	-	-	10.117	26.25	40.24	8.056	15.38	49.70
Jan.-07	4.54	10	0.744	8.01	16	10.434	9.09	10	0.289	9.09	22.50	41.73	7.146	12.30	47.394
Feb.-07	-	-	-	12.208	24	23.87	-	-	-	12.208	18	17.90	8.08	13.07	58.23
Mar.-07	-	-	-	8.305	20	14.24	-	-	-	8.305	18.33	29.382	15.02	14.28	56.39
Apr.-07	-	-	-	10	32	52.52	17.5	20	2.25	10.62	23.75	24.75	8.18	13.63	21.75
May-07	-	-	-	10	20	16.161	10	20	4.07	8.57	22.85	28.16	8.076	15.38	61.61

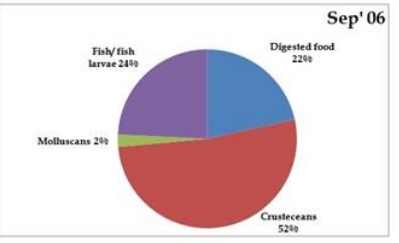


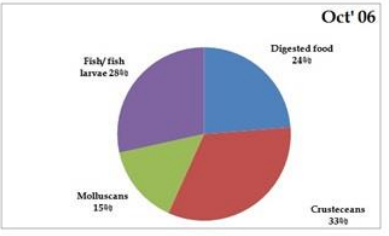
Graph # 2 The percentage Index preponderance of different food Items of *Nibea maculata* in different months.

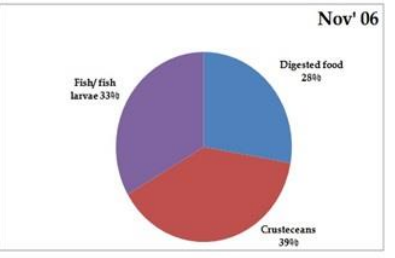


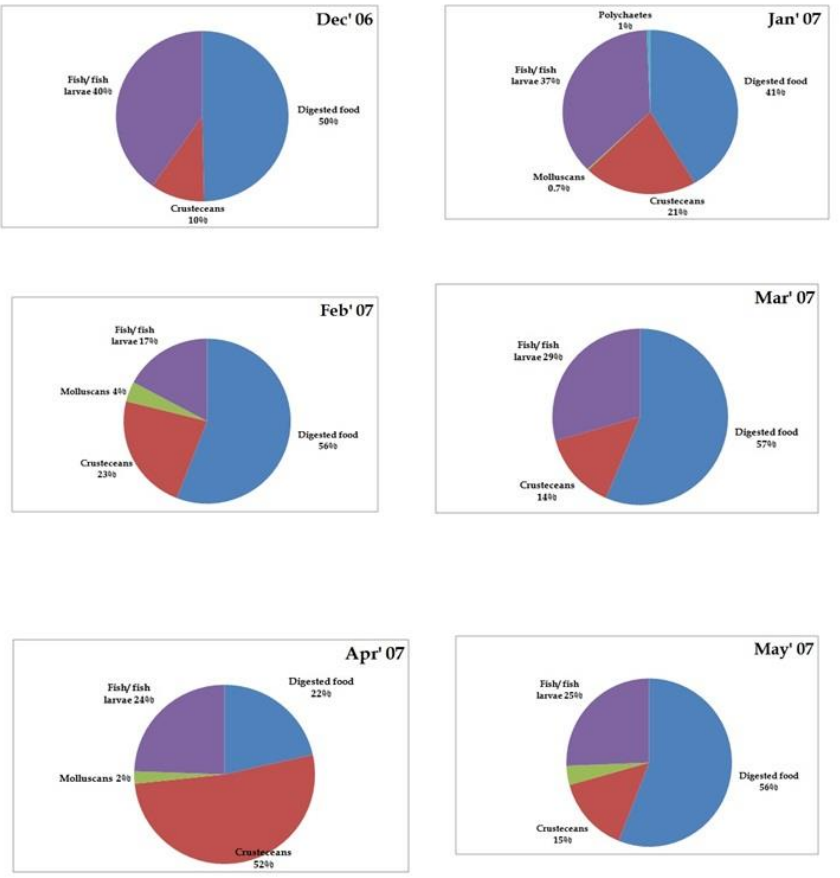












Discussion

From the present observations it reveals that gorged and full stomachs of *Nibea maculata* indicate high feed intensively during post-monsoon period. It is evident that *Nibea maculata* is a carnivore and its main (basic) food is fish and fish larvae. The chance of food availability is more during this season due to the river flood water brings more nutrients that may useful to grow the primary and ultimately secondary producers. And also for many species monsoon season is the breeding season; by nature behaviorally it is a predatory fish hence may feed the

larvae. This fact has been related to the observation of [17-18] which attributed the intensive feeding to the combined effect of food supply and temperature. However, the feeding intensity was low in February due to less abundance of food material. Infect it has been recently emphasized that intensity of feeding must be based not only on the quantity of food found in the stomach at the time of observations but also on the rate of digestion [19] and the frequency of feeding [20]. It is a known fact that the intensity of feeding is influenced by food supply [21]. Whereas [22] stated that feeding activity changes with seasons corresponding to variations and in the abundance of fish, and seasonal changes in water temperature and food organisms.

Regarding the feed composition, different groups of food organisms are represented throughout the year. Food item wise the index of preponderance crustaceans in monsoon, fishes in winter and the digested food in pre-monsoon seasons are noticed a high. The food is constituted mainly with shrimps, fishes, Molluscans and traces of Polycheates in the diet of *Nibea maculate.* The studies in other sciaenid species have indicated similar food preference [23-24]. And the crustaceans are the second dominated prey [13, 25]. Difference in the dominance of different food items can be attributed to the variation in their availability between habits [12].

The index of preponderance in fishes is decreased from post-winter to summer slowly and then there onwards increased trough the monsoon season. In case of Crustaceans the index of preponderance is decreased from monsoon to pre-summer and suddenly increased in summer. Regarding the digested food recorded very high in post-winter and slowly decreased to winter and then increased to pre-summer.

Nibea maculata is a very fast moving pelagic carnivore which feeds voraciously. It is an active feeder and feeds on a wide variety of crustaceans and fishes. Its occasional (secondary) food is molluscans and the polychaetes might be

obligatory or incidental food as their occurrence is very poor in guts.

REFERENCES

Bapat, S.V. and Bal, D.V. 1950. "The food of some young fishes from Bombay". *Proc.Indian. Acad. Sci.* 35B: 78-92 [14]

Bajkov. A.D.1935. "How to estimate the daily food consumption of the fish under natural conditions". *Trans American fish.soc* 65: 288-289 [19]

Blay Jr., w.k.,Awittor and Agbeko, D. 2006. "Seasonal variation in food preference and feeding ecology of two juvenile marine fishes, *Pseudotolithus senegalensis* (Sciaenidae) and *Brachydeuterus aurithes* (Haemulidae) off Cape coast, Ghana". *WAJAE*- Vol. 9-14-18 [11]

Chakraborty, S.K., Devadoss, P., Manojkumar, P.P., Ferozkhan, M., Jayasankar,P., Sivakami, S., Gandi, V., Appanna Sastry, Y., Raju, A., Livingston,P., Ameer Hamsa, K.M.S., Badruddin, M., Ramalingam, P., Dareswar, V.M., Seshagiri Rao, C.V., Nandakumaran, K., Chavan, B.B. and Seetha, P.K. 2000. "Thefishery, biology and stockassessment of jew fish resources of India.In". *Marine Fisheries Research and Management,* P. 604-616 V.N.pillai and N.G.Menon, (Eds.) [24]

Darnell, R.M. and Meierotto, R.R., 1962. "Determination of feeding chronology in fishes". *Trans American fish.soc* 91 313-320 [20]

Desai, V.R. 1970 "Studies on the fishery and biology of *Tar Tar* (Ham) from river Narbada". *J. Indian Fish. Soc. India* 2: 101-112 [15]

Ganapati, S.V. and Chacko, P.I. 1950. "Suggestions for stocking fish ponds in Madras" *Agric J* 37: 15 [6]

Hardy, A.E. 1936 "The ecological relation between herring and the plankton investigated with the plankton indicator" *J.Mar.Biol.Assoc* UK 21:147-291 [17]

Karandikar and Thakur, S.S. 1951 "Sciaenoides brawneus Day (Anatomy) with notes on distribution and bionomius". *Zoo.Mem.Univ.Bombay* 3 : 1-89 [23]

Manojkumar, P.P. 2003. "Observations on the food and feeding habits of *otolithes cuvieri*(Trewavas) off Veraval". *Indian J .Fish*. 26(1&2):24-34 [9]

Mookerjee, H. K., Ganguly, D.N. and Majumder, T.C. 1946. "On the food of esuarine fish of Bengal Sci". *Cult*. XIIO: 564-565 [5]

Nair , K .V .S., 1980 "Food and feeding habits of *Otolithesruber* (Scheneider) at Calicut. *Indian J. Fish* 26 (1 & 2): 133-139 [25]

Natarajan, A.V. and Jhingran A. G. 1961. "Index of preponderance – a method of grading the food elements in the stomach analysis of fishes". *Indian J. Fish* 8: 54-59 [16]

Qasim, S.Z. 1972. "The dynamics of food and feeding habits of some marine fishes". *Indian J. fish* 19:11 – 28 [7]

Ricker, W.E. 1937. "The food and feeding supply of Sokeye Salmon (*Oneliorhynkus herka walbum*) in Caltus lake. British Colombia". *J. Biol, Canada* 5 : 545-568 [18]

Ricker, W.E. 1946. "Production and utilization of fish populations". *Ecol mcnogr* 16:373-391 [21]

Sakamoto, T. 1982. "Studies on fishery biology of the ribbon fish, *Trichiurus lepturus Linn.* in the Kii channel.Wakayama Pre'. *Fish Sta* P 111-115 [22]

Sandhya, K.M., Chakraborthy, S.K., Kjaiswar, A. and Jasaduq hussain shah. 2014. "Food and feeding habits of *OtolithesCuvieri* (Trewavas, 1974) from Ratnagiri, Maharashtra". *Indian.J. Fish* 61(4): 99-101 [12]

Shanthi Prabha, Y., Manjulatha, C. and Rao. L.M. 2007. "Food and feeding habits of *Pomadasys maculatus* from

Bandaruvanipeta fishing village of Srikakulam District, Andhra Pradesh". *J Aqua. Biol* 22(1): 143-146 [1]

Shanthi Prabha and Manjulatha, C. 2008. "Food and feeding habits of *Upeneus vittatus* (Forsskal, 1775) from Visakhapatnam Coast (Andhra Pradesh) of India". *International Journal of Zoological Research* (Academic Journals Inc.) 4(1): 59-63 [2]

Sudha rani, P., Manjulatha, C. and Raju, D.V.S.N. 2013a. "Food and Feeding habits of *Parapenaeopsis stylifera* (H. Milne Edwards, 1837) from Bheemunipatnam coast of Visakhapatnam". *Bioscience Biotechnology Research Communications* (BBRC) 6(1):19-23 [3]

Sudharani, P., Manjulatha, C. and Raju, D.V.S.N. 2013b. "Food and feeding habits of the rough river prawn **fr**om Gosthani estuary, India"**.** *Asian Academic Research Journal of Multidisciplinary (AARJMD)* 1(16):324-333 [4]

Telveker, P. A., Chakraborthy, S.K., Jaiswar, A.K., 2006. "On some aspects of biology of *Johnius macrorhynus* (Mohan, 1976) from Mumbai waters. *J Mar. Biol. Ass.India* 48 (1): 124-127 [10]

Tiencheu, J.I., Djermas, T. 1994. "Food habits of two Sciaenid fish species (*Pseudotolithus senegalenmsis*) and *(Pseudotolithus typus*) of Cameron Fishbyte section. Nanga". *The ICLARM* quarterly. P. 40 [8]

Venugopal, N. N., Pillai, G.K. and Prakasan, D. 2014. "Food and feeding habits of *Johnieops sina* (cuvier,1830) along Cochin coast of India". *India J Fish* 61(1):103-107 [13]