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Observations on the food of *Nemipterus mesoprion* (Bleeker, 1853) from Malabar coast

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Abstract

Food of the threadfin bream *Nemipterus mesoprion* from the fishing grounds off Malabar coast were studied based on 3361 specimens. The studies showed that the fish is a demersal carnivore, subsisting mainly on crustaceans, teleosts, molluscs, polychaetes and miscellaneous food items. The trophic spectrum of *N. mesoprion* composed of 26 food items. Fish in all size groups preferred crustaceans. Penaeid prawns, *Acetes* spp. and deep-sea prawns were the dominant crustaceans in the diet. Anchovies, scads, lizardfishes and whitefish were the teleosts that formed the major diet component. *N. mesoprion* showed preference for teleosts as they grew**.** Copepods, crabs and squilla were seen mostly in the stomach of juveniles and pre-adult fishes. Teleosts were the major food during January-March and in all the other months crustaceans were dominant in the food. Feeding intensity was poor during most of the months.

Keywords: *Nemipterus mesoprion*, demersal carnivore, Malabar coast

Introduction

Threadfin breams are one of the major demersal finfish resources exploited along the Indian coast. They are caught by trawlers upto a depth of 120 m. On an average, they formed 5% of the total marine landings in India. In Kerala, the threadfin breams formed a major resource contributing 7% to the total marine catch during 2005-'06. Along the Malabar coast the threadfin breams contributed a major share to the total marine catch.

The fishery of threadfin breams in Malabar region is sustained mostly by *Nemipterus mesoprion* and *N. japonicus*. Earlier studies on *N. mesoprion* are by Murty (1982), Murty *et al*. (1992a, b, 2003), Rao (1989), Raje (1996), Zacharia and Nataraja (2003) and Manojkumar (2007). The present paper is on the food of *N. mesoprion* from Malabar region.

Material and methods

Random samples of *N. mesoprion* collected at weekly intervals during 2005 and 2006 from the fish landings at Puthiappa and Beypore formed the material for the study. A total of 3361 specimens in the length range of 89-249 mm were analysed. The total length and maturity stages of the fish were recorded and the stomach contents were analysed. Index of Relative Importance (IRI) of prey was estimated following Pinkas *et al.* (1971). This index is an integration of measurement of number, volume and frequency of occurrence to assist in evaluating the relationship of the various food items found in the stomach. It is calculated by summing the numerical and volumetric percentage values and multiplying with frequency of occurrence percentage value;

Index of relative importance, $IRI_i = (\%N_i + \%V_i) \%O_i$,

where, N_i, V_i and O_i; represent percentages of number, volume and frequency of occurrence of prey i respectively.

The intensity of feeding was determined based on the degree of distension of stomach due to feeding and the amount of food items in it. The stomachs were classified as gorged, full, ¾ full, ½ full, ¼ full, trace and empty and the data for the

study period were pooled and classified as poorly fed (empty and trace), moderately fed (1/4 full and 1/2 full) and heavily fed (¾ full, full and gorged). Since no difference in the food of male and female was noticed, the data on both the sexes were combined.

Results

The trophic spectrum of *N. mesoprion* composed of 26 dietary items (Table 1), which are classified into five general categories: fishes, crustaceans, molluscs, polychaetes and miscellaneous items.

Crustaceans: Crustaceans formed the main food in all months. *Acetes* spp. were the major crustacean food in the stomach and peak occurrence was noticed during April and August-December. Penaeid prawns were the second important crustacean component and they were present during most of the months with peak during January-March, May–June and November. Penaeid prawns were represented by *Penaeus indicus*, *Parapenaeopsis stylifera* and *Metapenaeus affinis*. Deep-sea prawns, represented by *Solenocera crassicornis* and *S. choprai* also formed dominant

Table 1. Index of Relative Importance of different food items of *N. mesoprion* along the Malabar coast during 2005-2006

Food	Jan	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec	Average
Crustaceans												
Acetes spp.	-	17.82	10.56	46.30	-	5.64	76.50	74.36	74.83	44.89	75.01	38.72
Crabs	1.40	4.67	-	-	-	10.08	-	0.49	-	2.25	1.36	1.84
Prawn larvae	-	-	-	-	-	-	-	0.65	3.27	-	0.65	0.42
Squilla	2.75	1.87	-	2.38	-	-	-	0.01	0.65	-	0.81	0.77
Penaeid prawns	26.91	10.81	18.42	1.97	24.04	67.71	5.49	3.68	1.47	17.34	3.39	16.48
Deep sea prawns	0.13	-	-	22.33	24.04	-	1.15	1.69	0.04	2.87	1.46	4.88
Copepods	-	-	-	-	-	-	-	-	1.39	-	-	0.13
Fishes												
Lizard fishes	0.27	0.25	-	4.74	27.88	-	-	0.01	0.14	-	0.01	3.03
Bregmaceros spp.	0.20	0.12	-	-	-	-	-	0.08	0.19	2.25	0.08	0.27
Silverbellies	-	0.12	-	0.78	-	-	-	-	-	-	-	0.08
Flatheads	12.76	-	-	0.76	-	-	-	0.28	-	3.48	-	1.57
Cynoglossus spp.	-	-	-	0.78	-	-	-	-	-	0.00	-	0.07
Larvae of eel	-	-	-	-	-	-	-	-	-	3.29	-	0.30
Epinephelus spp.	-	-	-	0.60	-	-	-	-	-	-	-	0.05
Scads	0.24	60.70	-	4.71	-	2.70	14.46	4.51	7.30	0.06	4.14	8.98
Lactarius lactarius	13.08	-	0.41	-	-	-	-	-	-	-	-	1.23
Fish larvae	33.48	-	-	-	-	-	1.34	1.65	1.35	1.57	1.65	3.73
N. japonicus	-	-	-	-	-	-	-	0.46	0.17	0.02	-	0.06
N. mesoprion	-	-	-	-	-	-	-	0.71	7.98	0.08	-	0.80
Stolephorus spp.	-	0.09	67.64	0.78	24.04	-	-	0.01	0.66	2.25	0.01	8.68
Johnius spp.	-	-	-	0.60	-	-	-	-	-	-	-	0.05
Molluscs												
Cuttlefishes	0.54	0.34	-	6.32	-	-	-	0.47	0.27	0.07	-	0.73
Octopus	3.93	0.91	-	1.97	-	1.69	-	0.00	0.00	0.61	0.05	0.83
Squids	1.85	0.11	2.97	4.28	-	2.70	1.06	0.65	0.17	4.69	-	1.68
Polychaetes	-	0.48	-	0.49	-	9.48	-	-	0.13	11.40	0.80	2.07
Misc. items	2.48	1.72	-	0.23	-	-	-	10.29	0.00	2.87	10.58	2.56

food items with a peak in April-May. Small-sized crabs were present in the diet during January-February, June, September and November-December and the average contribution was 1.8%. The presence of copepods, squilla and prawn larvae were observed in negligible quantities and their average contribution was 0.1%, 0.8% and 0.4% respectively.

Fishes: Fishes formed the second important food of *N. mesoprion* and were observed throughout the year. The following species could be identified: *Saurida tumbil*, *Bregmaceros mcclellandi*, *Leiognathus bindus, Secutor insidiator*, *Platycephalus* spp., *Nemipterus japonicus*, *N. mesoprion*, *Cynoglossus macrostomus*, *Epinephelus diacanthus*, *Decapterus russelli*, *Lactarius lactarius*, *Stolephorus* spp. and *Johnius* spp. Scads, represented by *D. russelli* were the dominant fish found in the gut; highest IRI of this item was noticed during February and August. *Stolephorus* spp. formed the second important food item followed by fish larvae. The average composition of all fishes for the period was 28.9%. The IRI values for fishes were highest during January-March and lowest in June.

***Molluscs*:** Molluscs represented by squids, cuttlefishes and octopus were present in the diet in almost all the months and the average IRI was 3.2%. The highest IRI for this item was in April and the lowest in December. The IRI of squids, cuttlefishes and octopus was 1.7%, 0.7% and 0.8% respectively.

Polychaetes: Polychaetes ranked fourth among the food organisms with an IRI of 2.1%. The highest IRI of polychaetes occurred during November and minimum in October.

Miscellaneous items: Euphausids, bivalve larvae, megalopa larvae, holothurians and unidentified zooplankton were the miscellaneous food items and the average IRI of this group was 2.5%. Miscellaneous food items were present in the diet occasionally and the highest IRI value was observed in December and lowest in April.

***Food in relation to size*:** Crustaceans were the most preferred food by the juveniles and as the size of fish increased, it showed preference to fish food. Teleosts started to appear in the stomach of fish of 100 mm length and above (Fig.1). The presence of penaeid prawns, deep-sea prawns, crabs and stomatopods was observed as the fish grew beyond 150 mm. Molluscs, represented by young ones of squids, cuttlefishes and octopus were occasionally present in the stomach of fish above 110 mm length. Polychaetes and miscellaneous food items were observed in the stomach of fishes above 130 mm length.

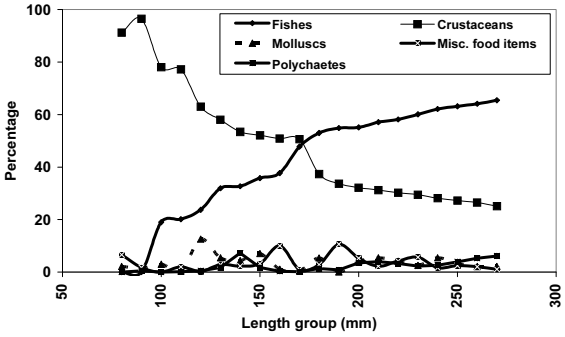

Fig. 1. Food composition of different length groups of *Nemipterus mesoprion*

***Feeding intensity*:** Poorly fed fishes were observed during all the months and, on an average, it formed 71.6% (Fig. 2). The number of heavily fed fishes was high during January-March and in October.

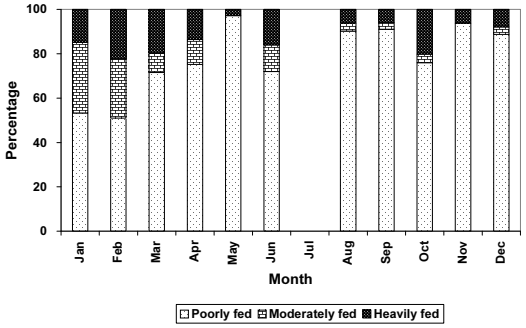

Fig. 2. Monthly feeding condition of *N. mesoprion* during 2005-2006

The percentage of feeding condition in relation to maturity stages is presented in Fig. 3. Fishes with actively fed stomachs were observed more in

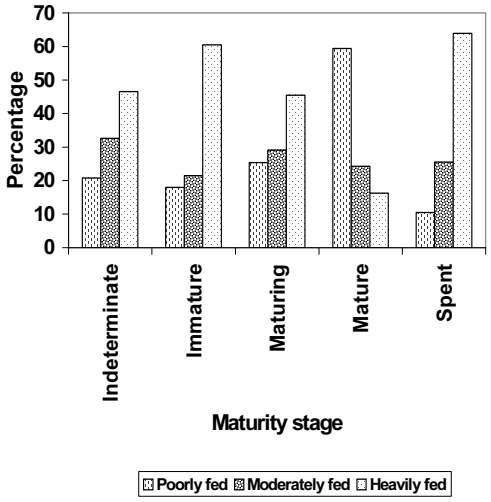

Fig. 3. Feeding condition of *N. mesoprion* in relation to maturity stages

spent fishes (64.1%) and lowest in mature fishes (16.2%). Poorly fed fishes were more in mature fishes (59.47%) and least in spent fishes (10.5%). In general, the feeding intensity was high in indeterminate, maturing and spent fishes and poor in mature fishes.

Discussion

The present study shows that *N. mesoprion* is a carnivore feeding on a mixed diet of 26 prey items consisting of crustaceans, teleosts, molluscs, polychaetes and miscellaneous items. Cannibalism was observed in this species.

The results show ontogenetic variations in the trophic spectrum of *N. mesoprion*. The young ones feed mainly on crustaceans, whereas the adults consume teleosts predominantly. This change in the diet was observed in the fish above 180 mm length. Planktonic organisms were absent in the stomach of adults in contrast to the young ones. As the fish grow, the size of their mouth increases proportionately, their swimming capacity is modified, and their energy requirements vary (Qasim, 1971). Thus, larger fish have different feeding requirements from smaller ones and attempt to satisfy by consuming a larger variety of prey types. The increasing variety of food consumed by predators as they grow in size is a common pattern among marine organisms, including invertebrates (Rangeley and Thomas, 1987; Mascaro and Seed, 2001).

Generally the intensity of feeding was higher in juveniles and spent fishes. In *N. mesoprion*, while feeding intensity did not increase with increasing size, the type of food components was size dependent.

Rao (1989) reported that *N. mesoprion* off Visakhapatnam is carnivorous, feeding on crustaceans and teleosts. Among the crustaceans, the main food items were *Penaeus* spp., *Metapenaeus* spp., *Acetes* spp. and squilla and the percentage of abundance of crustaceans was more during January –May. Raje (1996) noticed that *N. mesoprion* off Veraval was a carnivore, and the diet was composed of crustaceans, fishes, molluscs and annelids. *Acetes indicus* and *A. johni* formed the most dominant food items followed by fishes, prawns, other crustaceans, molluscs and annelids. According to Joshi (2005), the major fishes observed in the diet of *N. mesoprion* off Cochin were *Stolephorus* spp. and *Leiognathus* spp. and crustaceans such as prawns, mysids, crabs, squilla, *Acetes* spp. and deep-sea prawns. Similar observations were made by Zacharia and Nataraja (2003) from Karnataka coast. The result of the present study showed close similarities with earlier observations on the food of *N. mesoprion* made from the Indian waters.

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References

Joshi, K. K. 2005. Biology and population dynamics of *Nemipterus mesoprion* (Bleeker) off Cochin. *Indian J. Fish.,* 52 (3): 315-322.

Manojkumar, P. P. 2007. Fishery of threadfin breams with some aspects on the biology and stock assessment of *Nemipterus mesoprion* (Bleeker, 1853) off Malabar coast. *Indian J. Fish*., 54 (2): 148-154.

Mascaro, M. and R. Seed. 2001. Foraging behavior of juvenile *Carcinus maenas* (L) and *Cancer pagaras L. Mar. Biol*., 139: 1135-1145.

Murty, V. S. R. 1982. Observations on some aspects of biology of threadfin breams *Nemipterus mesoprion* (Bleeker) from Kakinada. *Indian J. Fish*., 28: 199-207.

Murty, V. S. R., T. A. Rao, M. Srinath, E. Vivekanandan, K.V. S. Nair, S. K. Chakraborty, S. G. Raje and P. U. Zacharia. 1992a. Stock assessment of threadfin breams (*Nemipterus* spp.) of India. *Indian J. Fish*., 39: (1, 2): 9-41.

Murty, V. S. R., K. V. S. Nair, P. A. Thomas, S. Lazarus, S. K. Chakraborty, S. G. Raje, C. Gopal, P. U. Zacharia and A. K. Velayudhan. 1992b. Present status of exploitation of fish and shellfish resources: Threadfin breams. *In*: P.V. Rao, V. S. R. Murty and K. Rengarajan, (Eds.), *Monsoon Fisheries of the West Coast of India. Prospects, Problems and Management.* 45:154-168.

Murty, V. S. R., K. K. Joshi, S. G. Raje, J. K. Sobha and U. Rajkumar. 2003. Threadfin breams. *In***:** M. Mohan Joseph and A. A. Jayaprakash (Eds.). *Status of Exploited Marine Fishery Resources of India*. CMFRI. Kochi, India. p 164-170.

Pinkas, L., M. S. Oliphant and I. L. K. Iverson. 1971. Food habits of albacore, bluefin tuna, and bonito in Californian waters. *Calif. Dep. Fish Game, Fish. Bull.*, 152: 1-105.

Qasim, S. Z. 1971. Dynamics of food and feeding habits of some marine fishes. *Indian J. Fish*., 19 (1&2): 12-28.

Raje, S. G. 1996. Some observations on the biology of *Nemipterus mesoprion* (Bleeker) from Veraval (Gujarat). *Indian J. Fish*., 43 (2): 163-170.

Rangeley, R. W. and M. L. H. Thomas. 1987. Predatory behavior of juvenile shore crab. *Carcinus maenas*. *J. Exp. Mar. Biol. Ecol*., 108: 191-197.

Rao, T. A. 1989. Fisheries of threadfin breams at Waltair with notes on some aspects of biology of *Nemipterus mesoprion* (Bleeker). *J. Mar. Biol. Ass. India*, 31: 103-109.

Zacharia, P. U. and G. D. Nataraja. 2003. Fishery and biology of threadfin breams, *Nemipterus mesoprion* from Mangalore-Malpe. *Indian J. Fish*., 50 (1): 1-10.

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