Stomach contents of some shore-caught teleosts of Natal, South Africa

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Stomach contents of shore-caught teleosts feeding on the Natal nearshore substratum were visually analysed for percentage composition. Commonly caught fish, namely *Rhabdosargus sarba, R. holubi, Pomadasys commersonni, Trachinotus africanus* and *T. botla*, were opportunistic omnivorous predators and fed largely on sand mussels and benthic crustacea. Less frequently caught predatory fish (15 species) fed mainly on benthic crustacea and other teleosts. The results are discussed briefly and will provide an input to a current ecosystem study on the environment in which these fish feed.

Beenagtige visse wat in die Natalse see se vlakgeleë sandlae wei, is vanaf die strand gevang en visueel geanaliseer om die persentasie samestelling van die buikinhoud te bepaal. Daar is gevind dat visse wat meer dikwels gevang word, naamlik *Rhabdosargus sarba, R. holubi, Pomadasys commersonni, Trachinotus africanus* en *T. botla*, opportunistiese nie-kieskeurige roofvisse is wat grootliks van sandmossels en seebodem-skaaldiere leef. Roofvisse wat minder dikwels gevang is (15 spesies), het hoofsaaklik op seebodem-skaaldiere en ander beenagtige visse jag gemaak. Die resultate word kortliks bespreek en lewer 'n bydrae tot die bestaande ekosisteem-studie van die omgewing vanwaar hierdie visse hul voedsel verkry.

The Oceanographic Research Institute (ORI) of Durban has for many years been involved in teleost research along the east coast of South Africa, including a programme on the biology of teleosts which utilize estuaries for a period of their lives (Wallace 1975a,b; Wallace & van der Elst 1975; Wallace & Schleyer 1979). Part of this programme involved sampling the marine phase of the life cycle of these fish by analysing data gathered from the catches of shore-based anglers along the Natal coast. These samples were not limited to partially estuarine-dependent species and most of the material gathered was from fish feeding on the nearshore sand substratum. Information on their stomach contents is presented here to augment a current ORI study on this ecosystem, known as the Natal Nearshore Sand Substratum Project (N_2S_2). A few species are omitted, namely the inshore reef fish and predatory game fish, as limited samples of these species were collected and more comprehensive publications are available on them (van der Elst 1976; Joubert & Hanekom 1980; van der Elst & Collette 1984).

Material for the work was collected from shore anglers during motorized beach patrols at times of maximum sport fishing; in the early morning and evening on weekdays, over weekends and at fishing competitions. The material was collected throughout 1972, partially from the Zululand coast north of Cape Vidal, but mainly from the Durban area which received considerable attention because of its large angling population and its proximity to the ORI.

The stomach content of each specimen was stored in 10% neutralized formalin with a record of the fish's identification and total length as well as the locality and date of capture. The bait used was recorded if known and this was taken into account when examining the samples. The constituents of the stomach contents were separated and identified under a low-power microscope in the laboratory and their proportion was estimated as a percentage. Mean values of the percentage composition of food items were calculated for fish species for which sufficient numbers had been collected. Where the numbers were considered insufficient and in species in which stomach contents were minimal, the data were recorded according to the following points system: 0–9% = +; 10–29% = ++; 30–49% = +++; 50–100% = ++++. Both of these approaches conform largely to the 'points method' discussed by Hynes (1950) in his review on fish

Table 1 Mean percentage composition of food items in the stomach contents of fish commonly caught by shore anglers in Natal

Species	Length (mm)	*N*	Sand mussels	Macrura	*Perna perna* & barnacles*	Gastropods	Teleosts	Echinoderms	Tunicates	Bryozoa	Hydrozoa	Cephalopods	Polychaetes	Algae	Other
Rhabdosargus sarba (Natal stumpnose)	306–642	135	31	17	22	8	4	4	2	2	–	<1	<1	<1	7
Rhabdosargus holubi (Cape stumpnose)	185–354	9	41	36	6	–	<1	–	–	–	–	–	–	–	16
Pomadasys commersonni (Spotted grunter)	332–857	42	46	24	2	4	8	3	5	–	3	–	–	<1	5
Trachinotus africanus (African pompano)	250–750	18	55	2	20	<1	6	2	–	–	–	–	–	–	15
Trachinotus botla (Largespot pompano)	296–621	12	–	66	–	5	2	–	<1	–	–	<1	–	–	26
Total		216	35	20	16	6	5	3	2	1	<1	<1	<1	<1	9

*Cirripedia are included with *P. perna*. They are often attached to these mussels and their ingestion appeared to be incidental.

feeding studies. Despite the subjective nature of this method, visual assessment of stomach contents is less laborious than other techniques and Hynes concluded that it is the most satisfactory in terms of non-spurious accuracy.

More quantitative analyses of the samples for bio-energetic estimations for the N_2S_2 programme were not considered possible; the results would have been biased by the different rates of digestion of prey organisms and the persistence of hard parts such as mollusc shells.

The fishes sampled can be separated into two groups, the first consisting of fish with substantial stomach contents and which were commonly caught from the shore. These consumed a variety of organisms but fed most heavily on sand mussels, crustacea and the brown mussel, *Perna perna*, in that order of importance (Table 1). Nearly half of the sand mussels found in the stomachs of the fish in this group were *Tivela polita* and another 40% consisted of *Donax madagascariensis* and *D. simplex* (Table 2). The crustacea consisted largely of the hippids, *Emerita austroafricana* and *Hippa ovalis*, the swimming prawn, *Macropetasma africanus*, and portunid, porcellanid and pagurid crabs. These were often finely milled, making their identification and an assessment of their proportions difficult. Nevertheless the following figures, corrected to exclude bait organisms, were calculated for the broader taxonomic groupings: crabs 37%; prawns, largely *M. africanus*, 26%; and hippids 24%, of which *E. austroafricana*

Table 2 Percentage composition of sand mussels found in stomach contents of fish commonly caught by shore anglers in Natal

Species	*Tivela polita*	*Tivela natalensis*	*Donax madagascariensis*	*Donax simplex*	*Donax bipartitus*	*Iactra trotteriana*
Rhabdosargus sarba (Natal stumpnose)	44	3	26	26	< 1	< 1
Rhabdosargus holubi (Cape stumpnose)	11	10	39	29	10	< 1
Pomadasys commersonni (Spotted grunter)	60	24	8	2	2	4
Trachinotus africanus (African pompano)	17	3	60	20	–	–
Total	46	11	23	17	1	2

Table 3 Stomach contents of fish infrequently caught by shore anglers in Natal or in which the stomach contents were minimal upon capture. Food items were rated in abundance according to the scale: 0 – 9% = +; 10 – 29% = + +; 30 – 49% = + + +; 50 – 100% = + + + +

Species	Length (mm)	*N*	Sand mussels	Macrura	*Perna perna* & barnacles*	Gastro-pods	Teleosts	Cephalo-pods	Poly-chaetes	Algae	Other
Argyrosomus hololepidotus (Kob)	202 – 992	18		+ + + +			+ + + +				+
Albula vulpes (Bonefish)	305 – 850	17	+ +	+ + + +	+	+	+		+		
Caranx ignobilis (Giant kingfish)	348 – 927	9		+ + +			+ + + +		+	+ +	
Caranx sexfasciatus (Bigeye kingfish)	304 – 540	5		+ + + +			+	+		+	+
Otolithes ruber (Snapper kob)	264 – 408	6		+ + + +			+ + + +				
Scomberoides commersonianus (Largemouth queenfish)	490 – 547	5		+ + + +			+ + + +				
Drepane punctata (Concertina fish)	248 – 305	5		+ + + +					+		
Carangoides ciliaris (Longfin kingfish)	535&554	2					+ + + +				
Elops machnata (Tenpounder)	593&600	2		+ + + +			+ +				
Rhabdosargus thorpei (Bigeye stumpnose)	294&335	2		+ + + +	+ + + +	+					
Acanthopagrus berda (River bream)	283&290	2	+ +	+ + + +		+					+
Alectis indicus (Indian mirror fish)	526	1		+ + + +							
Rachycentron canadum (Prodigal son)	> 1000	1		+ +			+ + + +	+			
Rhonciscus anas (Grey grunter)	298	1		+ + + +							
Trachysurus sp. (Sea catfish)	–	1		+ + + +							

*Cirripedia are included with *P. perna*. They are often attached to this mussel and their ingestion appeared to be incidental.

comprised 19% and *H. ovalis* 5%.

A characteristic of the group as a whole is that its members fed low in the food chain, most of the prey being detritivores and suspension feeders. With the exception of the Cape stumpnose, *Rhabdosargus holubi*, they are all found only in shallow water (usually < 10 m) close inshore (Fischer & Bianchi 1984; van der Elst, pers. comm.). The spotted grunter, *Pomadasys commersonni*, was the fish most dependent on sand mussels for its food and it is well adapted to feeding on them with its crushing pharyngeal teeth and habit of 'blowing' water on sand containing mussels to expose them (Smith 1965). The commonly caught Natal stumpnose, *R. sarba*, and African pompano, *Trachinotus africanus*, proved less restricted in their diet as they move onto reefs to feed on *P. perna* as well. The largespot pompano, *T. botla*, feeds largely on hippids for which it enters the shallow surf and swash zone.

The other group of fish were less frequently caught from the shore or were landed with minimal stomach contents, and often comprised more active predatory species (Table 3). Their diet was less varied and they preyed mainly upon the crustacea listed above. They were more dependent on prawns (49%) than the previous group and less dependent on crabs (28%) and hippids (9%). Small fish, usually unrecognizable, were also an important component of their diet.

Opportunism is the most remarkable characteristic of feeding in the fishes studied. This is demonstrated by the diversity of food organisms listed, particularly in Table 1, and the fact that specimens were occasionally gorged with items abundant for short intervals such as megalopa larvae and the pteropod, *Cavolina longirostris*. The small amount of algae consumed by a few species appeared to be incidental and all of the fishes examined can be classed as omnivorous predators. Various organisms emerge as the major food items of fish feeding on the Natal nearshore sand substratum and the results will provide corroborative evidence of the relative abundance of these organisms as well as an insight into the role of the teleosts feeding in this environment.

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Ophichthid eels in the coelom of several Natal offshore reef fish

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Mummified ophichthid eels are reported from the coeloms of several Natal continental shelf reef fish species. Originally mistaken to be parasitic, these eels are in fact free-living and are eaten by fish. Once ingested, they bore their way out of the stomach, using their pointed tails and become encapsulated in connective tissue within the coelomic cavity.

Mummifiseerde palings van die subfamilie Ophichthini word beskryf uit die selome van 'n verskeidenheid Natalse vastelandsplat-rifvisse. Oorspronklik foutief beskou as parasiete, is hierdie palings in werklikheid vrylewend en word deur visse geëet. Nadat hulle ingesluk is boor hulle deur die maagwand van die vis met behulp van hul gepunte sterte en word dan in die bindweefsel van die buikholte ingekapsel.

The subtropical waters of Natal (South Africa) contain a wide variety of reef fish. Thirty-two species are commonly caught by offshore line-fishermen, with members of the families Sparidae, Serranidae and Sciaenidae making up the bulk of commercial and sport catches.

Biological research on dominant reef species has been in progress since 1979. During this time ophichthid eels have been found in the coeloms of 13 reef fishes: 11 sparids, namely three slinger *Chrysoblephus puniceus* (Gilchrist & Thompson, 1917), three santer *Cheimerius nufar* (Ehrenberg, 1830), two Englishman *Chrysoblephus anglicus* (Gilchrist & Thompson, 1908), and three Dane *Porcostoma dentata* (Gilchrist & Thompson, 1908) and the serranid, halfmoon rockcod *Epi-*