

International Council for the  
Exploration of the Sea

C.M. 1968/G:2

Demersal Fish (Southern) Committee

Ref.: Pelagic Fish (S) Cttee.

& Shellfish and Benthos Cttee.

Observations on the Food of Fish of the  
West African Shelf

by

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This study is based on the material collected aboard the research vessel m/t "Wieczno" during its trip to the West African Shelf, including the fishing grounds of Barbas (21°11'N, 17°26'W) to the region of Freetown (08°24'N, 13°42'W). The catches were made at depths from 30 to 300 m in the period from 26th October to 29th November, 1966, and were performed by means of a herring trawl, which according to actual needs was rigged either for bottom or pelagic trawling.

For the purpose of this study random samples of 100 specimens were taken from the catch of particular species. Besides such data as body-length, the ratio of males and females, stage of maturity, filling of the digestive tracts (stomachs and intestines) were determined. Only after this analysis had been performed were 20 specimens with full stomachs selected from the sample. The stomachs were cut off and put into plastic bags, and thereafter frozen at a temperature of -30°C. This procedure was found to be more correct than taking again 20 random specimens out of the sample of 100 fish, since - as was often the case - none among those 20 specimens might have full stomachs. This would have prevented an analysis of food in the stomachs and might lead to the conclusion that the fish did not feed in the period under observation. In this manner 3,800 fish specimens were analysed, of which 760 stomachs of 38 species were examined with respect to the composition of food.

Percentage composition of food was established by weighing the total contents of 20 stomachs, assumed to be 100%. Then the contents was sorted into 5 groups; Crustacea, Mollusca, Echinodermata, Pisces and a group including all other species. These groups were weighed separately and the percentage participation of each was established. The stage of maturity was determined according to Maier's scale and the degree of filling of the stomachs according to K. R. Fortunatov's scale.

The fish samples were divided into three ecological groups according to the kind of food taken. In the first group were included fish feeding on plankton organisms; in the second group fish feeding on nekton and the third group contained fish searching for food mainly among the benthic fauna.

The results (Table 1) show that among the species caught, planktophage fish made up only 8%, while nektophage (predacious) fish made up 47% and benthophage fish 45%. From Plate 2 it appears that none of the groups mentioned feed solely on the food ascribed to it. Planktophage fish feed in 100% on pelagic invertebrate fauna, but some number of the specimens had also taken nektonic vertebrates (except fish larvae). Nektophage fish always feed up to 100% of pelagic invertebrate fauna, but a large number of individuals have the food composed also to great extent, up to 70%, of nekton invertebrate fauna (Crustacea, Cephalopoda) and a small number of fish of this group search for food among benthic invertebrate fauna (11% of the contents)

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In respect of the composition of the food the most "versatile" group are the benthophage fish. Their basic food is nekton invertebrates (41%). Some individuals of this group also feed upon vertebrate animals, both pelagic and benthal (20%).

The food of planktophage fish consists mainly of Decapod Crustaceans e.g. Pseudozoeca of Squilla, Portunus, Lucifer, and also of Copepodes, Euphausidae, Mysidacea, Ostracoda and Tunicata (Thaliacea).

Nektophageous species (predators) feed first of all on fish and Crustacea, (Natantia) as well as on Cephalopoda. The fact that nektophage fish feed to a great extent on fish, which are the object of commercial catches, is especially noted.

Benthal fish species utilise the easiest available food occurring in large quantities on the sea-bed. It is characteristic that fish feeding at the bottom always had full stomachs, which was not the case with nektophageous or planktophageous fish. This may be assumed to have connection with:-

- a) The benthophageous species have more possibilities of getting easily available food, the benthal fauna is less mobile or sessile and they depend to a lesser degree on the fluctuations in occurrence of such animals.
- b) The food taken consists mainly of hard-shelled Crustacea, Mollusca or Echinodermata, which remain longer in the intestines.

It should be mentioned that no relation was established between feeding and maturity of gonads, whereas a difference in the stage of maturity of males and females of the same species was very often noted. It may be assumed that the physiological state does not influence the taking of food, which is more or less even all through the whole development of an individual.

In some cases, Pagellus bogaraveo and Sarda sarda, differences were found in the stage of maturity depending on geographical latitude. Thus individuals of Pagellus bogaraveo occurring in the regions adjacent to equator showed more advanced maturity of the gonads than individuals caught in higher latitudes, whereas in Sarda sarda the reverse situation was observed.

In the trophic system (Plate 3) may be distinguished two levels of benthophageous fish, which penetrate through the nektophageous and planktophageous ichthyofauna. In turn, nektophageous fish search for food among benthophageous fish of the first and second level. Quite apart from these relations are the planktophageous species which feed mainly on zooplankton and fish fry.

## QUALITY COMPOSITION OF FOOD IN PARTICULAR FISH SPECIES

Date	Geogr. position	Depth m	Character of bottom	Length of body	Maturity stage of the gonads	Percent ratio of 0 : 0	Stomach filling	Crustacea in %	Mollusa in %	Echinodermata in %	Pisces in %	Other
PLANKTOPHAGE FISHES												
<i>Sardinella aurita</i>	20.XI.1966	08°31'N:13°51'W	40-70	sand, gravel	20-23	III-IV	60:40	1-2	40	-	60	-
<i>Brachydentereus auritus</i>	22.XI.1966	13°15'N:16°54'W	40-60	sandy mud	8-15	I-III	20:80	0-1	80	-	10	10
<i>Scomber colias</i>	27.XI.1966	20°45'N:17°35'W	100-160	sandy mud	35-38	I-III	60:40	3-5	20	60	10	10
NEKTOPHAGE FISHES												
<i>Paragaleus gruvelli</i>	23.XI.1966	16°50'N:16°40'W	32-80	sandy mud	86-95	III-IV	65:35	2-3	-	-	100	-
<i>Fistularia tabaccaria</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	58-61	II-IV	25:75	1-3	-	10	90	-
<i>Fistularia vilosa</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	46-65	II-V	30:70	0-4	5	30	65	-
<i>Sphyræna barracuda</i>	23.XI.1966	16°50'N:16°40'W	32-80	sandy mud	22-35	III-IV	45:55	0-4	-	-	100	-
	24.XI.1966	17°14'N:16°20'W	85-110	sandy mud	21-32	III-IV	50:50	0-4	-	-	100	-
<i>Merluccius merluccius</i>	18.XI.1966	08°24'N:13°42'W	41-62	sandy mud	41-62	IV	40:60	2-5	-	-	100	-
<i>Zeus faber</i>	24.XI.1966	17°14'N:16°20'W	85-110	sandy mud	18-46	I-III	40:60	4-5	-	15	85	-
<i>Apsilus fuscus</i>	22.XI.1966	13°15'N:16°54'W	40-60	sandy mud	20-28	III	50:50	0-1	30	-	70	-
<i>Parapristipoma humile</i>	27.XI.1966	13°40'N:17°10'W	20-80	sandy mud	20-29	II-III	40:60	0-1	30	-	70	-
	22.XI.1966	13°15'N:16°54'W	40-60	sandy mud	28-34	II-III	30:70	0-2	40	10	50	-
<i>Sciaena ronchus</i>	23.XI.1966	16°50'N:16°40'W	32-80	sandy mud	28-37	II-IV	70:30	0-1	20	10	70	-
<i>Decapterus punctatus</i>	23.XI.1966	16°50'N:16°40'W	32-80	sandy mud	23-25	0-IV	10:90	1-2	10	-	90	-
	24.XI.1966	17°14'N:16°20'W	85-110	mud	20-25	0-III	20:80	1-3	30	-	70	-
<i>Lichia vadigo</i>	24.XI.1966	18°45'N:16°25'W	30-150	sandy mud	48-56	III-IV	40:60	4-5	-	-	100	-
<i>Hynnys goreensis</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	48-60	V	80:20	0-2	40	-	60	-
<i>Pomatomus saltatrix</i>	25.XI.1966	18°08'N:16°23'W	70-150	sandy mud	51-55	II-IV	40:60	0-1	-	-	100	-
<i>Pagellus macropthalmus</i>	26.XI.1966	18°45'N:16°25'W	70-150	sandy mud	25-31	IV-V	45:55	3-4	30	30	40	-
<i>Pagellus bogaraveo</i>	27.XI.1966	08°28'N:13°45'W	40-60	fine sand	18-22	III-V	20:80	1-4	60	15	15	10
	27.XI.1966	20°45'N:17°35'W	62-180	sandy mud	31-33	III	40:60	3-5	70	-	25	5
<i>Hepatus hepatus</i>	17.XI.1966	08°28'N:13°45'W	40-60	fine sand	21-45	V-VII	70:30	2-3	20	-	80	-
<i>Sarda sarda</i>	17.XI.1966	08°28'N:13°45'W	40-60	fine sand	34-53	II-III	50:50	0-1	-	15	80	5
	18.XI.1966	08 24 N:13 42 W	40-60	sandy mud	45-47	I-III	60:40	0-1	-	10	90	-
	26.XI.1966	18 45N :16 25 W	30-150	sandy mud	48-51	III-IV	65:35	0-1	-	-	100	-
<i>Trichiurus lepturus</i>	26.XI.1966	18°45'N:16°25'W	30-150	sandy mud	108-132	III-V	30:70	0-5	-	40	60	-
BENTHOPHAGES FISHES												
<i>Hemiconiatus guttifer</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	48-51	II-III	40:60	4-5	10	50	20	30
<i>Lagocephalus levigatus</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	27-37	III-IV	60:40	3-4	50	10	5	35
<i>Holocentrus hastatus</i>	17.XI.1966	08°28'N:13°45'W	40-60	fine sand	20-23	III	50:50	2-3	50	-	50	-
<i>Lutianus agenes</i>	16.XI.1966	08°31'N:13°38'W	40-60	fine sand	34-48	III	35:65	0-2	25	15	5	40
<i>Parapristipoma mediterraneum</i>	22.XI.1966	13°15'N:16°54'W	40-60	sandy mud	35-38	III-IV	35:65	2-4	45	25	15	15
<i>Pomadourys peroteti</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	40-43	IV	40:60	0-5	35	40	5	10
<i>Lethrinus atlanticus</i>	16.XI.1966	08°31'N:13°38'W	40	fine sand	30-36	II-III	50:50	1-3	60	20	5	15
<i>Vomer setipinnis</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	57-63	III-V	35:65	5	90	5	5	5
<i>Mullus surmuletus</i>	17.XI.1966	08°28'N:13°45'W	40-60	fine sand	21-26	II-III	60:40	3-4	70	10	5	15
<i>Diplodus sargus</i>	28.XI.1966	21°11'N:17°26'W	100-300	sandy mud	39-41	IV	65:35	1-3	30	30	30	5
<i>Pagrus pagrus</i>	26.XI.1966	18°45'N:16°25'W	30-150	sandy mud	25-29	I-IV	20:80	1-4	30	30	25	10
<i>Pagrus ehrenbergii</i>	16.XI.1966	08°31'N:13°38'W	40	fine sand	24-36	II-III	55:45	1-3	60	20	5	15
<i>Uranoscopus scaber</i>	25.XI.1966	18°08'N:16°23'W	70-150	sandy mud	32-42	II-III	30:70	0-4	40	30	-	30
<i>Balistes caprisicus</i>	17.XI.1966	08°28'N:13°45'W	40-60	fine sand	37-48	II-IV	60:40	4-5	50	15	15	5
<i>Balistes forcipatus</i>	17.XI.1966	08°28'N:13°45'W	40-60	fine sand	31-37	III-IV	65:35	3-5	75	15	5	5
<i>Monocanthus setifer</i>	18.XI.1966	08°24'N:13°42'W	40-60	sandy mud	19-38	II-III	70:30	5	30	30	20	20

PLATE II

PERCENT COMPOSITION OF FOOD OF THE FISHES OF WEST AFRICAN SHELF

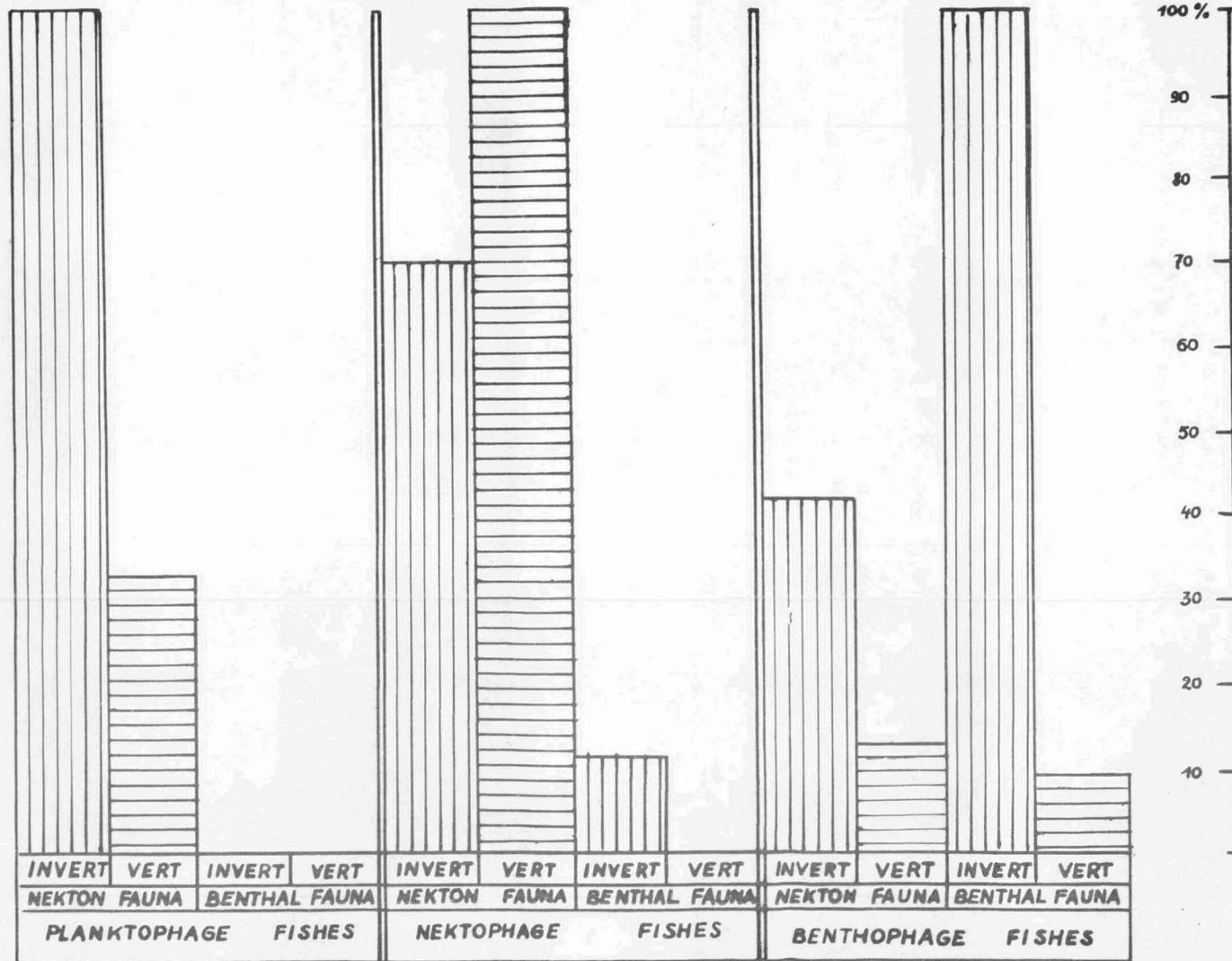


PLATE III

TROPHIC RELATIONS OF ICHTHYOFAUNA OF WEST AFRICAN SHELF

