SPECIES COMPOSITION, DISTRIBUTION, AND RESOURCE POTENTIAL OF FISHES RECORDED IN BOTTOM TRAWLING BETWEEN 50 – 200M DEPTH OFF THE NIGERIAN COAST

by

A. A. Amadi

TECHNICAL PAPER No. 3

JUNE 1982

Nigerian Institute For Oceanography And Marine Research

MARINE RESOURCES DIVISION

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ABSTRACT

15 trawl hauls in the 50 – 200m depth zone of the Nigerian continental shelf yielded 8092 fishes from 38 families comprising 48 species. *Dentex angolensis, Dentex congoensis, priacanthus arenatus and Ariomma bondi* were identified as the dominant species. Their resource potential in the area should be further investigated.

INTRODUCTION

The investigation was carried out under an FAO/NORAD sponsored survey in August 1981 to chart the offshore fish resources on the West African coast.

The focus in Nigerian waters was on the demersal resources between 50 and 200m for the reason that collection of data from survey trawling up to the 50m isobath by indigenous research vessels had been going on for some years.

The data presented in this work are seen as an important introductory step in plans by the Nigerian Institute for Oceanography and Marine Research to chart the entire fish resources in the country's EEZ.

OPERATIONAL PLAN

The survey was designed to incorporate both acoustic and trawling components, although the results in this work are based on the latter. Consequently while the acoustic systems were switched on throughout the survey route, half-hour trawl hauls were made at 15 stations between the 16th and 18th of August, 1981. These stations spanning the entire Nigerian coast were randomly chosen, but the exact positions were determined by using the information of the echosounders on the trawlability of grounds in view of both topographical and man-made obstacles (e.g. oil prospecting equipment). Results were extrapolated up to 60 minutes standard haul, using appropriate raising factors.

All catches were analyzed for total weight, species composition, and weight of species or groups thereof. Length frequencies of randomly chosen specimens of the more abundant species were taken.

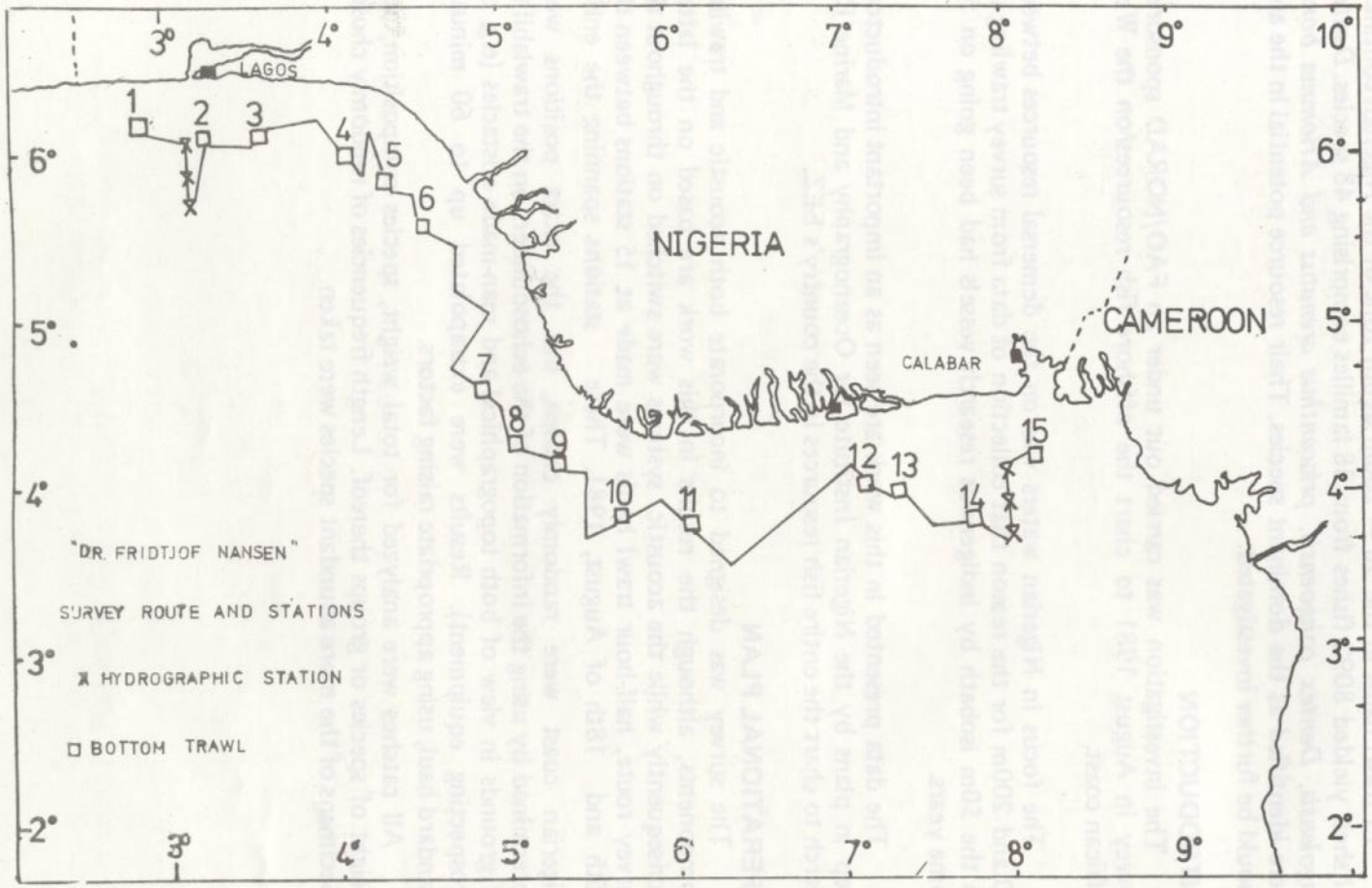

LAGOS
NIGERIA
CAMEROON
CALABAR
"DR. FRIDTJOF NANSEN"
SURVEY ROUTE AND STATIONS
HYDROGRAPHIC STATION
BOTTOM TRAWL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
3°
4°
5°
6°
7°
8°
9°
10°
2°

FIG. 1

30m. In the area off Lagos, salinities were slightly higher, being in the region of 34°/oo from the surface down to 50m.

The oxygen readings showed a rich shelf steadily decreasing in O_2 content with depth down to 400m.

(Adapted from Lars Foyn: Preliminary Cruise Report)

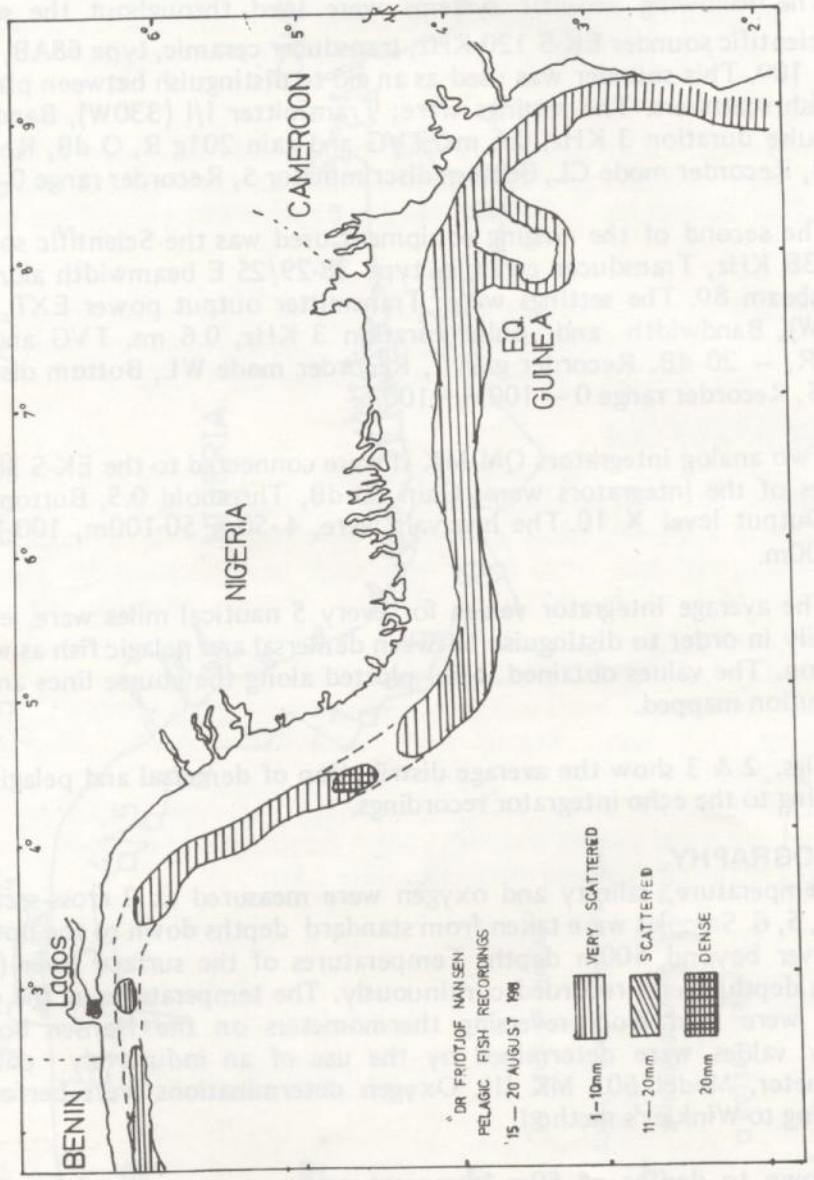


FIG. 2

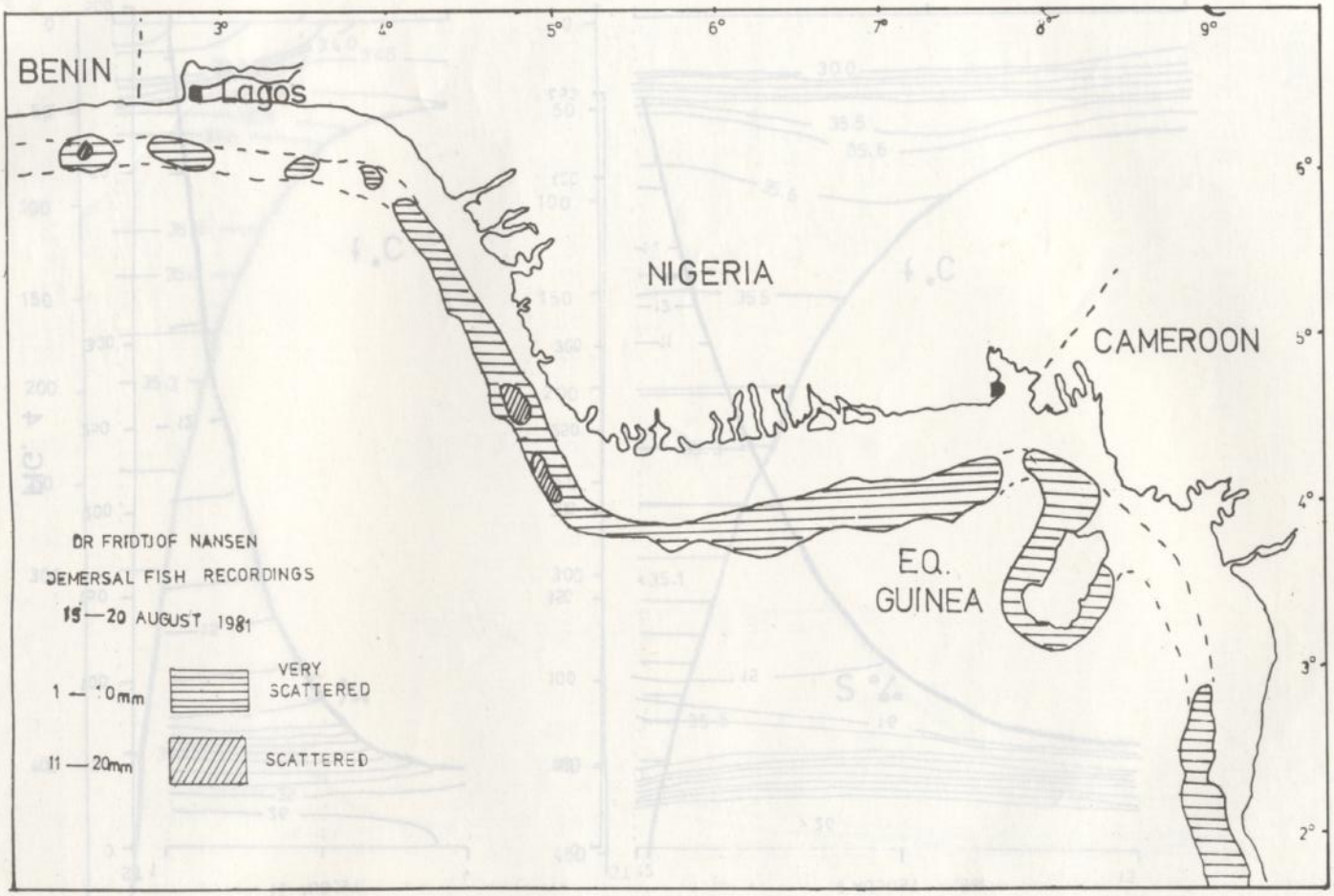
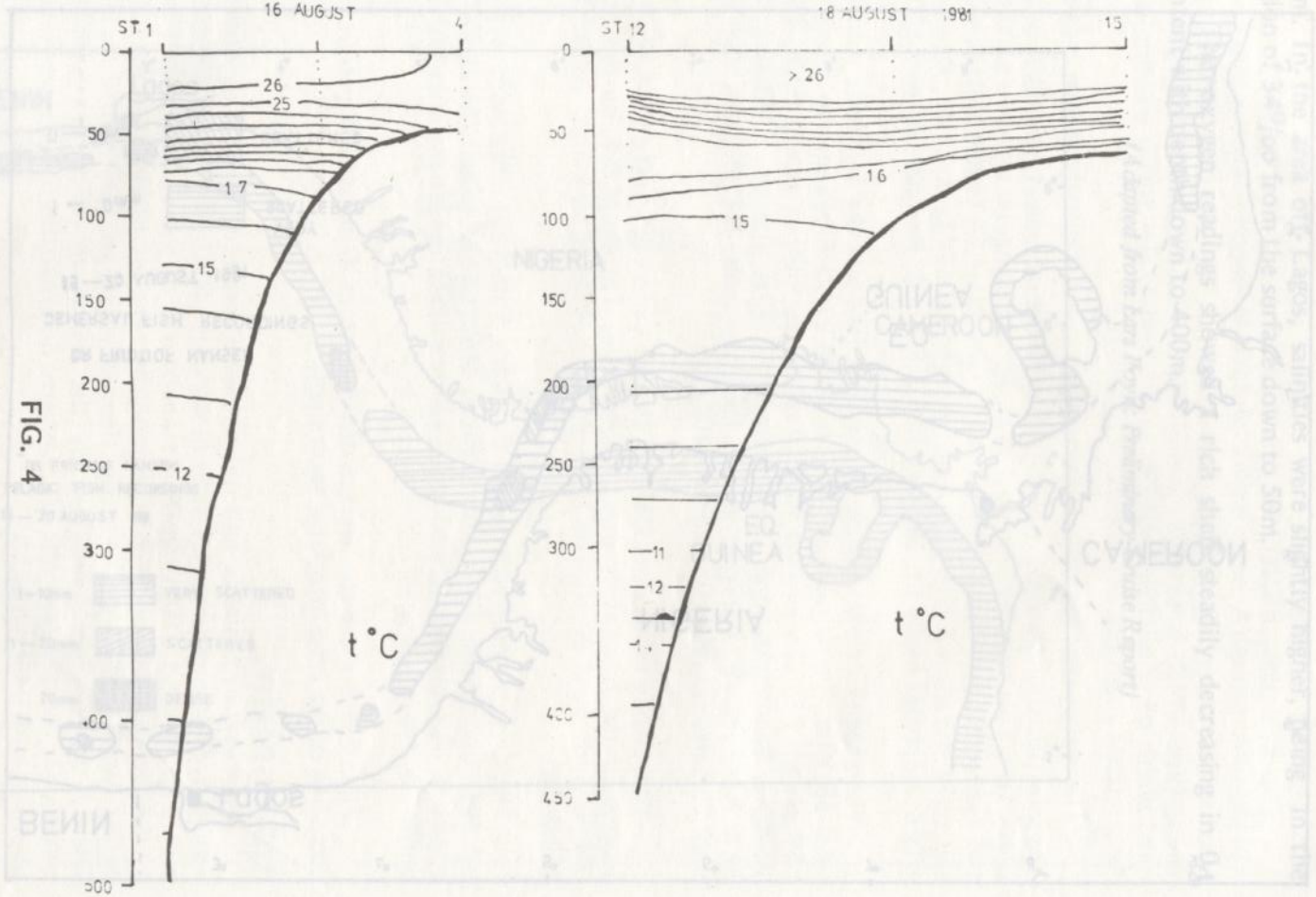

BENIN
Lagos
NIGERIA
CAMEROON
EQ.
GUINEA
3°
4°
5°
6°
7°
8°
9°
5°
5°
4°
3°
2°
DR FRIDTJOF NANSEN
DEMERSAL FISH RECORDINGS
15—20 AUGUST 1981
1 — 10mm
VERY
SCATTERED
11 — 20mm
SCATTERED

FIG. 3


16 AUGUST
ST 1
4
0
50
100
150
200
250
300
400
500
26
25
17
15
12
t °C
18 AUGUST 1981
ST 12
15
0
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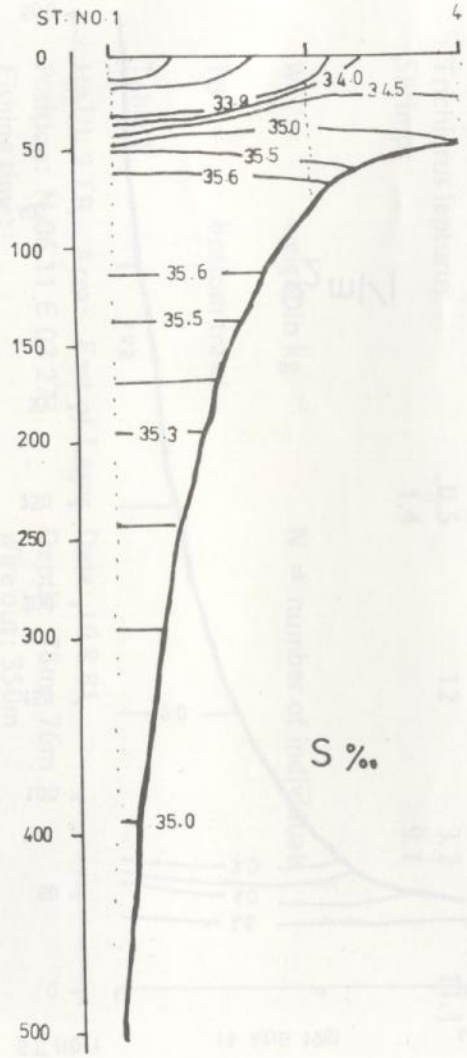
100
150
200
250
300
400
450
> 26
16
15
11
12
t °C

FIG. 4


ST. NO. 1
4
0
50
100
150
200
250
300
400
500
34.0
34.5
33.9
35.0
35.5
35.6
35.6
35.5
35.3
35.0
S ‰

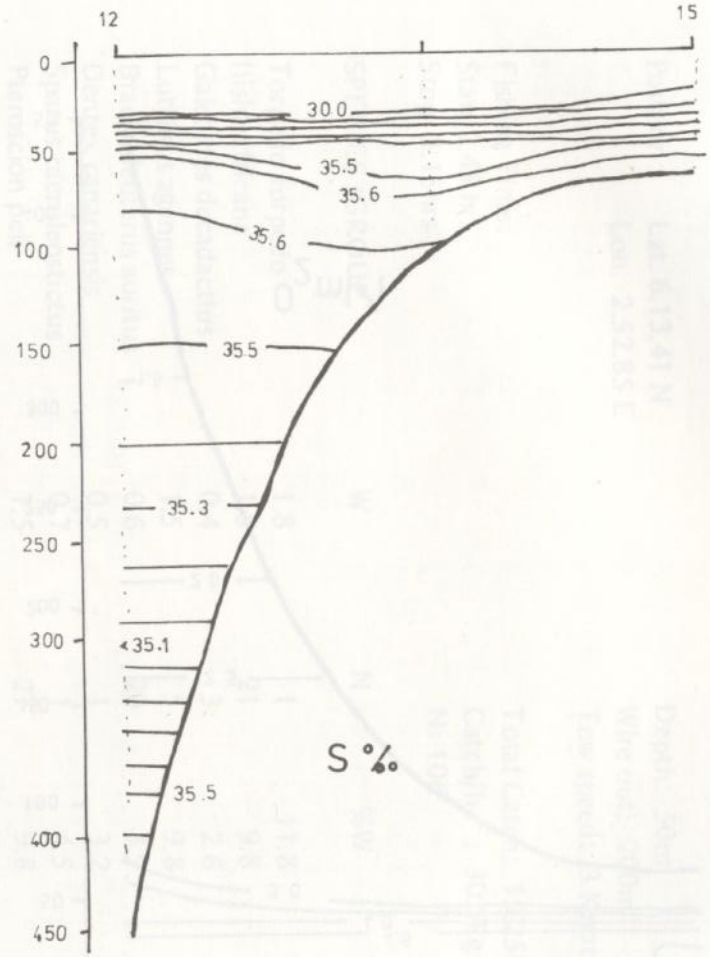

12
15
0
50
100
150
200
250
300
400
450
30.0
35.5
35.6
35.6
35.5
35.3
35.1
35.5
S ‰

FIG. 5

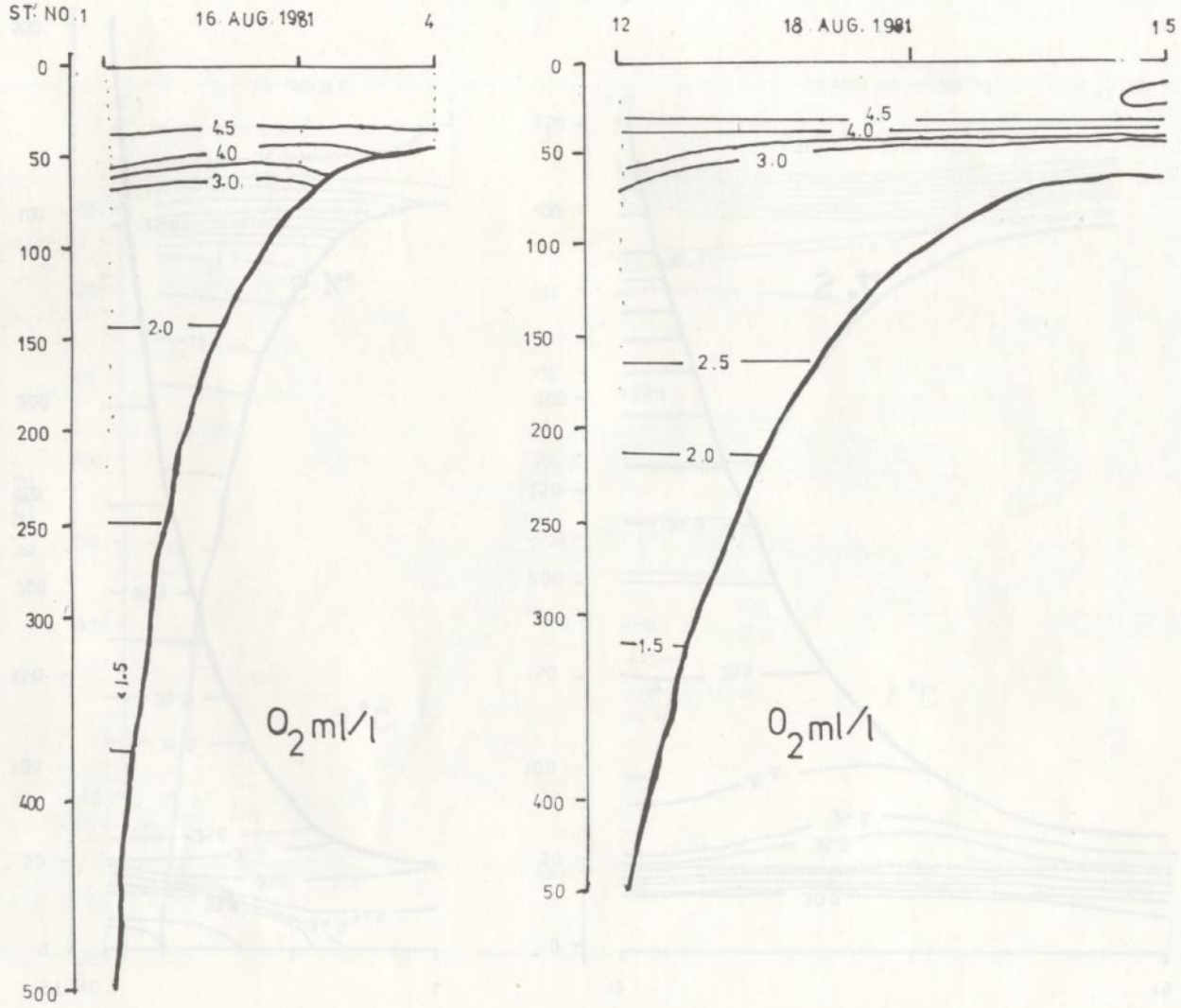

ST. NO.1
16 AUG. 1981
4
0
50
100
150
200
250
300
400
500
4.5
4.0
3.0
2.0
<1.5
O_2 ml/l
12
18 AUG. 1981
15
0
50
100
150
200
250
300
400
50
4.5
4.0
3.0
2.5
2.0
1.5
O_2 ml/l

FIG. 6

RESULTS

HAUL 1 TB Area: Off Badagry

Date: 16.8.81

Position: Lat. 6.13.41 N
Lon. 2.52.85 E

Depth: 50m
Wire out: 200m
Tow speed: 3 Knots

Fishing Time:
Start 2.45 hrs
Stop 3.15hrs

Total Catch: 15.25kg
Catch/h . : 30.5kg
N: 106

SPECIES /GROUP	W	N	%W	%N
Torpedo torpedo	1.8	1	11.8	0.9
Ilisha africana	1.5	21	9.8	19.0
Galeoides decadactlus	0.4	3	2.6	2.7
Lutjanus agennes	1.5	5	9.8	4.6
Brachydeuterus auritus	0.6	20	3.9	18.5
Dentex canariensis	0.5	1	3.2	0.9
Sparus caeruleostictus	0.7	1	4.5	0.9
Pteroscion peli	1.5	27	9.8	25.0
Pseudopeneus prayensis.	0.1	3	0.6	2.7
Chromis cadenati	0.3	14	1.6	12.9
Trichiurus lepturus	0.5	12	3.2	11.1
Shrimps	1.4		9.1	

W = weight in kg. N = number of individuals

TB = bottom trawl

Table 1

HAUL 2 TB Area: East of Lagos Date: 16.8.81
Position: N 06 11 E 03 27 Depth: 78m - 76m
Fishing time: Wire out: 350m
STart 10.30hrs Tow speed: 3 knots
Stop 11.00 hrs Total catch: 22.0kg
Catch/h 44.0kg
N : 42

It was noted that virtually all fish species associated with general fishing operation were also present in the by-catch of shrimpers, although the order of importance was not the same. The most important fish were the soles with a contribution of 41.36%, followed by the croakers with 29.27% and shiny nose with 10.17%. No other fish was found to contribute up to 10.00% of the catch.

Discussion:

In both types of fishing studied, the three most dominant species groups identified were the croakers, soles and shiny-nose. For the croakers only 0.26% of their total catch by general fishing vessels was below 20.0cm while 85.18% and 14.56% belonged to the medium and large size ranges respectively. The correnspponding figures for small, medium and large soles were 0.19%,81.57% and 18.24% respectively. On the other hand 3.90% of the total number of shiny-nose caught was below 20.0cm while medium and large accounted for 96.06% and 0.04% respectively.

The picture of the catches of shrimping vessels was not much different from that of general fishing vessels. For croakers 5.85%, 93.71% and 0.44% of the total number caught were in the size ranges of small, medium and large. The corresponding figures in respect of soles for the same size ranges were 0.19%, 99.63% and 0.18%. In the case of shiny-nose small size range accounted for 20.75% while medium contributed the remaining 79.25%.

A.O. Anyanwu, 1977/78, recorded length at maturity for male croakers - ***P. senegalensis*** and ***P. typus*** as 14.5 and 17.5cm while the females were 20.5 and 17.0cm respectively. Except for the female croaker - ***P. typus*** all other recorded lengths were in the range 0-20cm. But as stated above this range constituted a very negligible proportion of the totai catch such that there could be no reasonable claim that under-sized fish were being caught.

T. Ajayi, 1980 established that the total length of *C. **Canariensis*** varied between 12.4 - 46.0cm with length at maturity as 15.5cm and 15.0cm for the male and female respectively. Although the length at maturity for both sexes fell within the range 0 - 20cm, yet it was observed that only 0.19% of the total number of soles caught either by general fishing or shrimping vessels fell into that range.

The general inference from the study was that there was no scientific evidence to support any claim that Nigerian fishing trawlers were catching under-sized fish as at 1981 provided of course that there was no dumping of small fish at sea as provided in the sea Fisheries Decree No. 30 of 1971.

SPECIES GROUP	W	N	%W	%N
Squatina oculata	1.5	1	6.8	2.3
Raja miraletus	0.4	1	1.8	2.3
Saurida brasiliensis	0.4	20	1.8	47.6
Fistularia petimba	0.3	1	1.3	2.3
Epinephelus aeneus	12.8	4	58.0	9.5
Dentex angolensis	1.8	8	8.1	19.0
Dentex congoensis	0.4	3	1.8	7.1
Uranoscopus cadenati	0.3	2	1.3	4.7
Ariomma bondi	0.1	1	0.2	2.3
Syacium micrurum	0.02	1	0.1	2.3
Cephalopoda	4.0		18.0	

Table 2.

HAUL 3 TB Area: Off Lekki
Position: N 06 15 E 03 49
Fishing time:
Start 14.15hrs
Stop 14.45hrs

Date: 16.8.81
Depth: 83m – 69m
Wire out: 350m
Tow speed: 2 knt
Total catch: 7.5kg
Catch/h 15.0kg
N : 54

SPECIES/GROUP	W	N	%W	%N
Squatina oculata	1.4	1	18.6	1.8
Selene dorsalis	1.0	5	13.3	9.2
Decapterus punctatus	0.1	1	0.5	1.8
Dentex angolensis	4.0	33	53.3	61.1
Dentex congoensis	1.0	14	13.3	25.9
Cephalopoda	0.1		1.3	

Table 3.

HAUL 4 TB Area: Off Lekki
Position: N 06 12 E 04 01
Fishing time:
Start 17.45hrs
Stop 18.15hrs

Date: 16.8.81
Depth: 126m – 130m
Wire out: 250m
Tow speex: 3.3 knots
Total Catch: 19.2kg
Catch/h 38.4kg
N: 158

SPECIES/GROUP	W	N	%W	%N
Carcharinus brachyurus	3.5	1	18.2	0.5
Ilisha africana	0.2	1	1.0	0.5
Sphyraena piscatorium	0.9	3	4.6	1.6
Priacanthus arenatus	0.9	1	4.6	0.5
Alectis alexandrinus	1.2	1	6.2	0.5
Brachydeuterus auritus	3.9	123	20.3	66.1
Pteroscion peli	0.4	6	2.0	3.2
Scomberomorus tritor	0.4	1	2.0	0.5
Lagocephalus laevigatus	1.5	4	7.8	2.1
Selene dorsalis	3.0	10	15.6	5.3
Shrimps	2.0		10.4	
Cephalopoda	1.3		6.7	

Table 4.

HAUL 5 TB Area: Off Lekki
Position: N 05 55 E 04 25
Fishing Time:
Start 22.05
Stop 22.35

Date: 16.8.81
Depth: 150m - 190m
Wire Out: 550m
Tow Speed: 3 Knots
Total Catch: 40.1 kg
Catch/h : 80.2kg
N: 429

SPECIES / GROUP	W	N	%W	%N
Squatina oculata	3.0	1	3.7	0.3
Myctophidae	1.2	126	2.9	39.4
Antigonia capros	0.3	6	1.4	1.8
Dentex angolensis	14.4	94	35.9	29.0
Dentex congoensis	0.1	1	0.2	0.3
Pteroscion peli	1.1	9	2.7	2.8
Brotula barbata	5.1	18	12.7	5.6
Lepidotrigla carolae	8.5	26	21.1	8.1
Pterothrissus belloci	4.2	38	10.4	11.9
Shrimps	1.2		2.9	
Cephalopoda	1.1		2.7	

Table 5

HAUL 6 TB Area: Off Pennington River
Position: N 04 43 E 05 04
Fishing Time:
Start 08.10hrs
Stop 08.40hrs

Date: 17.8.81
Depth: 100m – 115m
Wire Out: 450m
Tow Speed: 3.5knots
Total Catch: 40 kg.
Catch/h : 80kg
N : 689

SPECIES /GROUP	W	N	%W	%N
Saurida brasiliensis	0.3	14	0.7	2
Zenopsis conchifer	0.3	2	0.7	0.2
Priacanthus arenatus	1.9	24	4.7	3.4
Decapterus ronchus	2.0	34	5.0	4.9
Spicara alta	18.5	253	46.2	36.7
Dentex angolensis	3.0	32	7.5	4.6
Dentex congoensis	1.1	13	2.7	1.8
Uranoscopus cadenati	3	2	0.7	0.2
Ariomma bondi	9.2	271	23.0	39.3
Trichiurus lepturus	0.1	1	0.2	0.1
Balistes capriscus	1.5	15	3.7	2.1

Syacium micrurum	0.1	1	0.1	0.1
Lepidotrigla carolae	0.4	12	1.0	1.7
Peristedion cataphractum	0.6	15	1.5	2.1
Cephalopoda	0.7		1.7	

Table 6.

HAUL 7 TB Area: Off Middleton River
Position: N 04 16 E 05 17
Fishing Time:
Start: 13.10hrs
Stop: 13.40hrs

Date: 17.8.81
Depth: 125m – 107m
Wire Out: 350m
Tow Speed: 3 knots
Total Catch: 33.0kg
Catch/h : 66.0kg
N: 194

SPECIES / GROUP	W	N	%W	%N
Squatina oculata	5.8	1	17.5	0.5
Priacanthus arenatus	0.1	1	0.3	0.5
Dentex angolensis	3.3	28	10.0	14.4
Dentex congoensis	1.5	20	4.5	10.3
Ariomma bondi	2.0	40	6.0	20.6
Tri chiurus lepturus	19.0	101	57.5	52.0
Peristedion cataphractum	0.1	3	0.3	1.5
Cephalopoda	1 2		3.6	

Table 7.

HAUL 8 TB Area: Off Fish Town River
Position N 04 015 E 05 27
Fishing Time:
Start: 15.00hrs
Stop: 15.30 hrs

Date: 17.8.81
Depth: 62m-56m
Wire Out: 250m
Tow Speed: 3 knots
Total Catch: 17.8kg
Catch/h 35.6kg
N · 236

SPECIES/GROUP	W	N	%W	%N
Epinephelus aeneus	1.5	1	8.4	0.4
Decapterus ronchus	4.8	52	26.9	22.0
Brachydeuterus auritus	3.3	146	18.5	61.8
Zenopsis conchifer	0.7	1	3.9	0.4
Dentex angolensis	1.1	4	6.1	1.6
Dentex congoensis	0.7	6	3.9	2.5
Saurida brasiliensis	0.04	2	0.2	0.8
Ariomma bondi	0.2	3	1.1	1.2
Sphyraena piscatorium	3.9	1	21.9	0.4
Decapterus punctatus	0.7	20	3.9	8.4
Cephalopoda	0.9		5.0	

Table 8

HAUL 9 TB Area: Off Sengana Branch of Niger River
DAte: 17.8.81

Position: N 03 54 E 05 47
Fishing Time:
Start: 20.05hrs
Stop: 20.35hrs

Depth: 60m - 65m
Wire Out: 250m
Tow Speed: 3knots
Total Catch: 7kg
Catch/h : 14kg
N : 111

SPECIES / GROUP	W	N	%W	%N
Pseudupeneus prayensis	1.5	24	21.4	21.6
Priacanthus arenatus	0.5	6	7.1	5.4
Dentex angolensis	1.0	8	14.2	7.2
Dentex congoensis	1.5	45	21.4	40.5
Spicara alta	1.0	8	14.2	7.2
Pomadasys peroteti	0.2	3	2.8	2.7
Syacium micrurum	0.5	12	7.1	10.8
Decapterus ronchus	0.7	5	10.0	9.0

Table 9.

HAUL 10 TB Area: Off Cape Formoso
Position: N 03 54 E 06 06
Fishing Time:
Start: 23.05hrs
Stop: 23.35hrs

Date: 17.8.81
Depth: 57m–60m
Wire Out: 250m
Tow Speed: 3.5knots
Total Catch: 16.6kg
Catch/h : 33.2kg
N : 127

SPECIES / GROUP	W	N	%W	%N
Sparus caeruleostictus	1.1	3	6.6	2.3
Dentex angolensis	1.5	7	9.0	5.5
Dentex congoensis	1.7	40	10.2	31.4
Priacanthus arenatus	2.5	33	15.0	25.9
Decapterus ronchus	2.8	41	16.8	32.2
Raja miraletus	1.6	2	9.6	1.5
Epinephelus aeneus	0.7	1	4.2	0.7
Shrimps	4.7	–	28.3	–

Table 10.

HAUL 11 TB Area: Off Andoni River
Position: N 04 02 E 07 16
Fishing Time:
Start: 7.05 hrs
Stop : 7.35hrs

Date: 18.8.81
Depth: 53m – 50m
Wire Out: 200m
Tow Speed: 2.5knots
Total Catch: 0 kg.
Catch/h: 0kg
N : O

NO CATCH!

Table 11.

HAUL 12 TB Area: Off Opobo River
Position: N 03 59 E 07 23
Fishing Time:
Start: 08.35hrs
Stop: 09.05hrs

Date: 18.8.81
Depth: 70m –65m
Wire Out: 350m
Tow Speed: 3.0knots
Total Catch: 228.0kg
Catch/h : 456kg
N : 3782

SPECIES / GROUP	W	N	%W	%N
Priacanthus arenatus	156.7	2849	68.7	75.3
Sardinella aurita	2.1	77	0.9	2.7
Ariomma bondi	21.0	399	9.2	14.0
Dentex angolensis	2.1	28	0.9	0.9
Dentex congoensis	18.2	385	7.9	13.5
Decapterus punctatus	0.7	14	0.3	0.4
Trichiurus lepturus	1.4	28	0.6	0.9
Sphyrna zygaena	22.0	1	9.6	0.03
squatina oculata	2.7	1	1.1	0.03
Cephalopoda	1.0	–	0.4	–

Table 12.

HAUL 13 TB Area: Off Qua Ibo River
Position: N 03 45 E 07 47
Fishing Time:
Start: 1200hrs
Stop: 1235hrs

Date: 18.8.81
Depth: 162m-142m
Wire Out: 700m
Tow Speed: 3.0knots
Total Catch: 58kg
Catch/h : 116 kg
N : 907

SPECIES/GROUP	W	N	%W	%N
Spicara alta	11.6	130	20	14.3
Ariomma bondi	18.8	480	32.4	52.9
Priacanthus arenatus	2.0	26	3.4	2.8
Dentex angolensis	11.6	106	20	11.6
Dentex congoensis	11.0	150	18.8	16.5
Pterothrissus belloci	2.2	14	3.7	1.5
Lepidotrigla carolae	0.2	1	0.3	0.1
Cephalopoda	0.5	6	0.8	0.6

Table 13.

HAUL 14 TB Ara: Off Cross River
Position: N 04 07 E 08 17
Fishing Time:
Start: 18.40hrs
Stop : 19.10hrs

Date: 18.8.81
Depth: 46m–53m
Wire Out: 250m
Tow Speed: 2.8 knots
Total Catch: 49 kg
Catch/h : 98 kg
N : 161

SPECIES / GROUP	W	N	%W	%N
Brachydeuterus auritus	3.1	76	6.3	47.2
Pteroscion peli	0.9	6	1.8	3.7
Pomadasys peroteti	0.5	19	1.0	11.8
Platycephalus gruveli	0.3	5	0.6	3.1
Syacium micrurum	0.4	31	0.8	19.2
Spicara alta	0.2	1	0.4	0.6
Dentex congoensis	0.2	1	0.4	0.6
Ariomma bondi	0.5	5	1.0	3.1
Epinephelus aeneus	0.4	1	0.8	0.6
Chilomycterus spinosus mauretanicus	0.2	4	0.4	2.4
Conger conger	12.0	1	24.4	0.6
Dasyatis margarita	1.0	5	2.0	3.1
Trichiurus lepturus	0.7	6	1.4	3.7

Table 14.

HAUL 15 TB Area: Off Nigeria/Cameroun Border

Position: N 03 59 E 08 45
Fishing Time:
Start: 22.00hrs
Stop: 22.30hrs

Date: 18.8.81
Depth: 67m–53m
Wire Out: 300m
Tow Speed: 3.3 knots
Total Catch: 22.1 kg
Catch/h : 44.2 kg
N : 236

SPECIES/GROUP	W	N	%W	%N
Brotula barbata	4.0	8	18.0	3.3
Saurida brasiliensis	0.2	10	0.9	4.2
Brachydeuterus auritus	2.3	115	10.4	48.7
Trigla lyra	2.0	32	9.0	13.5
Lepidotrigla carolae	1.3	6	5.8	2.5
Syacium micrurum	0.9	31	4.0	13.1
Dentex angolensis	3.9	20	17.6	8.4
Dentex congoensis	1.5	14	6.7	5.9
Shrimps	2.0	—	9.0	—
Cephalopoda	4.0	—	18.0	—

Table 15.

INDIVIDUAL COMPONENTS OF THE FISH CATCH Table 16.

FAMILY	SPECIES	COMMON NAME
Carcharinidae	Carcharinus brachyurus	Copper shark
Sphyrnidae	Sphyrna zygaena	Smooth hammerhead
Squatinidae	Squatina oculata	Smoothback angleshark
Rajidae	Raja miraletus	Skate
Dasyatidae	Dasyatis margarita	Sting ray
Torpedinidae	Torpedo torpedo	Electric ray
Pterthrissidae	Pterothrissus belloci	Bone fish
Congridae	Conger conger	European conger
Clupeidae	Ilisha africana	West African ilisha
	Sardinella aurita	Round sardinella
Synodontidae	Saurida brasiliensis	Brazilian lizardfish
Myctophidae	Unidentified	Lanternfish
Fistularidae	Fistularia petimba	Red cornetfish
Zeidae	Zenopsis conchifer	Silver John Dory

FAMILY	SPECIES	COMMON NAME
Caproidae	Antigonia capros	Boar fish
Sphyraenidae	Sphyraena piscatorium	Barracuda
Polynemidae	Galeoides decadactylus	Lesser African threadfin
Priacanthidae	Priacanthus arenatus	Atlantic bigeye
Carangidae	Decapterus ronchus	False scad
	Decapterus punctatus	Round scad
	Selene dorsalis	African lookdown
	Alectis alexandrinus	Alexandria pompano
Lutjanidae	Lutjanus agennes	African red snapper
Centracanthidae	Spicara alta	Bigeye picarel
Pomadysyidae	Brachydeuterus auritus	Bigeye grunt
	Pomadasys peroteti	Parrot grunt
Sparidae	Dentex angolensis	Angola dentex
	Dentex congoensis	Congo dentex
	Dentex canariensis	Canary dentex
	Sparus caeruleostictus	Blue-spotted sea bream
Sciaenidae	Pteroscion peli	Boe drum
Mullidae	Pseudopeneus prayensis	West African goatfish
Pomacentridae	Chromis cadenati	Stripped chromis
Uranoscopidae	Uranoscopus cadenati	West African stargazer
Brotulidae	Brotula barbata	Brotula
Arimmidae	Arimma bondi	Silverrag driftfish
Trichiuridae	Trichiurus lepturus	Largehead hairtail
Scombridae	Scomberomorus tritor	West African Spanish mackerel
Balistidae	Balistes capriscus	Grey triggerfish

FAMILY	SPECIES	COMMON NAME
Tetraodontidae	Lagocephalus la evigatus	Smooth puffer
Diodontidae	Chilomycterus spinosus mauretanicus	Guinean burrfish
Bothidae	Scyacium micrurum	Lefteye flounder
Triglidae	Lepidotrigla carolae	Carol gunard
	Trigla lyra	Gunard
Peristediidae	Peristedion cataphractum	African armoured sea robin
Platycephalidae	Platycephalus gruveli	Flathead

Table 17. **BATHYMETRIC DISTRIBUTION OF FISHES**

SPECIES	DEPTH IN METRES														
	50	60	70	80	90	100	110	120	130	140	150	160	170	180	200
Carcharinus brachyurus								+	+						
Sphyrna zygaena		+	+												
Squatina oculata			+	+	+		+	+	+		+	+	+	+	+
Raja miraletus	+	+													
Dasyatis margarita	+	+													
Torpedo torpedo	+									+	+	+	+	+	+
Pterothrissus belloci										+	+	+	+	+	+
Conger conger	+														
Ilisha africana	+							+	+						
Sardinella aurita		+	+												
Saurida brasiliensis	+	+	+	+		+	+	+							
Myctophidae											+	+	+	+	+
Fistularia petimba			+	+											
Zenopsis conchifer	+	+				+	+	+							
Antigonia capros											+	+	+	+	+
Sphyraena piscatorium	+	+	+					+	+						
Galeoides decadactylus	+														
Epinephelus aeneus	+	+	+	+											
Priacanthus arenatus		+	+			+	+	+	+	+	+	+			
Decapterus punctatus		+	+	+	+										
Decapterus ronchus		+	+			+	+								
Selene dorsalis			+	+	+			+	+						
Alectis alexandrinus								+	+						

SPECIES	DEPTH IN METRES														
	50	60	70	80	90	100	110	120	130	140	150	160	170	180	200
Lutjanus agennes	+														
Spicara alta	+	+	+			+	+			+	+	+			
Brachydeuterus auritus	+	+	+					+	+						
Pomadasys peroteti	+	+	+												
Dentex angolensis	+	+	+	+		+	+	+	+		+	+	+	+	+
Dentex congoensis	+	+	+	+		+	+	+	+		+	+	+	+	+
Dentex canariensis	+														
Sparus caeruleostrictus	+	+													
Pteroscion peli	+								+		+	+	+	+	+
Pseudupeneus prayensis		+	+	+											
Chromis cadenati	+														
Uranoscopus cadenati			+	+		+	+	+							
Brotula barbata	+	+	+								+	+	+	+	+
Ariomma bondi	+	+	+	+		+	+	+	+	+	+	+			
Trichiurus lepturus	+	+	+			+	+	+	+						
Scomberomorus tritor								+	+						
Balistes capriscus						+	+	+							
Lagocephalus laevigatus								+	+						
Chilomycterus spinosus	+														
Syacium micrurum	+	+	+	+		+	+	+							
Trigla lyra	+	+													
Lepidotrigla carolae	+	+				+	+	+		+	+	+	+	+	+
Peristedion cataphractum						+	+	+	+						
Platycephalus gruveli	+														

Table 18. CATCH RATES IN kg/h BY STATIONS.

Station	Depth in metres	Catch/h	Day	Night
1	50	30		+
2	76 – 78	44	+	
3	69 – 83	15	+	
4	126 – 130	38.4	+	
5	150 – 190	80.2		+
6	100 – 115	80	+	
7	107 – 125	66	+	
8	56 – 62	35.6	+	
9	60 – 65	14		+
10	57 – 60	33.2		+
11	50 – 53	0	+	
12	65 – 70	456	+	
13	142 – 162	116	+	
14	46 – 53	98	+	
15	53 – 67	44.2		+

Table 19.

CATCH RATES IN kg/h OF IMPORTANT SPECIES IN SURVEYED AREA

SPECIES	Catch /h
Priacanthus arenatus	21.9
Ariomma bondi	6.8
Dentex angolensis	6.3
Dentex congoensis	5.1
Spicara alta	4.1
Trichiurus lepturus	2.8
Brachydeuterus auritus	1.7
Squatina oculata	1.9
Epinephelus aeneus	2.0
Shripms	5.3
Cephalopoda	1.9

Table 20.

SIZE DATA ON IMPORTANT SPECIES

Species	Total Wt (kg)	N	N measured	Total Length (cm) Range	Mean	Mean Wt. (g)
P. arenatus	164.7	2950	755	13–25	19	55.8
A. bondi	51.7	1199	144	5–15	10	43.1
D. angolensis	47.7	368	279	10–27	18.5	129.6
D. congoensis	38.9	692	285	8–23	15.5	56.2
S. alta	28.3	392	106	11–21	16	72.1
T. lepturus	21.7	148	37	10–49	29.5	146.6
B.auritus	13.2	480	217	6–21	13.5	27.5

SUMMARY OF SURVEY FINDINGS

A total of 8092 fishes from 38 families comprising at least 48 species of finfish were caught. All were identified to species level with the exception of the Myctophidae.

There were 4 species each of Carangidae and Sparidae and 2 of the Pomadasyidae taken in the survey area. Apart from these the general pattern was that only a single species occurred from each particular family.

The bathymetric distribution of the species showed that at the shallower depths, between 50 and 70m, the concentration of fish was higher. There was a marked decline from 80 - 100m, but a slightly heavier concentration from 100 — 130m. Fewer species were caught in the deeper waters from 130 to 200m.

In terms of frequency of occurrence in the catches at all depths, the sea breams *Dentex angolensis* and *Dentex congoensis* showed the widest distribution. These two species were taken in 13 depth strata out of the 15 into which the survey area was subdivided *(See Table 17).* They were closely followed by *Lepidotrigla carolae, Ariomma bondi* and the shark *Squatina oculata* which were caught in 11 depth regions. The Atlantic bigeye, *Priacanthus arenatus* and *Brotula barbata* occurred in 9 depth areas. While no species was restricted to deeper waters, some were caught only in the shallower waters between 50 and 60m. This was the case with the skates and rays, *Conger conger, Lutjanus agennes, Sparus caeruleostictus, Dentex canariensis, Chromis cadenati, Chilomycterus spinosus mauretanicus* and *Platycephalus gruveli.*

Shrimps occurred mainly in the shallower depths fished, but the cephalopods were recorded throughout all the depth ranges trawled in the survey.

Catch rates were worked out in kg/h of tow. These were highest for the Atlantic bigeye, *Priacanthus arenatus* at 21.9 kg/h, followed by *Ariomma bondi*, 6.8 kg&h, *Dentex angolensis* and *Dentex congoensis* with 6.3 kg/h, and 5.1 kg/h respectively. There was an appreciable catch rate of 5.3 kg/h for shrimps.

A comparison of these catch rates in relation to the trawled stations and depths is shown in Table 18, where the best catch rates were recorded for stations 12, 13, and 14 with the corresponding depths ranging from 46m to 162m. The poorest catch rate was in Station 11 between 50 and 53m where no fish at all were caught. There were 5 nocturnal hauls, the highest being 80.2 kg/h in Station 9 at 60 - 65m.

Table 20 which shows the size data on some species with apparent potential as resource fish illustrates the descending order of magnitude of catch in weight by species, as well as a range from 6cm to 49cm total length, with means from 10cm to 29.5cm. The largest recorded weight for a species was 164.7 kg. The species, *Priacanthus arenatus* is closely followed by the driftfishes, sea breams and picarels.

DISCUSSION

The results of the survey show the importance of the family Sparidae as the dominant groundfish species in the 50 to 200m depth region of the Nigerian continental slope. This inference agrees with past researches by LONGHURST (1961), and WILLIAMS (1966). The high catch rate of *Priacanthus*, and its frequency of occurrence in most stations are important in the consideration of this species as a likely exploitable stock. It remains to be seen if there are seasonal influences on the abundance of this and other species encountered in the area. The present work was in August midway through the rainy season in the south of Nigeria. Results of identical surveys in the dry months of the year should make interesting comparison.

Sparids, with the exception of *Sparus caeruleosticus* are rare in the very shallow coastal region of Nigeria. There, the dominant commercial species are the Sciaenidae, *Pseudotolithus typus*, *P. senegalensis* and *P.elongatus*. None of these croakers was recorded in the catches during the survey. The only sciaenid taken was Pteroscion peli.

Other species regularly encountered in trawl fishing up to a depth of 50m off Nigeria, but which never recorded in this survey were *Pomadasys jubelini* and the catfish *Arius*. In contrast the Carangidae and *Brachydeuterus*

auritus appear to enjoy a wide bathymetric shelf distribution. Other fishes in this category include *Epinephelus* and *Trichiurus*. Juveniles of both species enter estuaries in Nigeria (personal observation).

The fish fauna in the survey area is typically diverse, but with relatively few individuals representing each particular species. In most cases the incidence of sole species representing families was common *(see Table 16)*.

A decline in the occurrence of elasmobranchs with increasing depth was noticeable, although *Carcharinus brachyurus* was taken between 120m and 130m. Catches of hammerhead sharks never exceeded a depth of 70m, and only the smoothback angleshark, *Squatina oculata* was caught in depths ranging from 70m to 200m.

This species is dorsoventrally compressed in the manner of the flatfishes and apparently a typical slow-swimming bottom dweller of this region.

Hauls from 100m to 130m appeared to produce a higher diversity of species. Thereafter fewer species were recorded from there down to 200m. But the best catch rates were between 46 and 70m and 142 to 162m. Such rates were good from 150m down to 190m. It is possible that the total number of hauls were not sufficient enough for a predictive assertion on the overall relationship of catch rates with depth.

Poor catch rates were registered for 4 of the 5 night hauls, but the poorest rates were for 2 of the diurnal hauls *(see Table 18)*. The rest of the day time catches showed appreciable catch rates, the highest being 456 kg/h which consisted of mainly *Priacanthus*.

Catches of the rest of the species not included in Table 19 consisted of insignificant trace quantities and these were excluded from the quantitative statistical data thus presented.

Probably because of the high opening nature of the trawl, some pelagic species such as *Sardinella, Ilisha, Ariomma* and *Scomberomorus* were captured. Catches of *Ariomma* were particularly sizeable enough to generate some interest, as the importance of this species has hitherto previously not been stressed.

Catches of shrimps, principally panaeids, and unidentified caphalopods were significant. Little is known of the abundance of squids and cattlefish in Nigerian waters, but their catch rate of 5.3 kg/h indicates the presence of an exploitable stock. Future research should throw more light on this.

CONCULSION

There is the likelihood of seasonal fluctuations in both bathymetric and spatial distribution of the fish stocks in the Gulf of Guinea. This view is not new and cannot be overstressed. Results achieved in this investigation will therefore be seen as a precedent to regular monitoring work on the state of the living aquatic resources in the area.

An important aspect of the findings in this research is the evidence or an apparent potential stock of *Priacanthus arenatus* and *Ariomma bondi* in the 50m to 200m depth zone of Nigeria's EEZ, and probably in the same depths throughout the tropical East Central Atlantic. There is also the resultant confirmation of the dominance of the family Sparidae as hitherto mentioned in past researches in this region.

The influence of freshwater runoff in Lagos, the Niger Delta and on the Cross River estuary in Calabar had no noticeable effect on the surveyed area during the period of investigation. It is however important to continue parallel measurements of abiotic parameters such as salinity, temperature and oxygen. Indeed LONGHURST (1965) has shown that the community structure of West African fishes is controlled principally by temperature and bottom deposit. Additional impetus to the rationale behind hydrographic research in the area is supplied by a postulation in the Guinean Trawling Survey Report (1966): "It might be expected that the depths of maximum fish abundance would change with movements of the base of the thermocline."

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