

Reports on Surveys with the
R/V DR FRIDTJOF NANSEN

NORAD AND UNDP/FAO GLO/82/001

SURVEY OF THE ABUNDANCE AND DISTRIBUTION OF THE
FISH RESOURCES OF CONGO AND GABON

REPORT OF CRUISE NO 1

2 - 15 MARCH 1985

INSTITUTE OF MARINE RESEARCH, BERGEN

1. INTRODUCTION

Under an agreement between the Governments of Congo and Gabon, the United Nations Food and Agricultural Organisation (FAO) and the Norwegian Agency for Development Aid (NORAD), the fishery research vessel DR. FRIDTJOF NANSEN is conducting a series of surveys of the fish resources of Gabon and Congo. This forms part of the UNDP/FAO programme GLO/82/001.

This cruise report is the first of a series of interim reports to be issued upon the completion of each individual survey. The results will be further analysed in investigational reports.

The following scientific personnel participated:

From IMR, Bergen:

T. Stroemme (cruise leader)
S. Myklevoll
O. Skaatun
I. Svellingen (instrument chief)
T. Haugland

From FAO

Gabriella Bianchi

From Congo

Prosper Mfina
Francois Bileko

From Gabon

Leon Mba Nguema
Jean Alhogo Nang

From Zaire

Enganya Mpia Wango

2. NARRATIVE

The survey started in Pointe Noire on 2 March. The shelf was covered northwards with an acoustic survey grid with approximately 10 miles between the transects. Semi-random bottom trawl stations were laid out along the cruisetrack during daylight to assess the demersal biomass by the so called swept area method. The area just south of Cape Lopez is restricted due

to heavy oil drilling activities. This area was not surveyed as no permit to navigate there had been received. The vessel called on Port Gentil on 9 March for refuelling. Thereafter the survey continued northwards to the northern Gabonese border. A call was made on Owendo from 13 to 14 March to finalize the cruise report and meet representatives of the fisheries administration and UNDP, Libreville. The Gabonese scientists were disembarked in Owendo, whereafter the vessel steamed to Pointe Noire to disembark crew and remaining scientist and for layup.

The cruise track with trawl and hydrographical stations are shown in Figure 1.

3. HYDROGRAPHY

Only limited hydrographical work was carried out. Two sections were laid out, one a little north of Mayumba and one north of Port Gentil (Figure 1). Figure 2 shows these two sections together with a third one, just south of the Congo river, carried out a few days earlier at the end of the preceding survey in Angola.

The surface temperature shows only slight variations along the coast from Pointe Noire to North-Gabon and lies within the range 28-30 degr. C. The thermocline is located at around 20 m depth.

The oxygen content of the water is such that it should not limit the distribution of the fishes on the shelf. The level is above 2 ml/l down to about 200 m depth.

4. BOTTOM DESCRIPTION

The types of bottom observed by the echo sounder along the cruise tracks were classified according to their assumed suitability for bottom trawling as follows:

1. Even smooth bottom, likely to be suitable for trawling.
2. Generally smooth, but more uneven bottom; care must be taken to select fishing path.

3. Rough bottom, unsuitable for trawling.

4. Very steep bottom, unsuitable for trawling.

Figure 3 presents the results with some interpolation between cruise tracks. Some uncertainty is then of course introduced since only a narrow strip of bottom has actually been observed.

5. FISH DISTRIBUTION AND ABUNDANCE

The acoustic data obtained from the echo sounders and integrators are processed and classified according to a procedure based on experience in evaluating of the different types of echo recordings produced by various forms of organisms and on the information gained from the fishing experiments. Three categories are usually distinguished:

1. Pelagic fish type I : Clupeids e.g. sardinellas, sardines, anchovies.
2. Pelagic fish type II: Other schooling pelagic fish such as horse mackerel, other carangids, mackerels, hairtails, barracudas etc.
3. Demersal fish Other than pelagic schooling fish such as seabreams, croakers, snappers groupers, grunts etc.

In addition, signals caused by plankton and by mesopelagic fish such as myctophids are recorded, but no further processing is made of these data.

Assessment of the abundance of fish resources based on acoustic observations combined with experimental fishing is a method which especially lends itself to fish found in schools or other aggregations in mid water. There are some strictly bottom dwelling fishes e.g. rays and flounders which will escape acoustic detection. Also fish in the very surface layer can not be recorded by the echo sounder, but schools may be detected by the horizontal ranging sonar. For navigational reasons the work with the R/V "Dr. Fridtjof Nansen " is limited to waters deeper than about 15m. The effects, if any, of these factors will be towards an underestimate.

The abundance of the demersal fish stock are also assessed on basis of semi-random bottom trawl stations along the cruise track.

A common feature during the survey was the presence of dense registrations of plankton which screened the rather faint traces of fish resources. This will somewhat effect the precision of the acoustic estimates, and makes the trawl survey assessment useful for comparison.

During the present survey the abundance of the small pelagic fish resources was very low and it has not been considered meaningful to separate the faint pelagic recordings into Pelagic I and pelagic II as introduced above. The division will be applied when higher abundances will be recorded, probably in the course of later coverages, during other seasons.

Figure 4 shows the distribution of small pelagic fish while Figure 5 shows the demersal resources recorded by the acoustic system. Where pelagic registrations were found, they were generally of low level and no true schools were located which could form basis for industrialized fisheries. No exploitable resources of sardinellas, anchovies or horsemackerel were found. It is assumed that they were south of the area investigated, in accordance with the general seasonal migration cycle. The remaining small pelagic resources consisted of scattered occurrences of Trachurus trecae (10-20cm), Decapterus punctatus (6-21cm), Chloroscombrus chrysurus (20-26cm) and Balistes capriscus (7-8cm). The triggerfish, Balistes capriscus was found from Cape Lopez and northwards and was assessed to 52 000 tonnes. The remaining small pelagic resources were assessed to 48 000 tonnes.

Also the demersal resources were assessed as quite poor. The estimate from the acoustic system was 30 000 tonnes, while the trawl survey gave 125 000 tonnes. The last is considered to be the most reliable figure as the screening effect from plankton and a generally low level of the registrations severely affected the accuracy of the acoustic estimate. The demersal species consisted mainly of seabreams (Dentex spp., Sparus spp. and

Pagellus bellottii), groupers (Epinephelus aeneus) and emperors (Pseudotolithus senegalensis). In deeper waters the bigeye (Priacanthus arenatus) was common.

Records of fishing stations and catch of dominant species are shown in Appendix II.

Pooled and statistically unweighted distributions from all samples of the most common species are shown in appendix III.

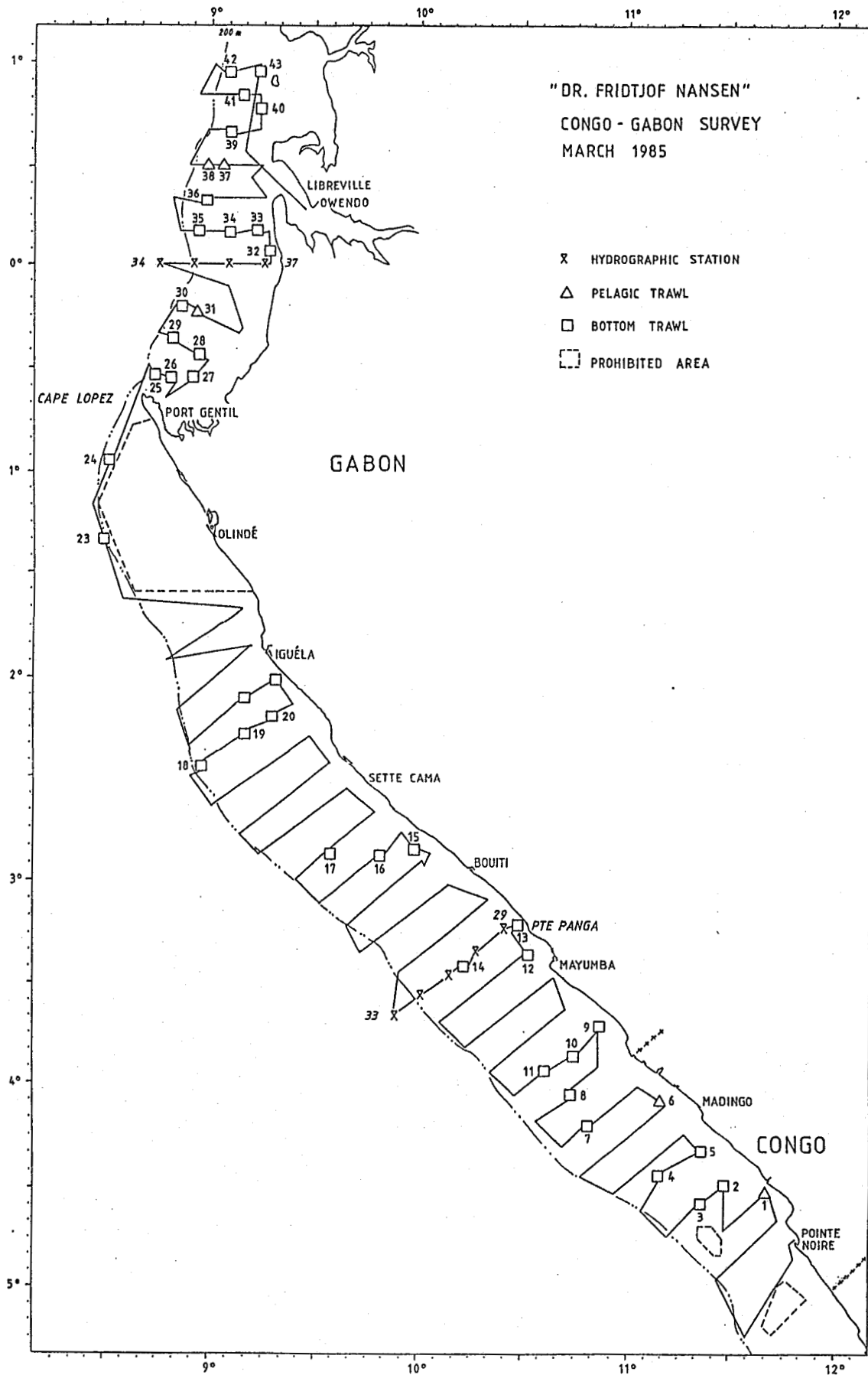


Figure 1. Cruise track and stations worked.

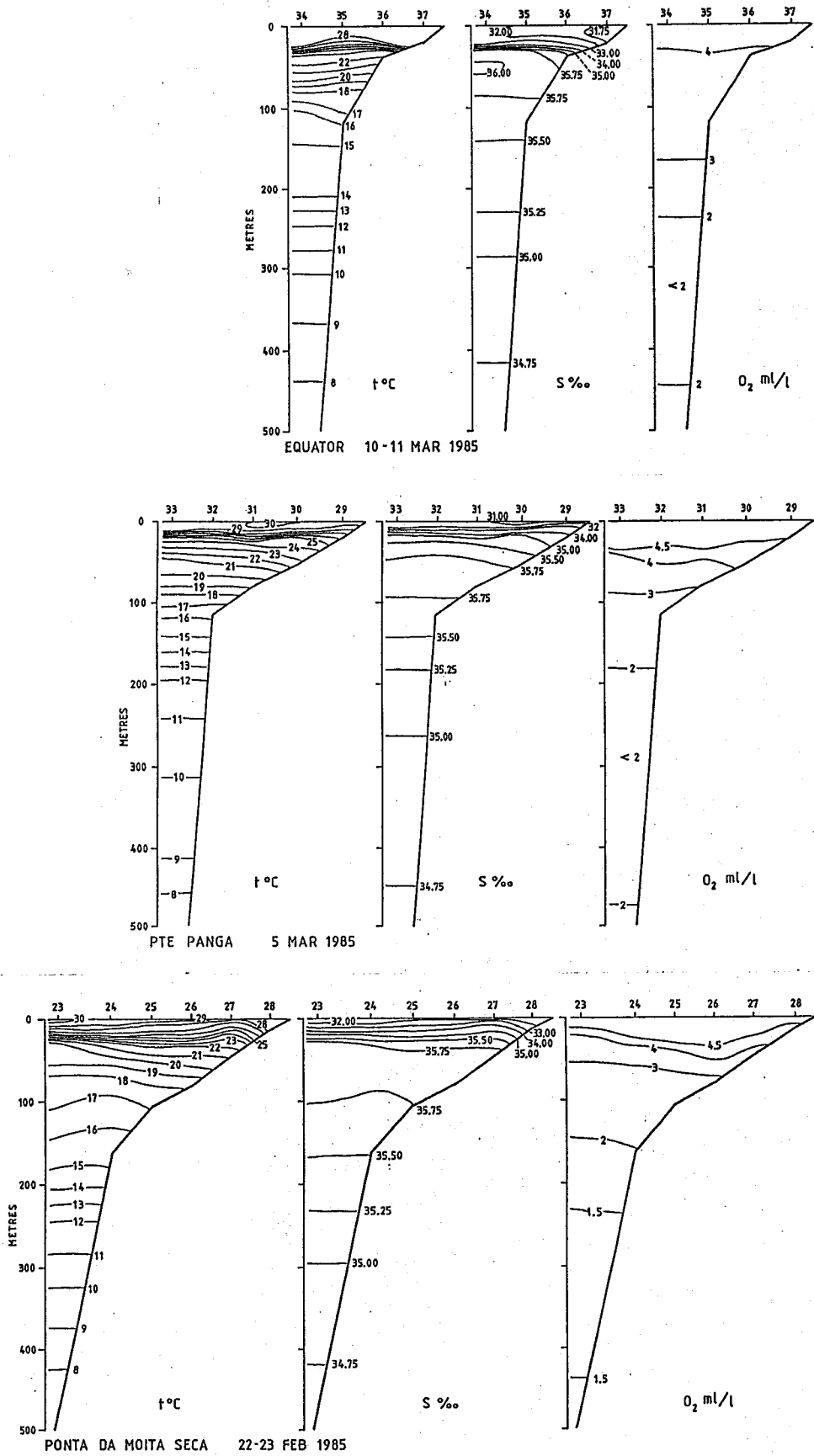


Figure 2. The hydrographical sections

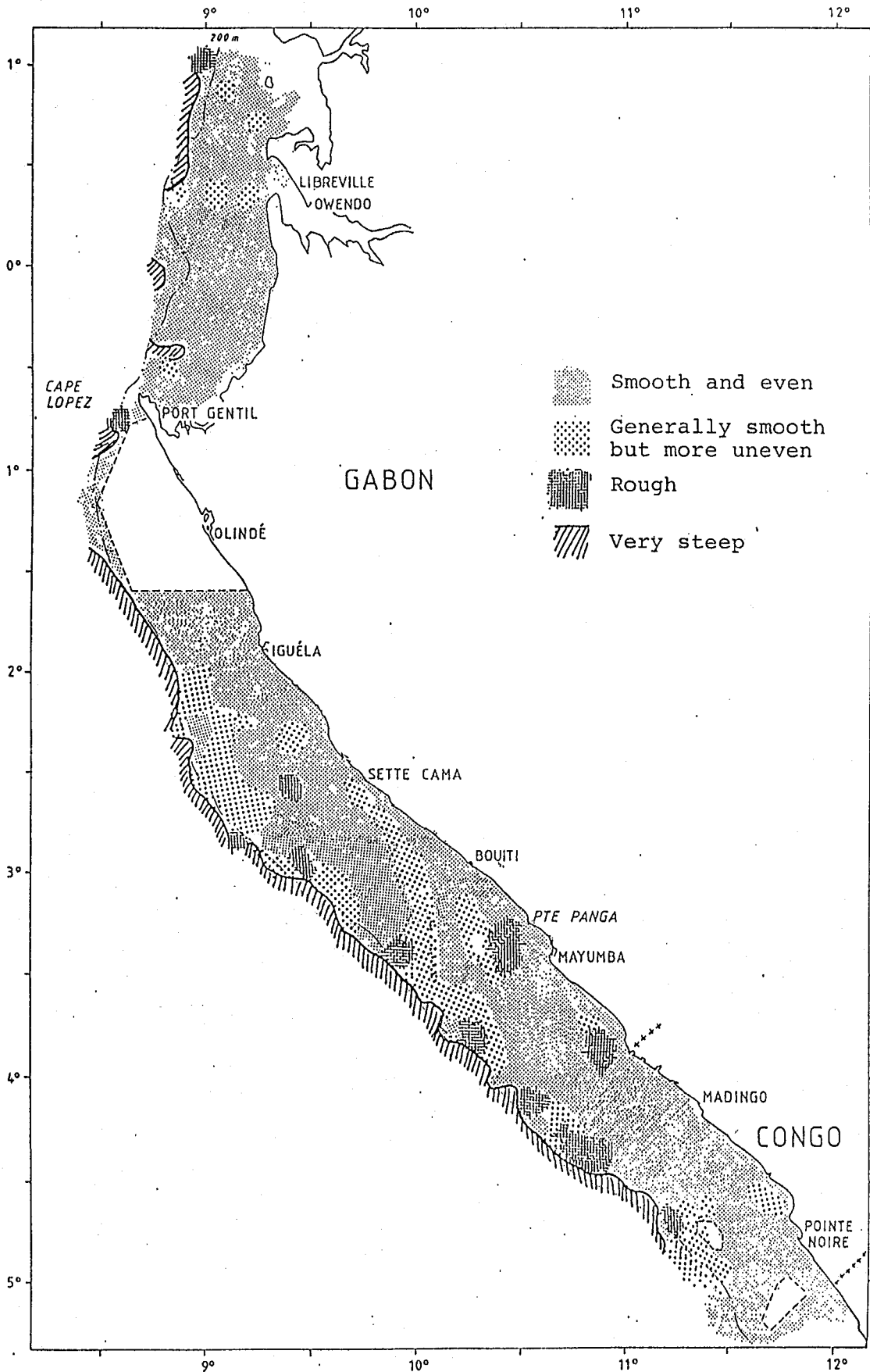


Figure 3. Bottom types.

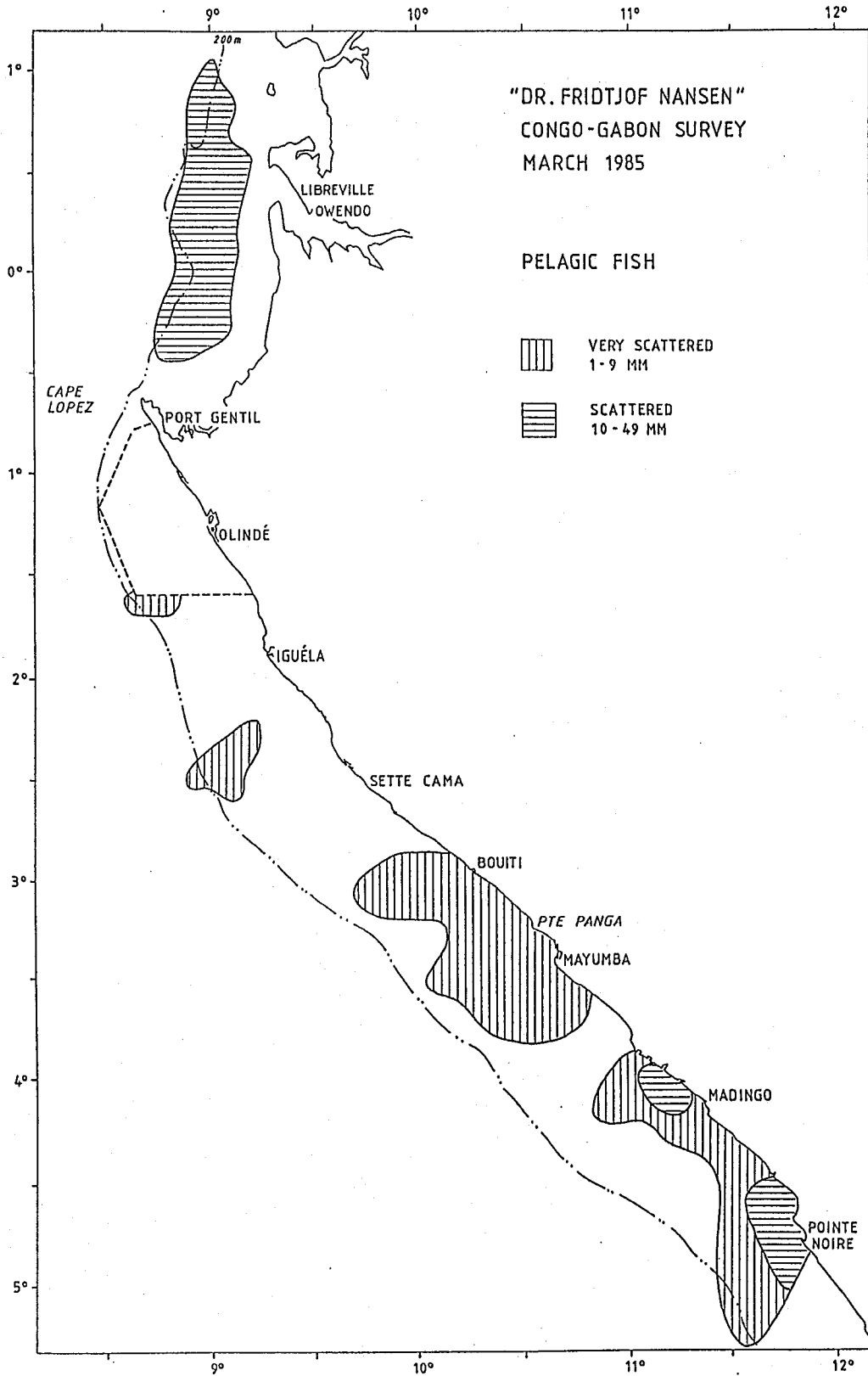


Figure 4. The distribution of small pelagic fish.

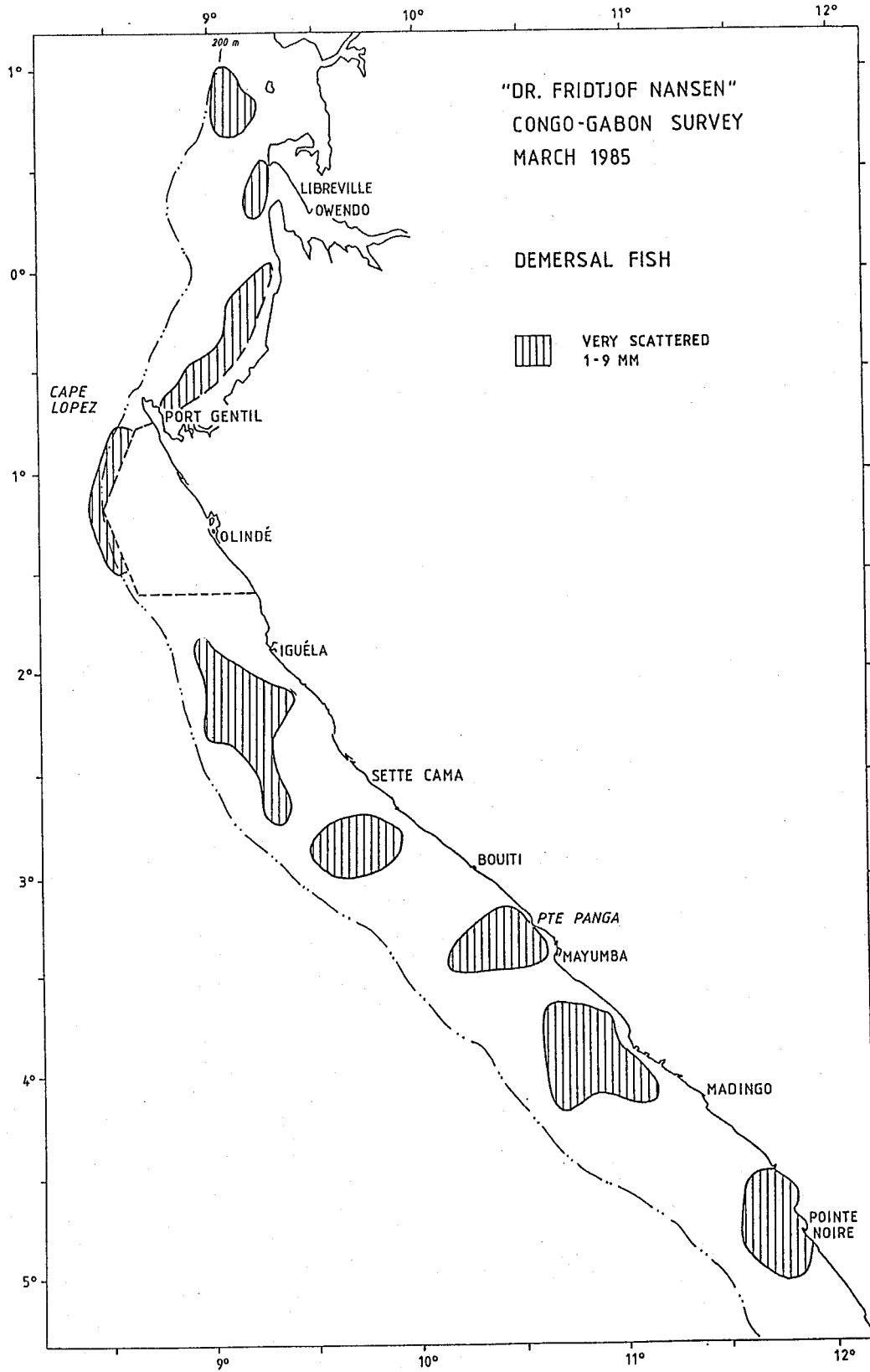


Figure 5. The distribution of demersal fish from acoustic registrations.

APPENDIX I

INSTRUMENTS AND FISHING GEAR USED

Acoustic instruments:

Two Simrad echosounders EK 400, 38 and 120 kHz were used during the survey for estimation of fish density.

Instrument settings:

	EK 400/38	EK 400/120
Range	0-100+100	0-100
Transmitter	High(5 kW nom.)	High(1.25 kW nom)
Bandwidth	3.3 kHz	3.3 kHz
Pulse length	1 ms	1 ms
TVG	20 log R	20 log R
Attenuator	20 dB	0 dB
Recorder gain	7	5
Transducer	Ceramic (8 x8)	Ceramic (10 cm circ.)

EK 400/38 was coupled to the digital integrator QD and to analog integrator QM.

QD settings: Gain 30 dB, Threshold 10 mV.

QM settings: Gain 20 dB x 10, threshold 10
Gain 10 dB x 10, threshold 1

Sonar:

An ST-sonar was used to detect fish schools close to the surface. Recorder range 0-250m.

Calibration on standard target 3/2 -85:

EK 400/38 : SL + VR = 140.7 dB (Cu 60)

EK 400/120: SL + VR = 112.1 dB (Cu 30)

Instrument constant for biomass calculations : C =0.082 m /mm/nm

Hydrographic equipment

Temperature, salinity and oxygen content was sampled at standard depths with Nansen bottles. Oxygen was measured with the Winkler method and salinity determined with an inductive salinometer. Surface temperature was recorded at 4 m depth with a thermograph.

Fishing gear

Bottom trawl: High opening shrimp and fish trawl with rubber bobbins gear, headline 31m, headline height during trawling abt 6m.

Pelagic trawls: Type "Harstadtrawl", width abt 30 m, vertical opening 10-15 m; Type modified "Bastrawl", width abt 25m, vertical opening abt 25 m; all trawls with fine meshed inner lining in cod ends.

Contants applied for the bottom trawl survey:

Catchability coefficient	: Q = 1.0
Distance between wings of trawl during trawling	: 18.5 m

APPENDIX II: Record of fishing stations with dominant species.
 BT: Bottom trawl, PT: Pelagic trawl.

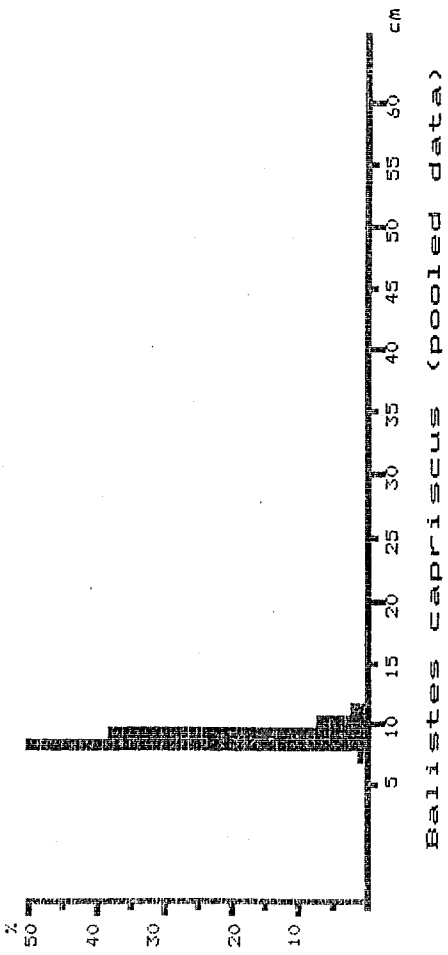
DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M)		POSITION		CATCH (KG)		DOMINANT SPECIES	WEIGHT (KG)	
				BOTTOM	GEAR	LATIT.	LONGIT.	TOTAL	PR HR		PR HR	%
03.03	0350	1	PT	13	5	504 32'	E011 39'	207,8	623,4	Chloroscombrus chrysurus Raja sp Sphyraena quachancho Ilisha africana	171,00 135,00 97,20 86,40	27,4 21,6 15,5 13,8
03.03	0737	2	BT	33	33	504 30'	E011 29'	237,1	474,2	Brachydeuterus auritus Ilisha africana Sphyraena quachancho Chloroscombrus chrysurus	180,80 65,60 52,80 40,00	38,1 13,8 11,1 8,4
03.03	1012	3	BT	74	74	504 36'	E011 22'	31,8	63,6	Brachydeuterus auritus Pentheroscion mbizi Trachurus trecae Dentex angolensis	44,00 10,20 4,00 2,10	69,1 16,0 6,2 3,3
03.03	1537	4	BT	91	91	504 27'	E011 10'	22,4	44,8	Brachydeuterus auritus Epinephelus aeneus Dentex canariensis Illex coindetii	20,00 9,20 5,00 3,80	44,6 20,5 11,1 8,4
03.03	1803	5	BT	30	30	504 21'	E011 22'	135,8	904,4	Pseudotolithus typus Pseudotolithus senegalensis Pteroscion peli Galeoides decadactylus	338,99 135,19 81,91 79,25	37,4 14,9 9,0 8,7
04.03	0155	6	PT	21	2	504 05'	E011 09'	102,1	204,2	Lutjanus agennes Ilisha africana Sardinella maderensis Sphyraena quachancho	70,60 56,00 20,20 17,20	34,5 27,4 9,8 8,4
04.03	0710	7	BT	102	102	504 13'	E010 49'	19,6	78,4	Dentex angolensis Ariomma bondi Umbrina canariensis Dentex canariensis	19,40 17,20 14,00 10,80	24,7 21,9 17,8 13,7
04.03	1105	8	BT	91	91	504 04'	E010 45'	20,3	40,6	Brachydeuterus auritus Trachurus trecae Dentex angolensis Decapterus rhonchus	24,00 4,80 3,40 1,80	59,1 11,8 8,3 4,4
04.03	1442	9	BT	26	26	503 44'	E010 51'	203,4	406,8	Pomadasys jubelini Sparus caeruleostictus Dentex canariensis Epinephelus aeneus	96,80 73,80 51,20 32,00	23,7 18,1 12,5 7,8
04.03	1700	10	BT	50	50	503 53'	E010 45'	36,4	72,8	Epinephelus aeneus Sphyraena sphyraena Brachydeuterus auritus Sphyraena quachancho	22,40 15,60 14,20 7,60	30,7 21,4 19,5 10,4

DATE	TIME	STN No.	GEAR TYPE	DEPTH (M)		POSITION		CATCH (KG)		DOMINANT SPECIES	WEIGHT (KG)	
	START			BOTTOM	GEAR	LATIT.	LONGIT.	TOTAL	PR HR		PR HR	%
04.03	1850	11	BT	92	92	S03 57'	E010 37'	254,4	508,8	Trachurus trecae Chelidonichthys gabonensis Brachydeuterus auritus Dentex angolensis	440,00 12,80 12,00 9,60	86,4 2,5 2,3 1,8
05.03	0855	12	BT	18	18	S03 23'	E010 33'	6,2	12,4	Alectis alexandrinus Caranx crysos Sepia officinalis hierredda Decapterus punctatus	5,70 4,10 1,80 ,70	45,9 33,0 14,5 5,6
05.03	1055	13	BT	6	6	S03 13'	E010 30'	195,5	391,0	Sphyraena guachancho Ilisha africana Chloroscombrus chrysurus Brachydeuterus auritus	132,00 80,20 79,80 44,40	33,7 20,5 20,4 11,3
05.03	1450	14	BT	63	63	S03 26'	E010 14'	17,8	35,6	Decapterus punctatus Epinephelus aeneus Pagellus bellottii Sardinella aurita	19,20 6,60 4,20 3,20	53,9 18,5 11,7 8,9
06.03	0820	15	BT	15	15	S02 51'	E009 59'	3,4	29,1	Dentex canariensis Sparus caeruleostictus Drepane africana	14,14 9,85 4,28	48,5 33,8 14,7
06.03	1017	16	BT	39	39	S02 53'	E009 50'	20,0	40,0	Pagellus bellottii Epinephelus aeneus Dentex canariensis Decapterus punctatus	30,40 4,80 1,70 1,50	76,0 12,0 4,2 3,7
06.03	1542	17	BT	81	81	S02 53'	E009 34'	363,5	727,0	Dentex gibbosus Dentex canariensis Epinephelus aeneus Sparus caeruleostictus	188,60 176,00 146,00 88,40	25,9 24,2 20,0 12,1
07.03	0750	18	BT	122	122	S02 28'	E008 59'	575,4	1150,8	Spicara alta Roops boops Ariomma bondi Trachurus trecae	590,00 240,00 124,00 94,00	51,2 20,8 10,7 8,1
07.03	1035	19	BT	50	50	S02 18'	E009 11'	481,3	962,6	Dentex canariensis Sparus caeruleostictus Lutjanus fulgens Epinephelus aeneus Sparus auriga	207,60 197,60 164,80 135,40 180,00	21,5 20,5 17,1 14,0 18,6
07.03	1240	20	BT	26	26	S02 12'	E009 19'	16,5	33,0	Alectis alexandrinus Pagellus bellottii Ephippion guttifer Decapterus punctatus	12,60 7,40 5,20 4,40	38,1 22,4 15,7 13,3

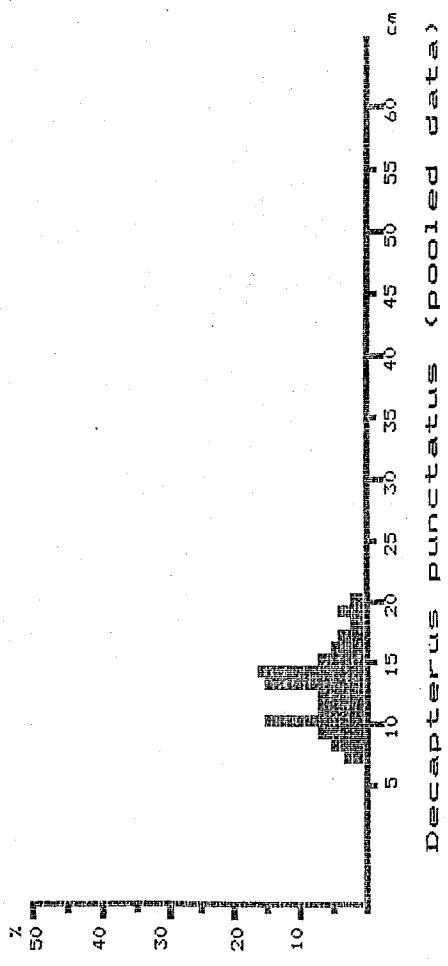
DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M)		POSITION		CATCH (KG)		DOMINANT SPECIES	WEIGHT (KG)	
				BOTTOM	GEAR	LATIT.	LONGIT.	TOTAL	PR HR		PR HR	%
07.03	1438	21	BT	13	13	S02 02'	E009 19'	13,4	67,0	<i>Alectis alexandrinus</i> <i>Drepane africana</i> <i>Scomberomorus tritor</i> <i>Chaetodipterus goreensis</i>	44,00 17,00 5,00 1,00	65,6 25,3 7,4 1,4
07.03	1655	22	BT	44	44	S02 09'	E009 10'	8,1	16,2	<i>Pagellus bellottii</i> <i>Decapterus punctatus</i> <i>Fistularia petimba</i> <i>Zeus faber</i>	10,20 5,40 ,30 ,30	62,9 33,3 1,8 1,8
08.03	0915	23	BT	121	121	S01 21'	E008 30'	131,9	263,8	<i>Ariomma bondi</i> <i>Spicara alta</i> <i>Dentex congoensis</i> <i>Epinephelus aeneus</i>	141,60 41,60 32,80 16,60	53,6 15,7 12,4 6,2
08.03	1240	24	BT	44	44	S00 56'	E008 32'	1,2	2,4	<i>Pagellus bellottii</i> <i>Fistularia petimba</i> <i>Lagocephalus laevigatus</i> <i>Chelidonichthys gabonensis</i> LOLIGINIDAE	1,00 ,40 ,40 ,30 ,30	41,6 16,6 16,6 12,5 12,5
08.03	1703	25	BT	95	95	S00 33'	E008 44'	11,0	66,0	<i>Ariomma bondi</i> <i>Dentex canariensis</i> <i>Illex coindetii</i>	34,80 28,20 3,00	52,7 42,7 4,5
08.03	1815	26	BT	62	62	S00 34'	E008 49'	23,4	46,8	<i>Trachurus trecae</i> <i>Epinephelus aeneus</i> <i>Sphyraena sphyraena</i> <i>Priacanthus arenatus</i>	10,90 8,70 5,20 4,20	23,2 18,5 11,1 8,9
10.03	0935	27	BT	16	16	S00 32'	E008 56'	7,0	14,0	<i>Alectis alexandrinus</i> <i>Sparus caeruleostictus</i> <i>Psettodes belcheri</i> <i>Selene dorsalis</i>	7,80 2,70 1,70 1,60	55,7 19,2 12,1 11,4
10.03	1134	28	BT	25	25	S00 26'	E008 55'	15,4	30,8	<i>Pagellus bellottii</i> <i>Balistes capriscus</i> <i>Sparus caeruleostictus</i> <i>Decapterus punctatus</i>	21,20 4,40 1,30 1,00	68,8 14,2 4,2 3,2
10.03	1335	29	BT	145	145	S00 22'	E008 49'	115,8	231,6	<i>Ariomma bondi</i> <i>Spicara alta</i> <i>Dentex angolensis</i> <i>Trachurus trecae</i>	142,40 64,00 13,60 8,00	61,4 27,6 5,8 3,4
10.03	1620	30	BT	132	132	S00 14'	E008 52'	132,3	264,6	<i>Priacanthus arenatus</i> <i>Ariomma bondi</i> <i>Spicara alta</i> <i>Dentex angolensis</i>	125,00 67,00 24,50 17,50	47,2 25,3 9,2 6,6

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M)		POSITION		CATCH (KG)		DOMINANT SPECIES	WEIGHT (KG)	
				BOTTOM	GEAR	LATIT.	LONGIT.	TOTAL	PR HR		PR HR	%
10.03	1755	31	BT	66	10	S00	15' E008 56'	69,3	138,6	Balistes capriscus	138,60	100,0
11.03	0704	32	BT	16	16	N00	06' E009 17'	42,7	85,4	Alectis alexandrinus Scomberomorus tritor Sparus caeruleostictus Sphyraena guachancho	62,00 7,80 4,30 2,40	72,5 9,1 5,0 2,8
11.03	0900	33	BT	25	25	N00	09' E009 14'	4,2	8,4	Alectis alexandrinus Arius heudeloti Selene dorsalis Chloroscombrus chrysurus	3,10 1,60 ,80 ,70	36,9 19,0 9,5 8,3
11.03	1050	34	BT	47	47	N00	09' E009 06'	43,2	86,4	Priacanthus arenatus Dentex congoensis Pagellus bellottii Sparus caeruleostictus	37,00 18,00 13,40 4,80	42,8 20,8 15,5 5,5
11.03	1240	35	BT	70	70	N00	10' E008 56'	251,0	502,0	Dentex congoensis Priacanthus arenatus Trachurus trecae Ariomma bondi	240,00 134,00 70,00 22,00	47,8 26,6 13,9 4,3
11.03	1635	36	BT	63	63	N00	18' E008 59'	128,5	257,0	Dentex congoensis Epinephelus aeneus Dentex canariensis Trachurus trecae	117,60 56,80 42,00 10,80	45,7 22,1 16,3 4,2
11.03	2155	37	PT	52	18	N00	30' E009 02'	46,4	92,8	Balistes capriscus Lutjanus agennes Saurida brasiliensis	65,20 18,80 6,00	70,2 20,2 6,4
11.03	2355	38	PT	59	44	N00	29' E008 59'	30,8	141,9	Balistes capriscus Ariomma bondi	138,30 1,61	97,4 1,1
12.03	0707	39	BT	39	39	N00	41' E009 06'	533,2	1066,4	Lutjanus fulgens Lutjanus agennes Sparus caeruleostictus Dentex canariensis	628,00 259,60 89,60 31,00	58,8 24,3 8,4 2,9
12.03	0905	40	BT	18	18	N00	48' E009 14'	18,5	37,0	Ehippion guttifer Sparus caeruleostictus Sphyraena guachancho Alectis alexandrinus	13,20 11,20 10,40 1,40	35,6 30,2 28,1 3,7
12.03	1058	41	BT	43	43	N00	50' E009 09'	56,4	112,8	Sparus caeruleostictus Epinephelus aeneus Selene dorsalis Epinephelus quaza	64,20 22,00 9,00 6,80	56,9 19,5 7,9 6,0

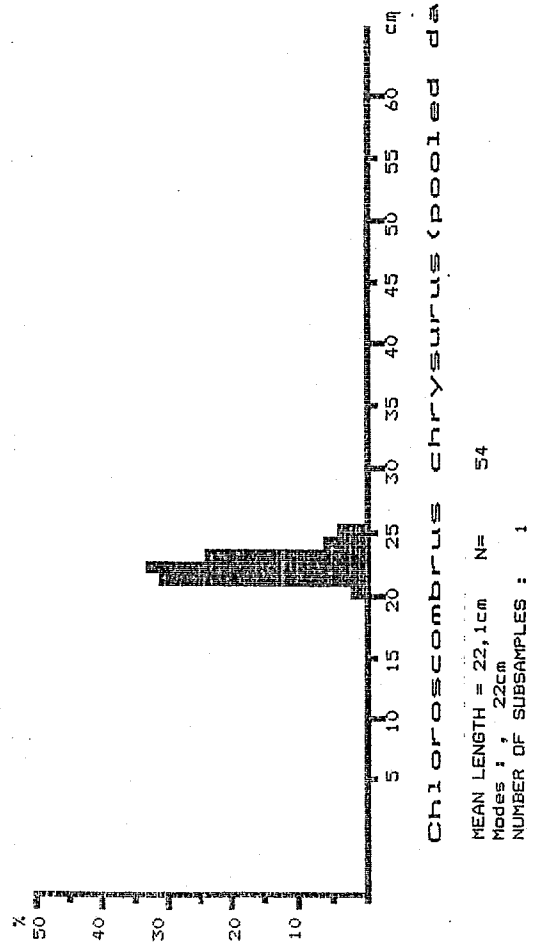
DATE	TIME	STN	GEAR	DEPTH (M)	POSITION		CATCH (KG)		WEIGHT (KG)			
					LATIT.	LONGIT.	TOTAL	PR HR	PR HR	%		
12.03	1430	42	BT	54	54	N00 56'	E009 05'	72,5	145,0	Priacanthus arenatus	99,00	68,2
										Decapterus punctatus	16,20	11,1
										Dentex angolensis	12,00	8,2
										Pagellus bellottii	4,80	3,3
12.03	1617	43	BT	27	27	N00 56'	E009 14'	13,6	27,2	Epinephelus aeneus	7,80	28,6
										Alectis alexandrinus	6,60	24,2
										Selene dorsalis	5,40	19,8
										Ephippion guttifer	3,40	12,5



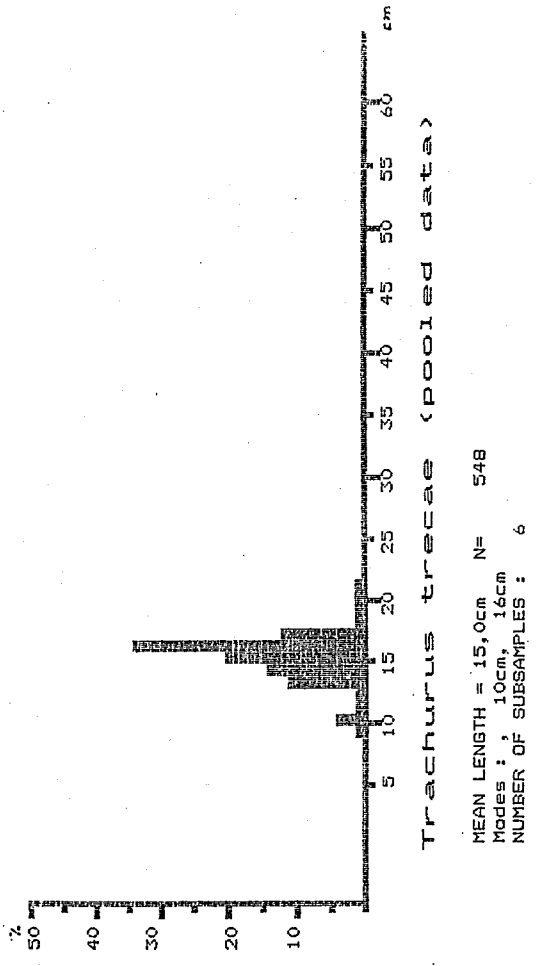
MEAN LENGTH = 8,5cm N= 125
 Modes : 8cm
 NUMBER OF SUBSAMPLES : 2



MEAN LENGTH = 12,6cm N= 531
 Modes : 10cm, 14cm, 19cm
 NUMBER OF SUBSAMPLES : 7

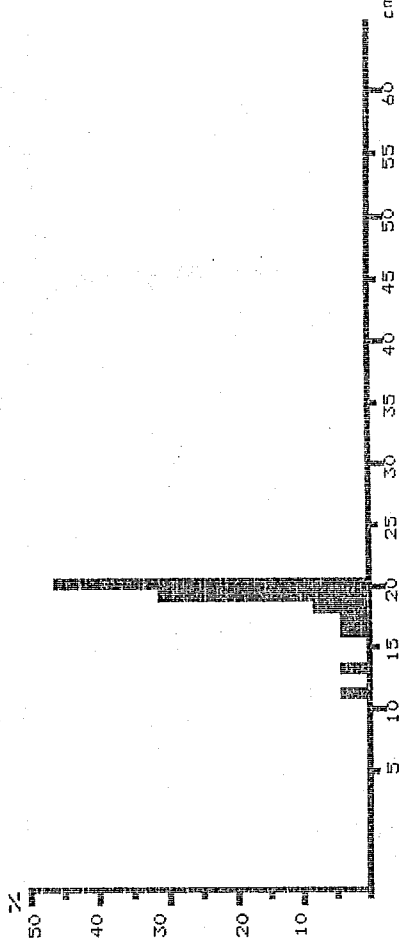


MEAN LENGTH = 22,1cm N= 54
 Modes : 22cm
 NUMBER OF SUBSAMPLES : 1



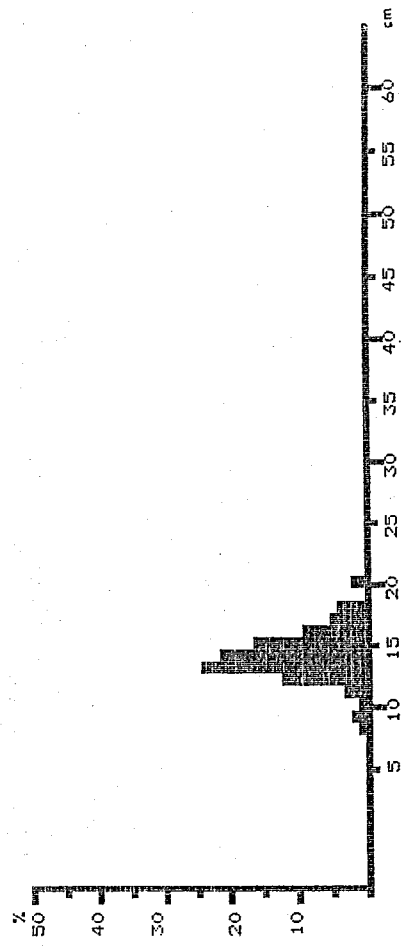
MEAN LENGTH = 15,0cm N= 548
 Modes : 10cm, 16cm
 NUMBER OF SUBSAMPLES : 6

APPENDIX III - Pooled length distributions of the most common species. All length samples contributing to the pool are unweighted.



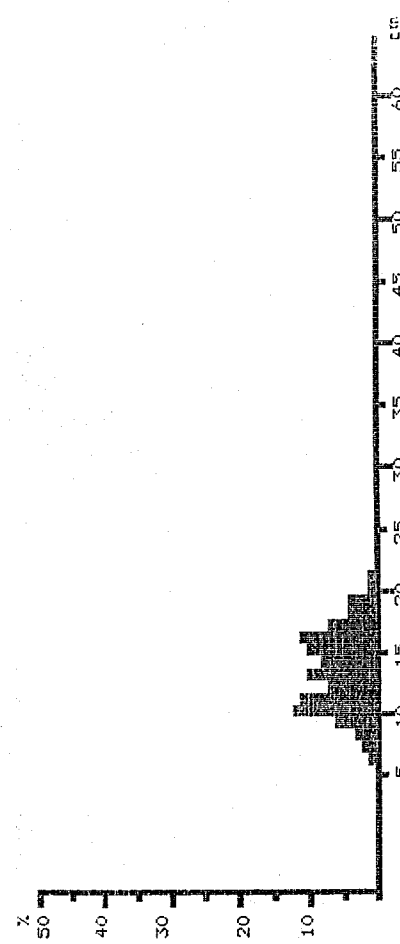
Sardineella aurita (pooled data)

MEAN LENGTH = 18.6cm N= 26
 Modes : 11cm, 13cm, 20cm
 NUMBER OF SUBSAMPLES : 1



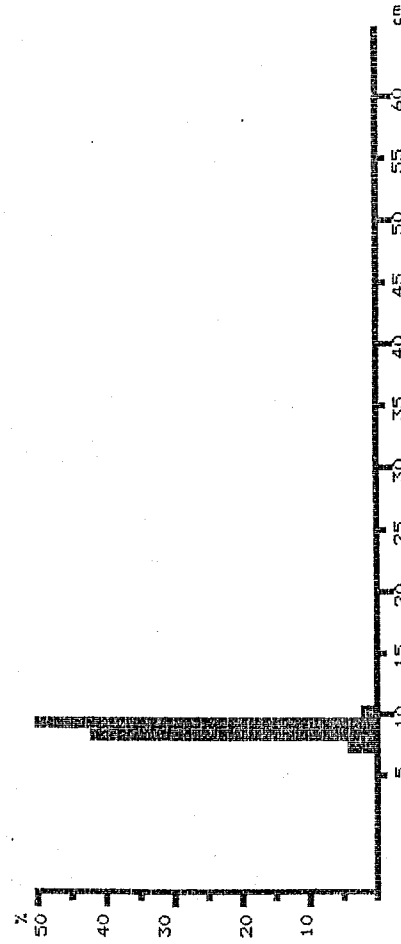
Brachydeuterus auritus (pooled data)

MEAN LENGTH = 14.0cm N= 182
 Modes : 9cm, 13cm, 20cm
 NUMBER OF SUBSAMPLES : 2



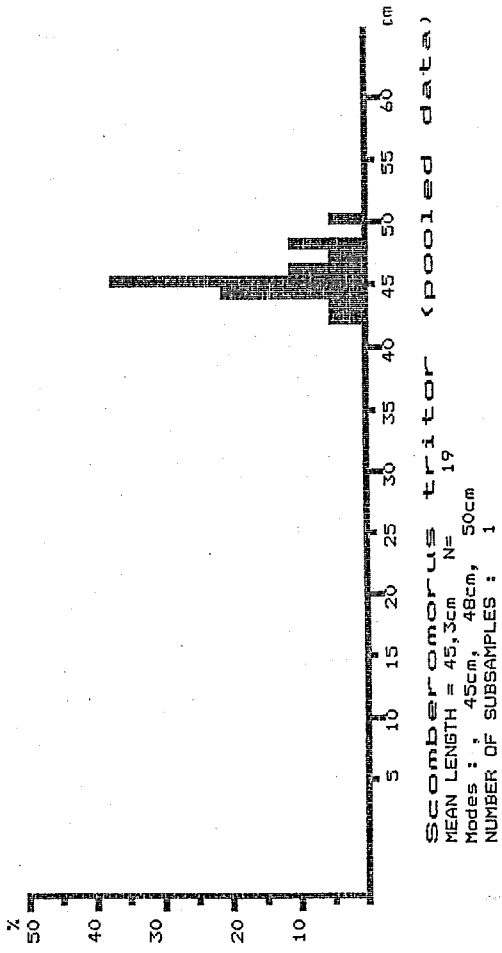
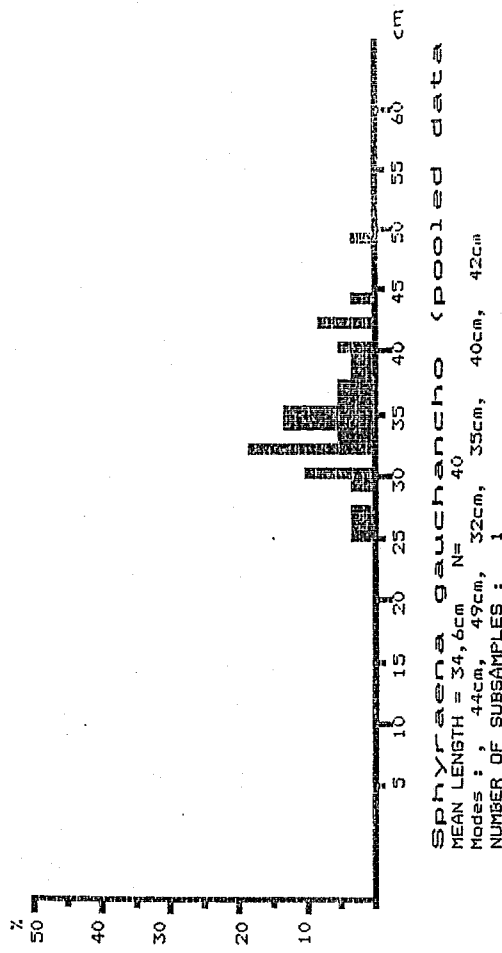
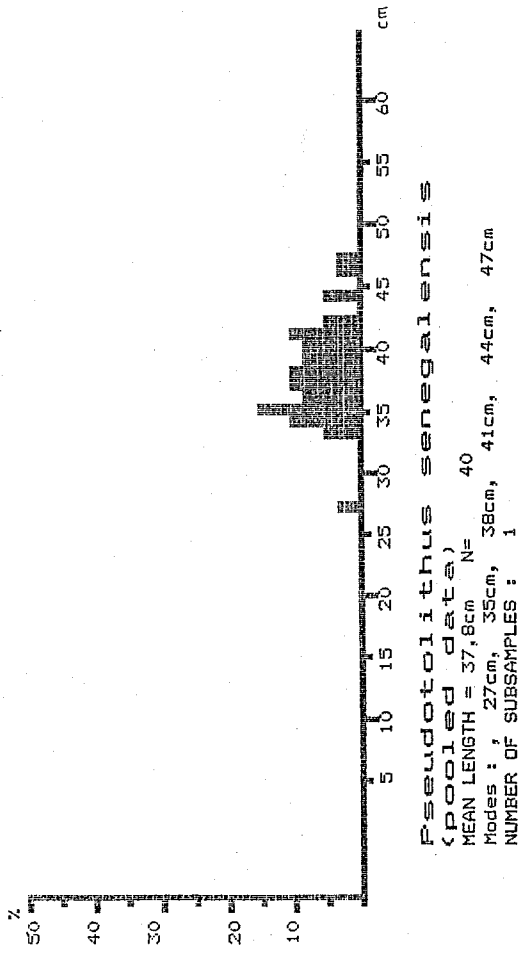
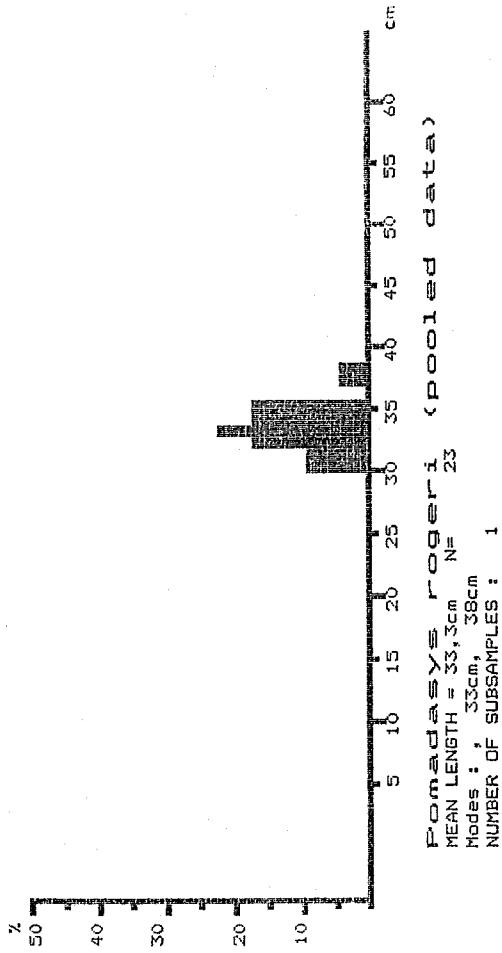
Ilisha africana (pooled data)

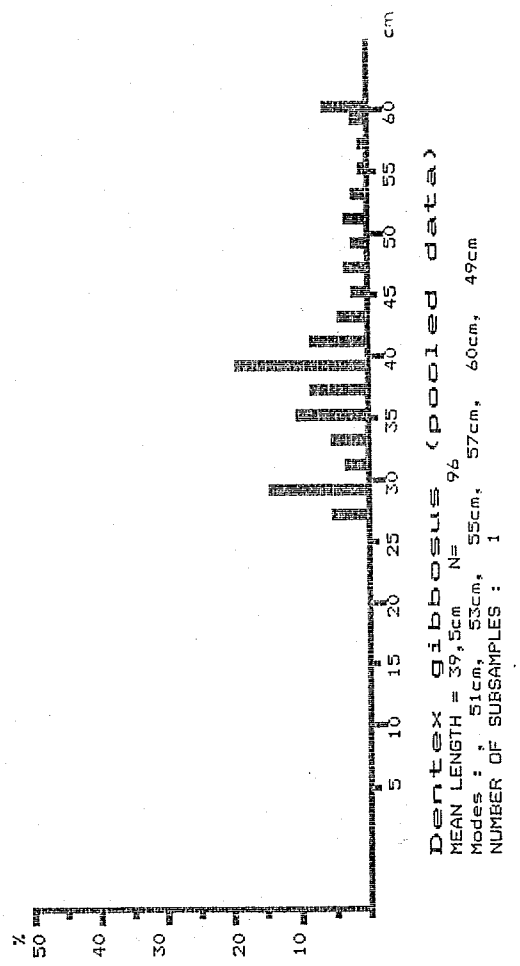
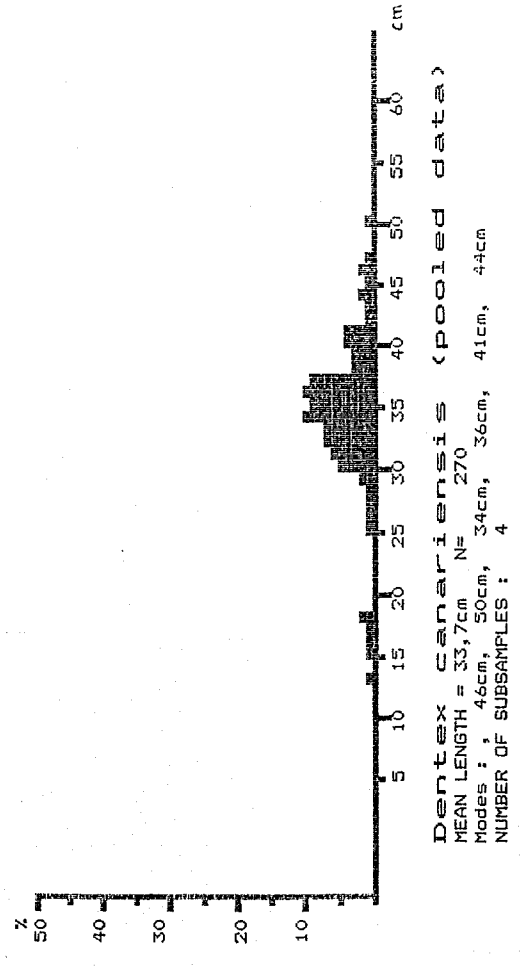
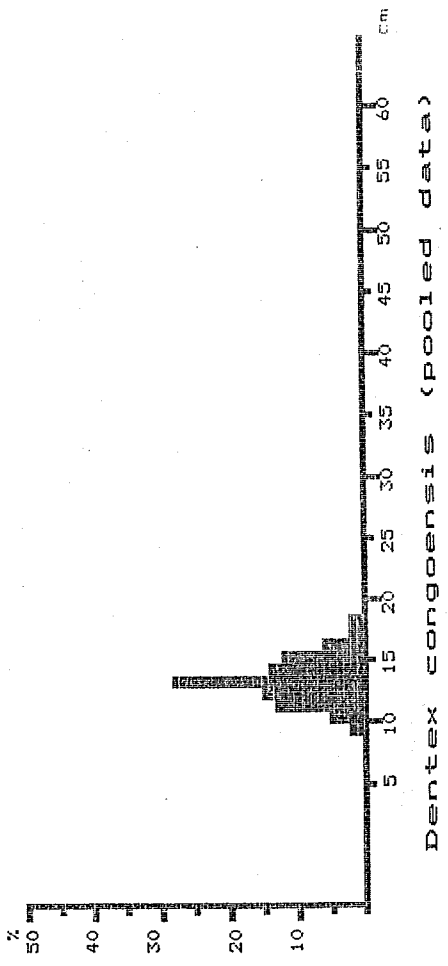
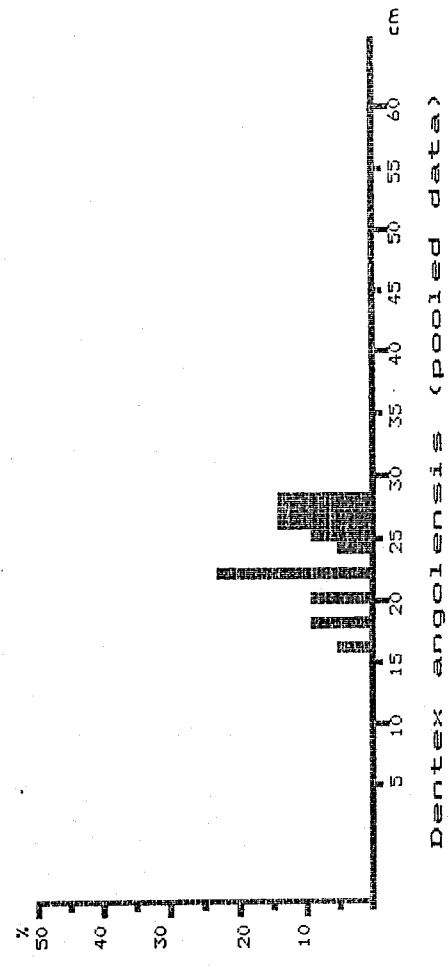
MEAN LENGTH = 13.3cm N= 406
 Modes : 10cm, 13cm, 16cm
 NUMBER OF SUBSAMPLES : 3

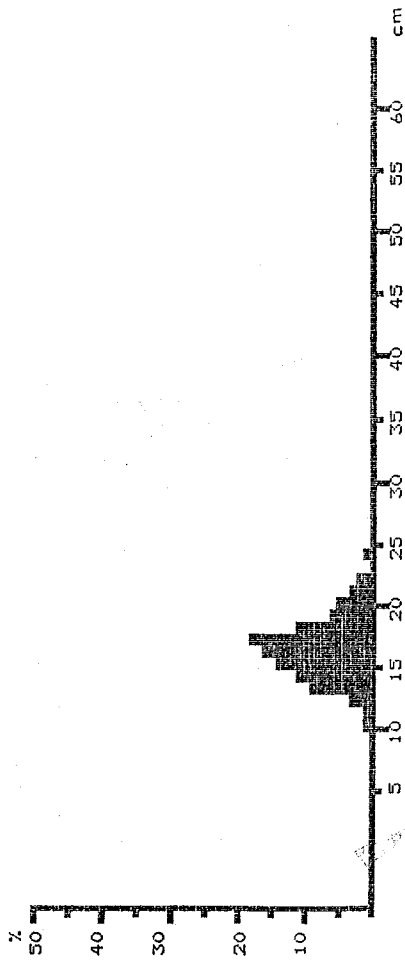


Sardineella maderensis (pooled data)

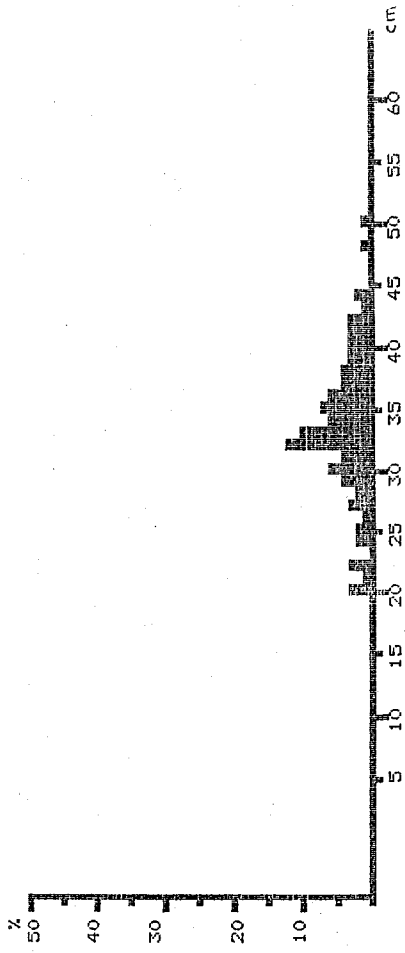
MEAN LENGTH = 8.5cm N= 100
 Modes : 9cm
 NUMBER OF SUBSAMPLES : 1







Pagellus bellotti (pooled data)
 MEAN LENGTH = 16.2cm N= 427
 Modes : 17cm, 24cm
 NUMBER OF SUBSAMPLES : 4



Sparus caeruleostictus (pooled data)
 MEAN LENGTH = 33.2cm N= 305
 Modes : 35cm, 44cm, 48cm, 50cm, 30cm, 32cm
 NUMBER OF SUBSAMPLES : 5