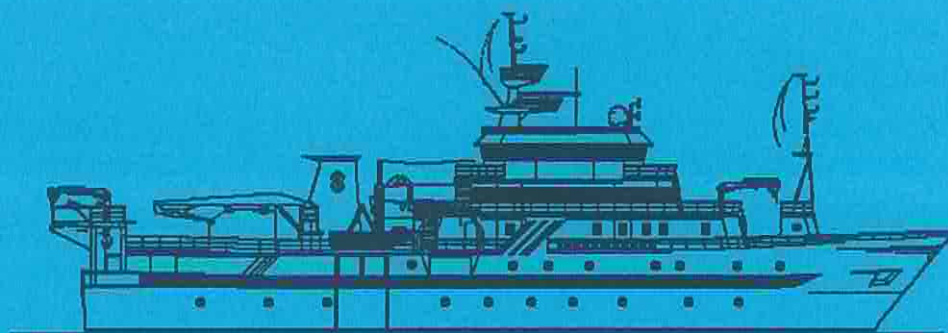


NORAD - FAO/UNDP PROJECT GLO 92/013

CRUISE REPORTS "DR. FRIDTJOF NANSEN"



SURVEYS OF THE FISH RESOURCES OF ANGOLA

Preliminary Report Cruise No 1/94

21 February - 16 March 1994

**Institute of Marine Research
IMR, Bergen**

**Institute of Fisheries Research
IIP, Luanda**

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CHAPTER 1 INTRODUCTION

1.1 OBJECTIVES

The main objectives of the survey were to map the distribution and estimate the abundance of small pelagic fish in the region Cabinda-Benguela, including:

- * sardinella
- * Cunene horse mackerel
- * other pelagic fishes

In addition, the shelf between Tombua and Benguela would be covered as part of a joint survey with Namibia to assess the sardine stock.

Other objectives included mapping the overall hydrographic regime by using a CTD-sonde on stations distributed all over the survey area and to monitor the temperature, salt and oxygen regimes on the IIP standard profiles for hydrographical studies.

On-the-job training, particularly on the utilization of the acoustic system for stock assessment purposes and general methodology in oceanographic research, would be carried out, on a daily basis, for Angolan participants. This aspect is emphasized in this new phase of the 'Dr. Fridtjof Nansen' programme, that aims, besides the basic resource investigations, to increase national competence in fishery and oceanographic research.

1.2 PARTICIPATION

The scientific staff consisted of:

From IIP, Luanda:

António Fontes Pereira, N'Kossi Luyeye, Fernando Gombo (from 27/2), Anizabel P. Teixeira (from 27/2), Quilanda Fidel (from 27/2), Enoque G. Vasco (from 27/2).

From IMR, Bergen:

Tore Strømme (to 27/2), Reidar Toresen (from 27/2), Tor Gammelsrød (from 27/2), Oddgeir Alvheim, Terje Haugland and Martin Dahl.

1.3 NARRATIVE

The survey started at Cunene when the vessel entered Angolan waters from the south. At first, the area from Cunene to Tombua was surveyed with systematic parallel transects approximately 5 nautical miles apart, from the shore to the 100 m isobath. Baia dos Tigres was also surveyed. The acoustic survey was temporarily ended off Tombua for a call in Luanda, from 23 to 27 February. The vessel left Luanda and steamed south to Benguela where the survey was resumed by systematic triangular transects, from shore to the 200 m isobath, the endpoints of the transects being approximately 10 naut.miles apart. In areas where pelagic fish aggregations were recorded, surveying was conducted both during day- and nighttime. In the area from Benguela to Luanda, pelagic fish were recorded more or less continuously and this area was therefore surveyed more thoroughly. A few additional areas with very high recorded densities of sardinella were covered twice during daytime to ensure proper sampling both biologically, by trawling, and acoustically. In the area north of Luanda, between Ambriz and the Congo River, a 10 nautical mile wide zone along the coast was not covered for security reasons. The Cabinda region was only partially covered because of oil drilling activities.

1.4 SURVEY EFFORT

Fig. 1a-c shows the cruise track with fishing stations and the hydrographic profiles.

The number of hauls per area and depth interval, can be summarized as follows:

	Pelagic hauls	Bottom hauls	Distance surveyed
Cabinda-Luanda	20	6	1 380 nm
Luanda-Beng.	31	2	1 750 nm
Beng.-Cunene	3		360 nm

The total number of CTD stations were 93.

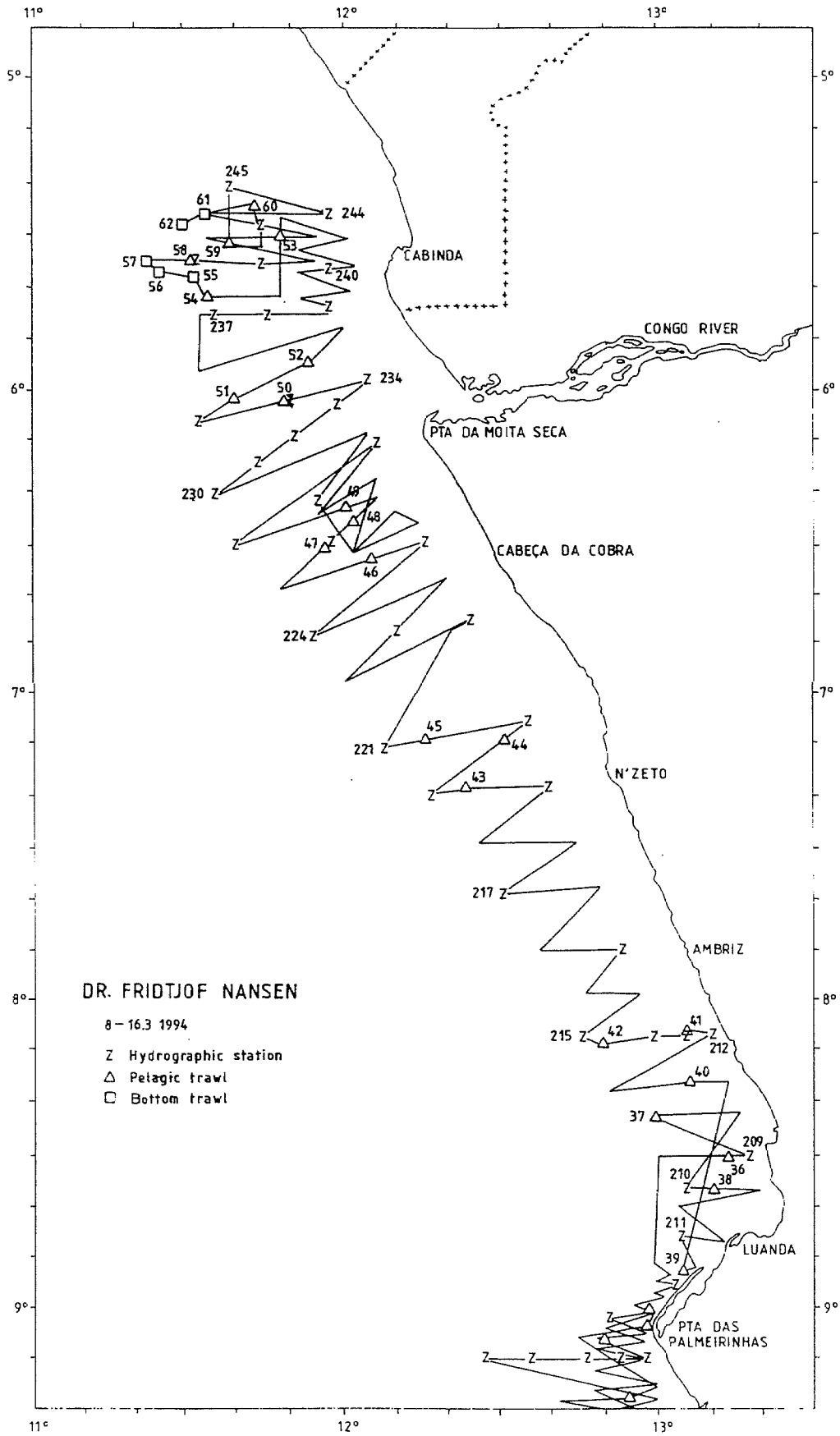


Figure 1a. Course tracks with fishing stations and hydrographic profiles, Cabinda-Luanda.

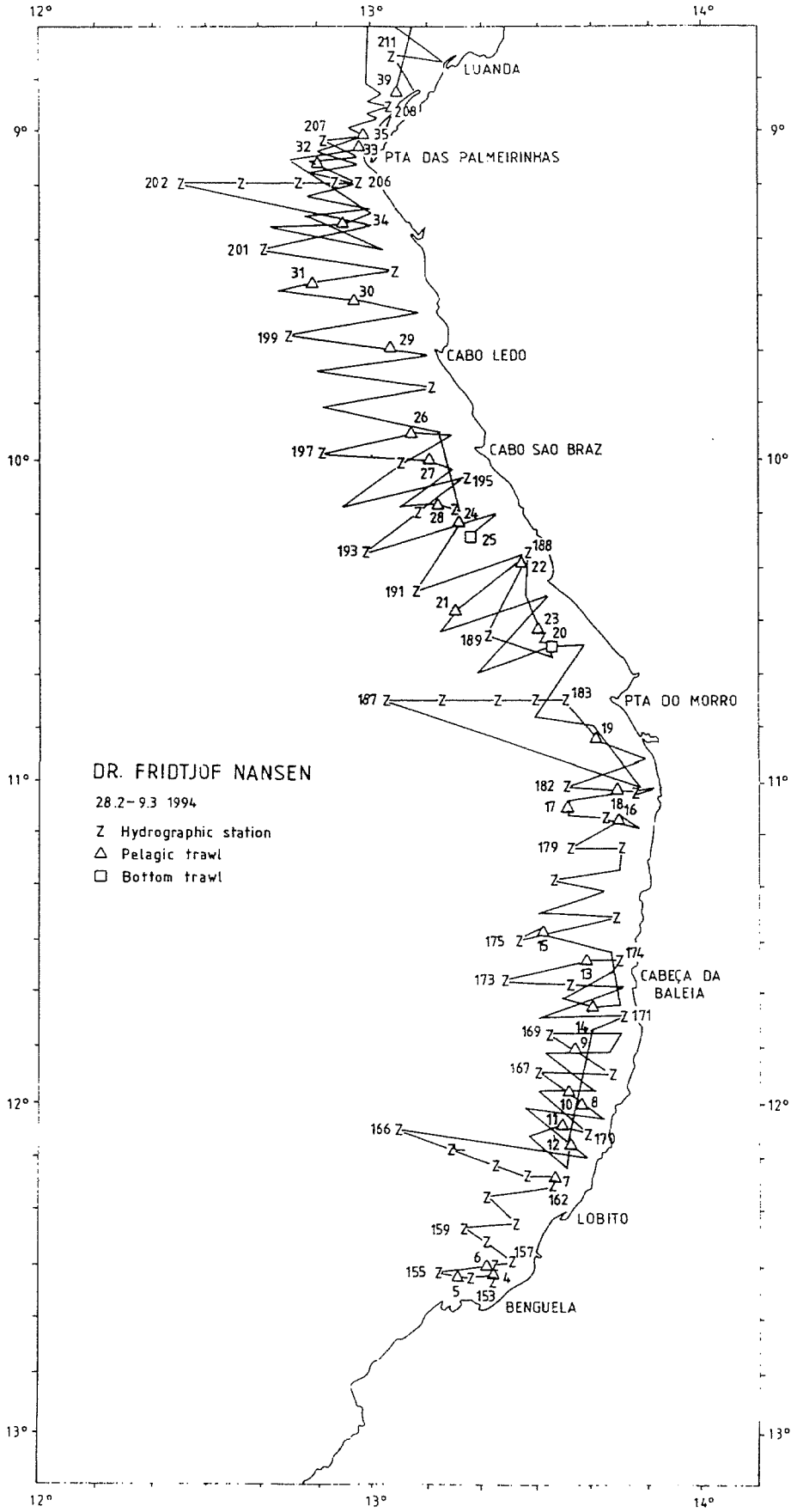


Figure 1b. Course tracks with fishing stations and hydrographic profiles, Luanda-Benguela.

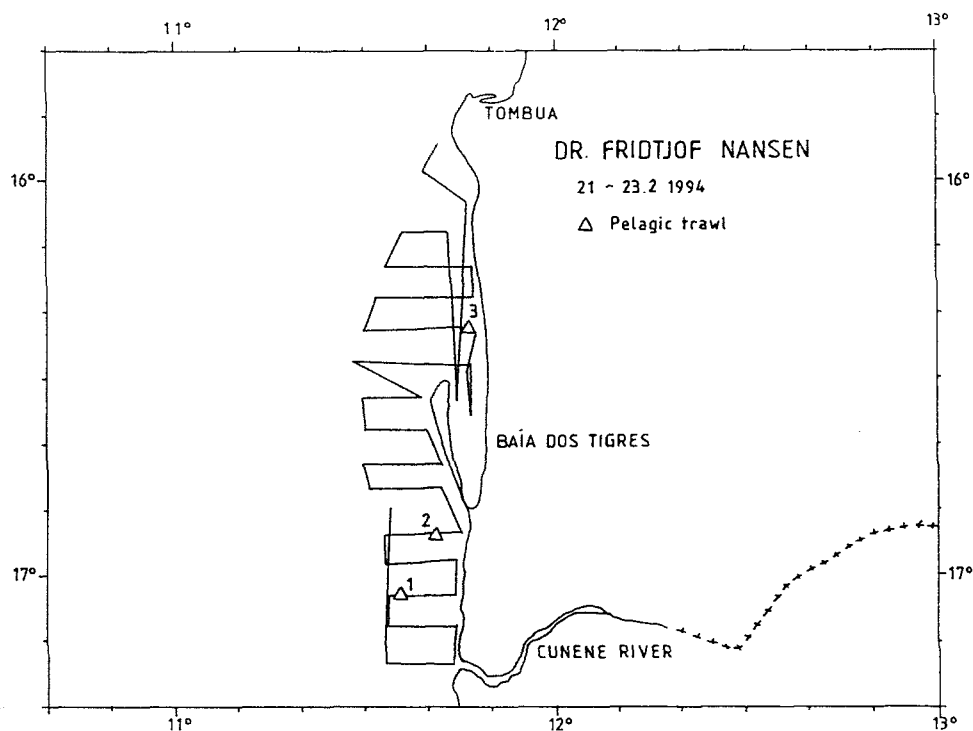


Figure 1c. Course tracks with fishing stations and hydrographic profiles, Tombua-Cunene.

1.5 METHODS

The catches were sampled for species composition, by weight and numbers. Biological samples, i.e length and weight compositions were taken for the target species. Records of fishing stations are presented in Annex I.

A description of the acoustic instruments and their standard settings are given in Annex II. This also includes a description of the fishing gear used.

The following target strength (TS) function was applied to convert S_A -values (mean integrator value for a given area) to number of fish (pilchard, sardinella and Cunene horse mackerel):

$$TS = 20 \log L - 72 \text{ dB} \quad (1)$$

or on the form $C_F = 1.26 \cdot 10^6 \cdot L^{-2}$ (2)

where L is total length and C_F is the fish conversion factor. The following formula was programmed into Excel (4.0) sheets to calculate the number of fish in length groups (cm) for each fish concentration:

$$N_i = A \cdot S_A \cdot \frac{p_i}{\sum_{i=1}^n \frac{p_i}{C_{Fi}}} \quad (3)$$

where

N_i = number of fish in length group i

A = area (naut.miles²) of fish concentration

S_A = mean integrator value in area (A)

p_i = proportion of fish in length group i in samples from the area

C_{Fi} = fish conversion factor for length group i

The number per length group (N_i) was then summed and the total number of fish obtained:

$$N = \sum_{i=1}^n N_i \quad (4)$$

The biomass of fish per length group (B_i) was calculated by applying observed mean weights per length group (W_i) multiplied by number of fish in the same length groups (N_i). The total biomass in each area was obtained by summing the biomass of each length group:

$$B = \sum_{i=0}^n N_i \bar{W}_i \quad (5)$$

The number and biomass per length group in each concentration were at last summed to obtain the total for each region.

The mean integrator values in each sampling unit (S_A -values) were divided between the following categories of fish on the basis of trawl catches and characteristics of the echo traces:

- sardinella (*S. aurita* and *S. maderensis*)
- sardine
- Cunene horse mackerel
- anchovies
- P2 (carangids, scombrids, barracudas and hairtails)
- *Brachydeuterus*
- other demersal fish
- plankton

CHAPTER 2 HYDROGRAPHY

2.1 INSTRUMENTS AND METHODS

Continuous profiles of temperature, salinity and oxygen were obtained with a Seabird 911 CTD Plus system. The data were logged in real time on a PC on board, using the Seabird SEASAVE software. As a routine the profiles were taken down to a few meters above the bottom. Two NISKIN bottles were triggered for water samples. These were usually taken near the bottom and near the surface (typically at 3m depth), and samples were taken for analysis of oxygen and salinity. The oxygen content was analyzed on board within a few days after the collection by the Winkler method.

Salinity calibrations could not be run on board because the salinometer was not functioning.

Results from the oxygen calibration are shown in Figure 2 after removing obvious outliers. It is a linear relationship between the Winkler titrated and the CTD results, indicating that the CTD values are too low. The oxygen values obtained with the CTD should be corrected according to the formula:

$$O_2 = O_{2CTD} * 1.193 + 0.189$$

When this formula was applied we obtained a standard error between titrated and CTD values of 0.17 using 241 accepted values. (NB!. The original CTD-data on .CNV files still have the 'old' values, i.e. these should be recalculated according to the formula above. One should also consider to change the calibration constants in the Seabird DATCNV program accordingly.)

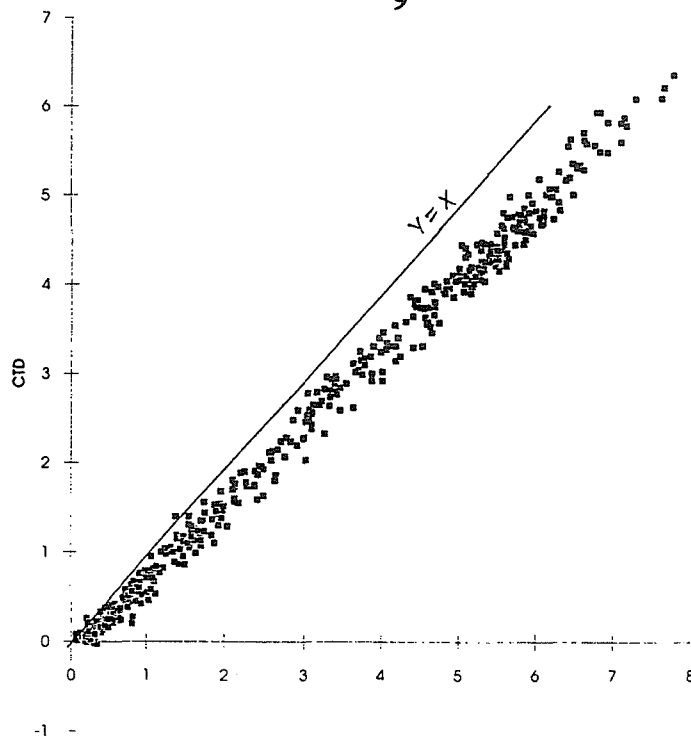


Figure 2 Comparison of oxygen obtained with the CTD versus the Winkler titrated values.

2.2 RESULTS

Horizontal distribution maps

The surface (5m depth) temperature distribution between Benguela and Luanda is shown in Fig. 3a and between Luanda and Cabinda in Fig. 3b. The corresponding salinity distribution is shown in Fig. 4a and 4b. The surface water is warm, according to the season, and the isotherms run more or less parallel to the coast, indicating that the north-south variation of the temperature is much less than the cross shelf variation. The near shore zone is the coldest, and at some places the difference is up to 5°C. This indicates that water mixing takes place in these zones, probably due to the presence of winds or to tidal currents.

The salinity variation (Fig.4) is a lot more confusing. As the density in the region is dominated by the temperature, the salinity may almost be regarded as a neutral tracer. The Congo River water is readily seen some distance from the shore and water below 35 psu may be observed as far south as Pta de Palmeirinhas. Just outside the Congo River mouth the low salinity water seems to split into two branches, one heading South-West, and the main branch heading North-West.

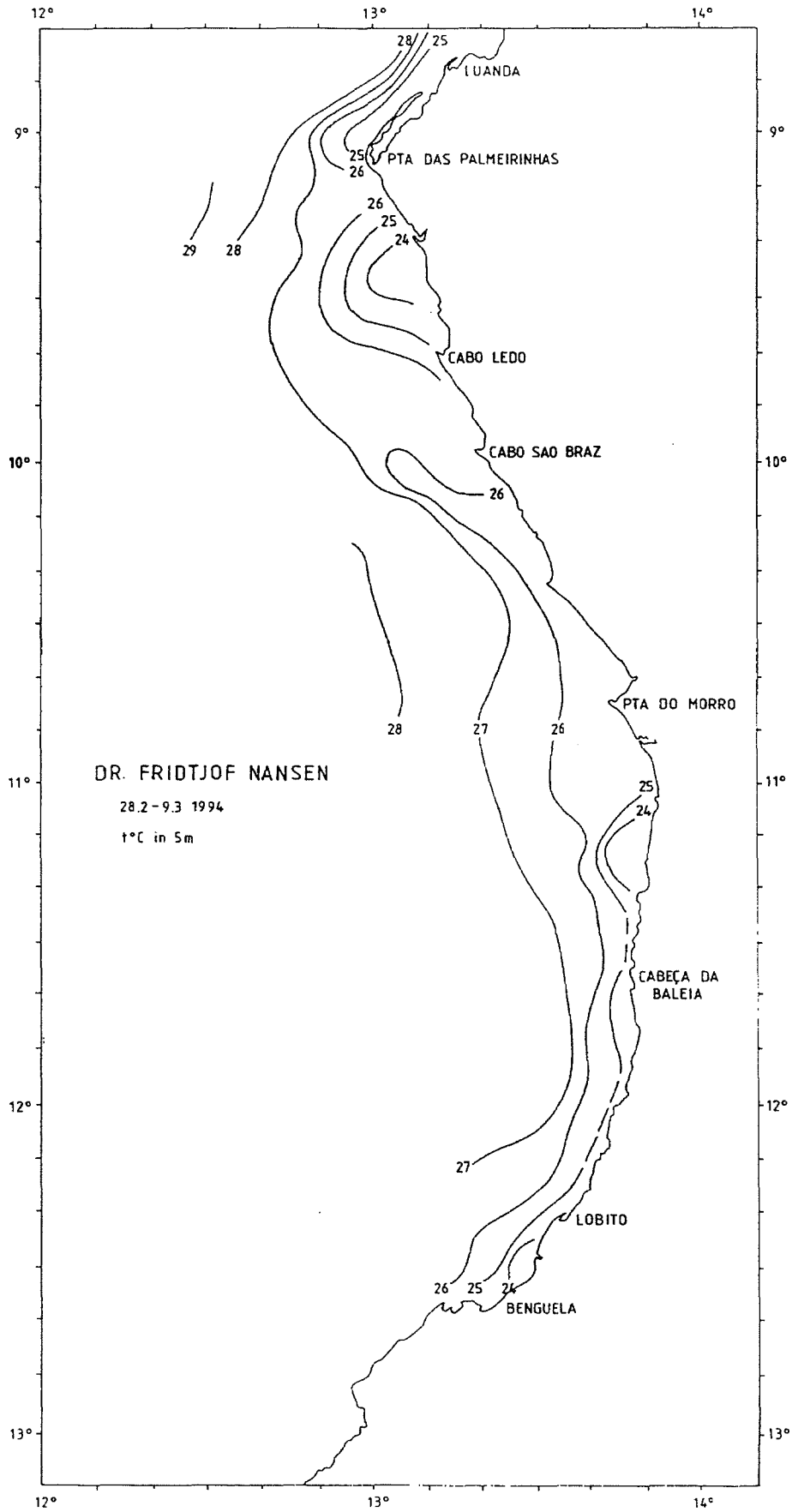


Figure 3 Horizontal distribution of temperature: a) Benguela-Luanda, and b) Luanda-Cabinda.

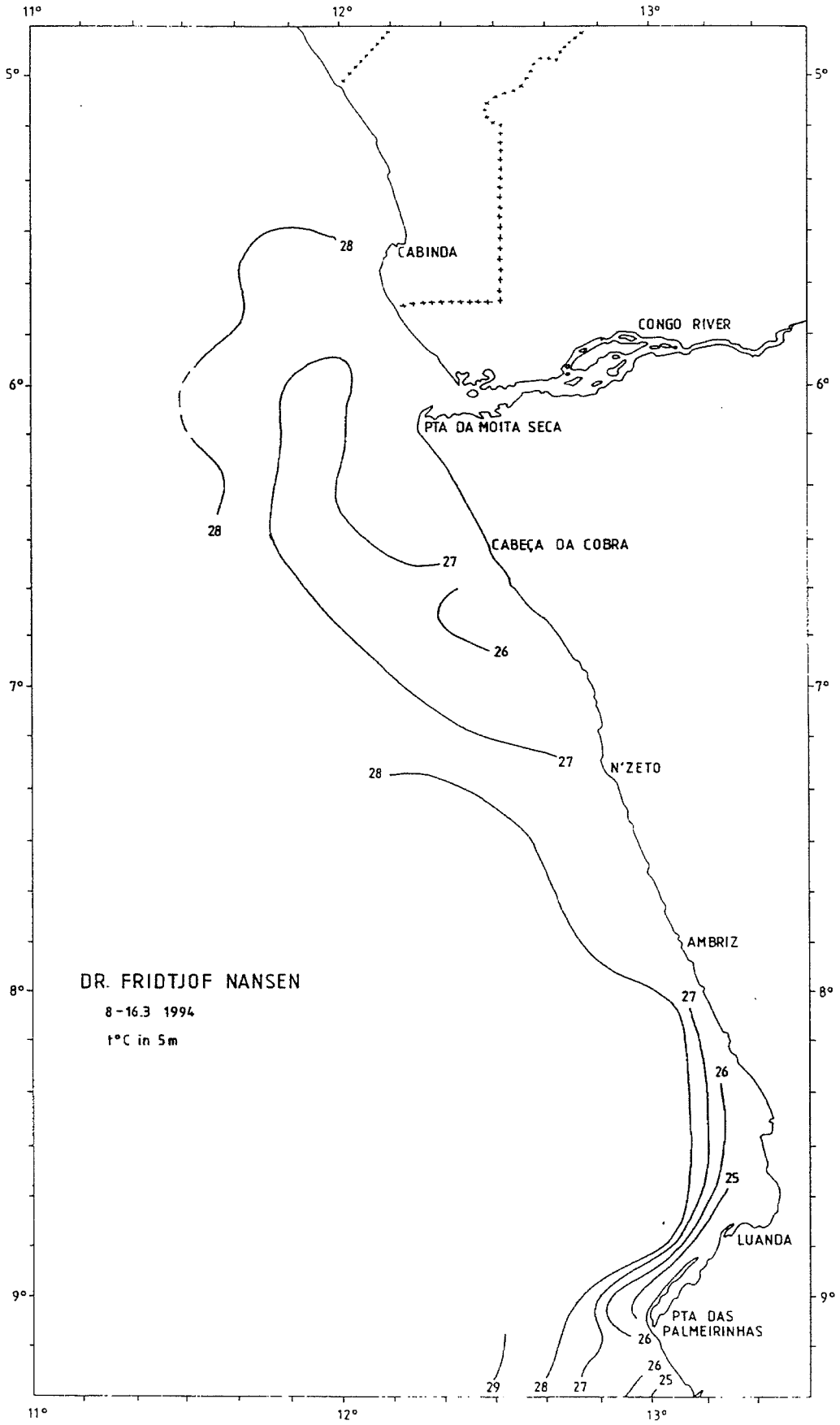


Figure 3b

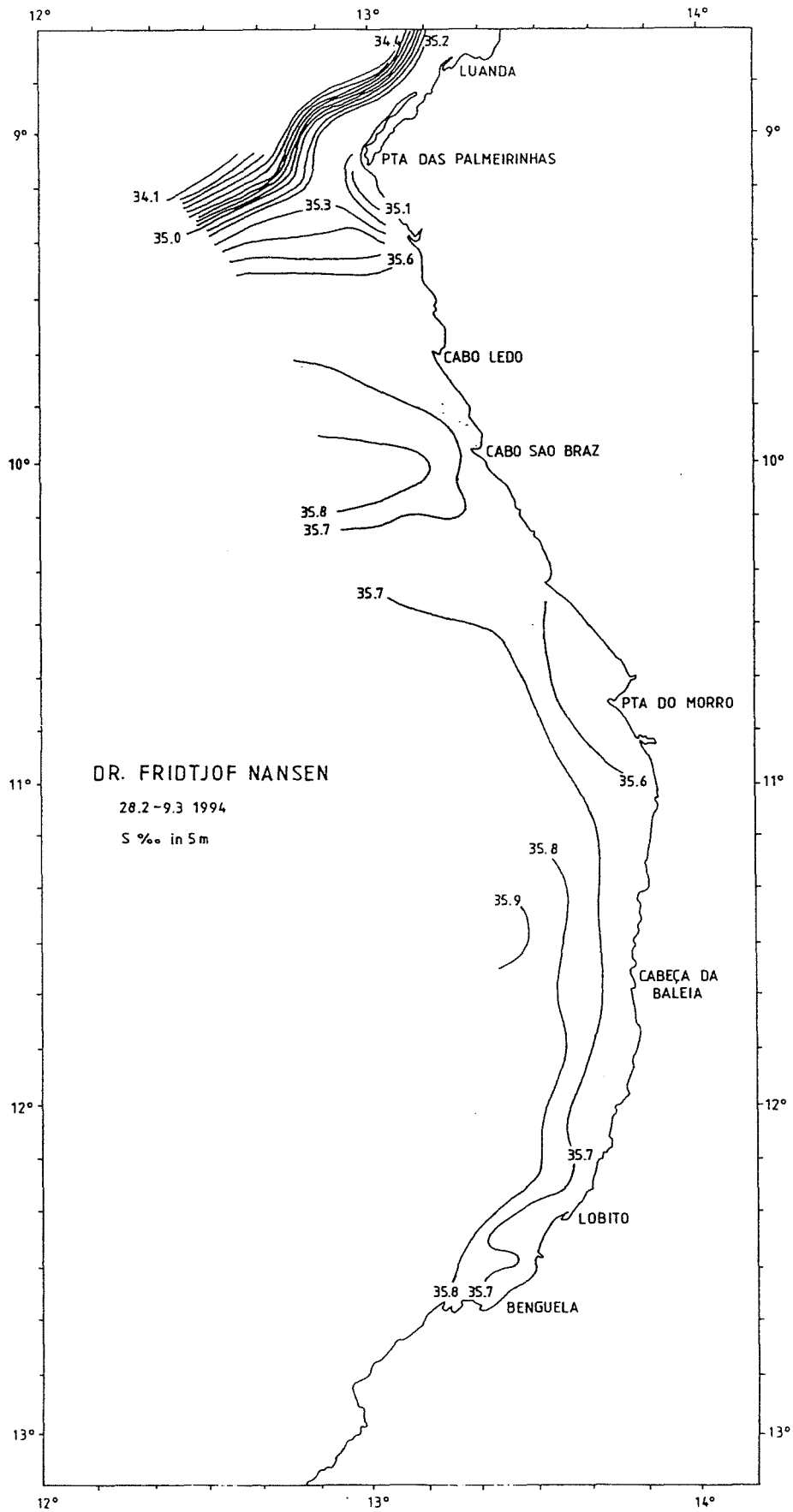


Figure 4 Horizontal distribution of salinity: a) Benguela-Luanda, and b) Luanda-Cabinda.

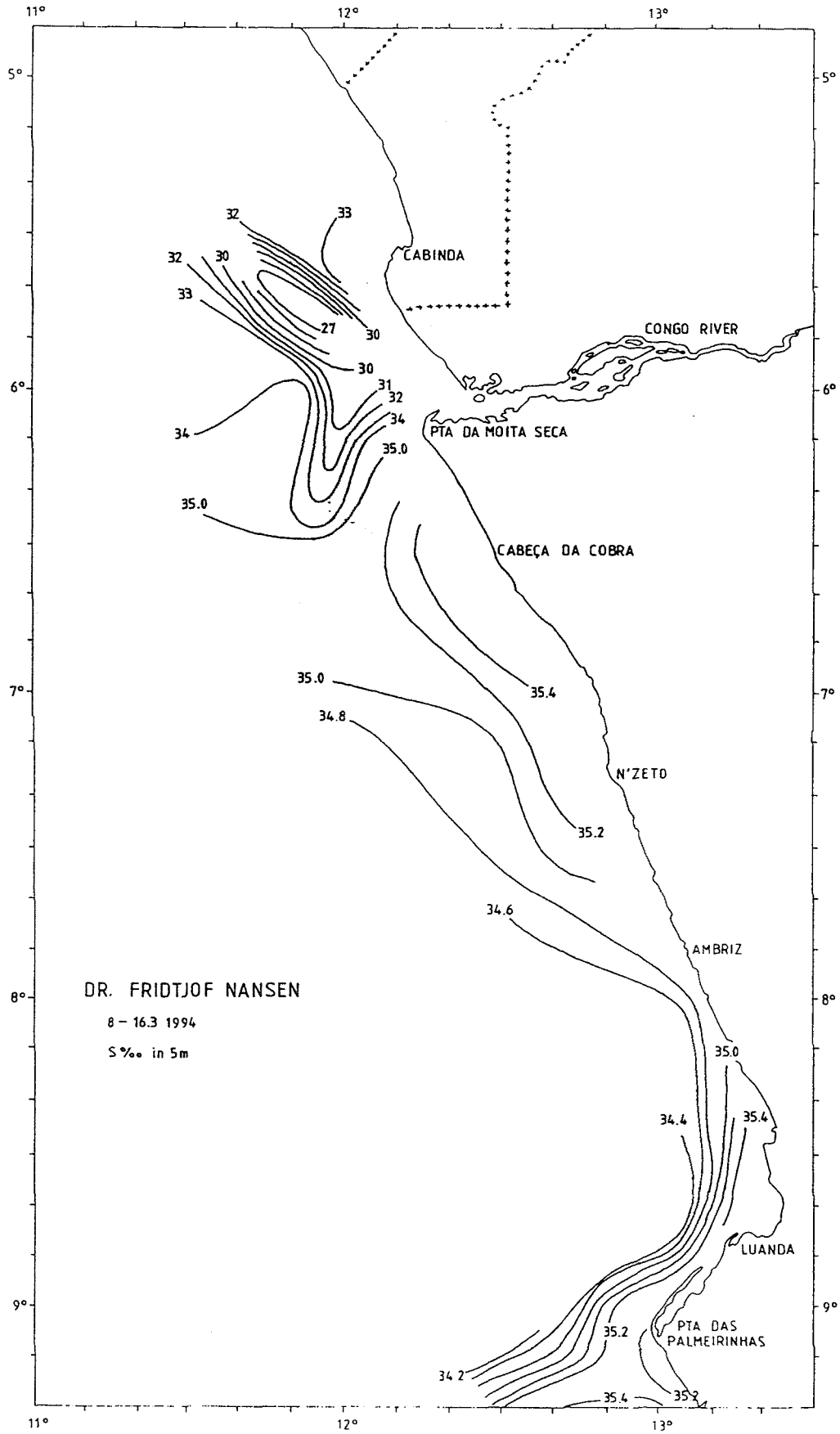


Figure 4b

Vertical sections

A section was made running W-NW outside Lobito, and in Fig.5 shows the vertical distribution of a) temperature, b) salinity and c) dissolved oxygen. Corresponding sections are displayed for Pta do Morro (Fig.6), Pta das Palmeirinhas (Fig.7), Ambriz (Fig.8) and across the Congo River Canyon (Fig.9). A strong thermocline is usually found at about 30 m depth. Fig.10 shows the upper part of the profiles at st 165 in the Lobito section. The slight rise of the isotherms towards the coast, observed in all sections except the Congo River, indicates mixing with colder subsurface water.

In the southernmost section (Lobito, Fig. 5) an oxygen maximum layer is evident at about 30 m, just below the thermocline, see Fig.10. Going northwards this oxygen maximum gradually disappears, while a salinity maximum layer develops. This salinity maximum is seen as far south as the Pta de Morro section (Fig 6b), but not in the Lobito section (Fig. 5b). The disappearance of the salinity maximum in the Lobito section is demonstrated in Fig. 11, where the T-S diagram of st. 165 in the Lobito section with st. 215 in the Ambriz section are presented for comparison. The maximum salinity is usually found at about 50 m depth and its core values increase northwards, becoming more than 36 psu in the Congo River section.

On-the-job training

Three oceanographers from IIP participated in the daily routines of oceanographic sampling, using the SEABIRD CTD system. They were also trained in analyzing oxygen using the Winkler method. Furthermore, they participated in drawing the sections and were trained in using PCs for data analyses.

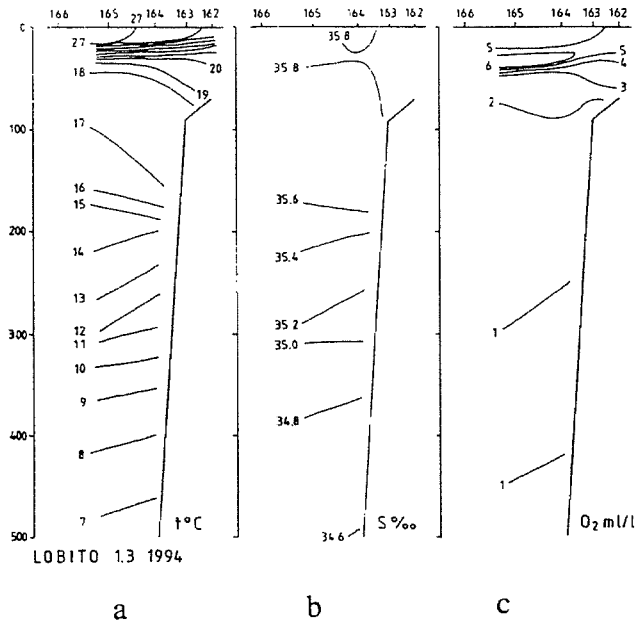


Figure 5 Vertical sections of a) temperature, b) salinity and c) oxygen. Lobito.

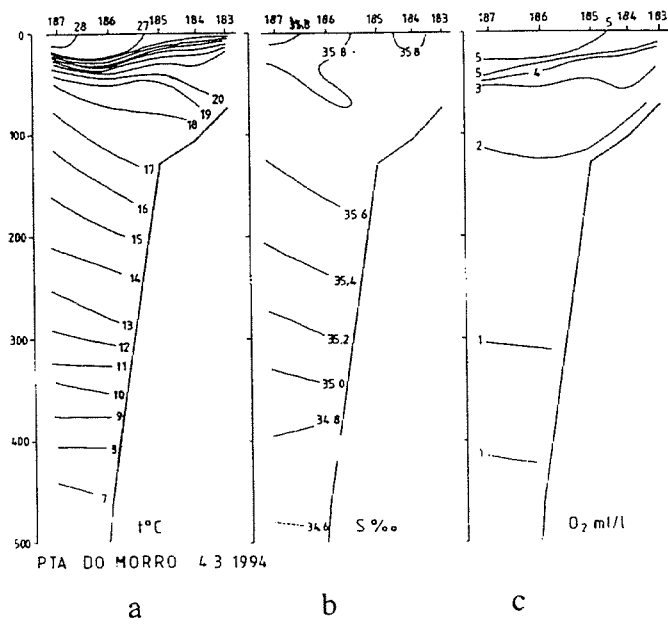


Figure 6 Vertical sections of a) temperature, b) salinity and c) oxygen. Pta do Morro.

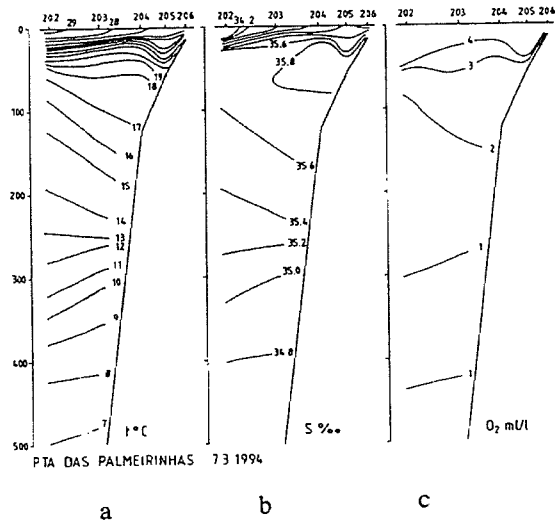


Figure 7 Vertical sections of a) temperature, b) salinity and c) oxygen. Pta das Palmeirinhas.

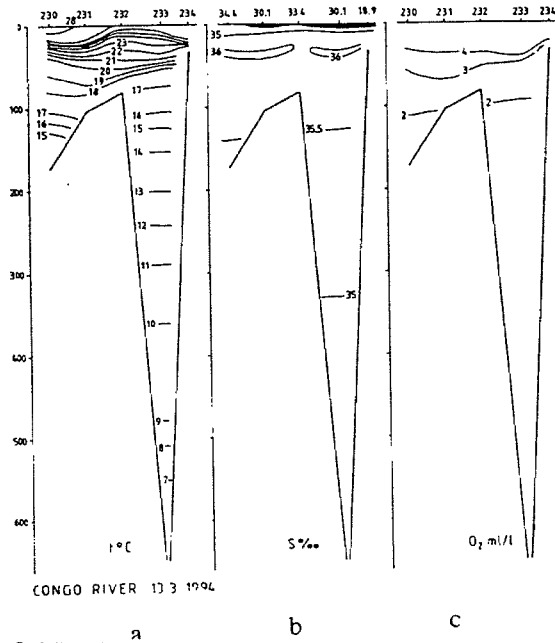


Figure 8 Vertical sections of a) temperature, b) salinity and c) oxygen. Ambriz.

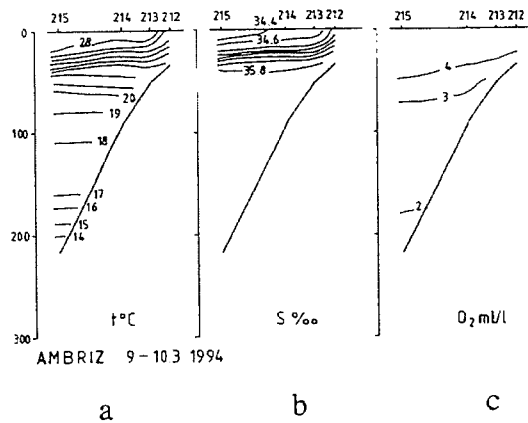


Figure 9 Vertical sections of a) temperature, b) salinity and c) oxygen. Congo River.

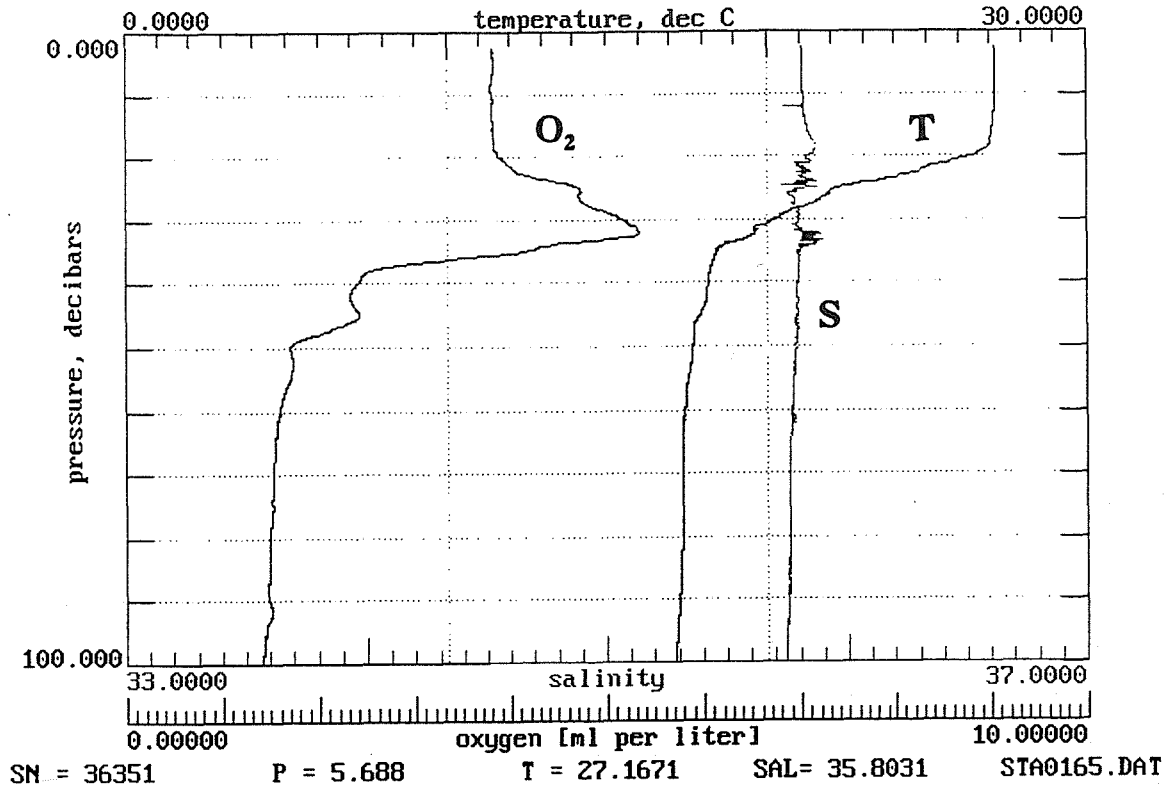


Figure 10. Vertical profiles temperature, salinity and oxygen at the upper 100 m of st. 165 in the Lobito section.

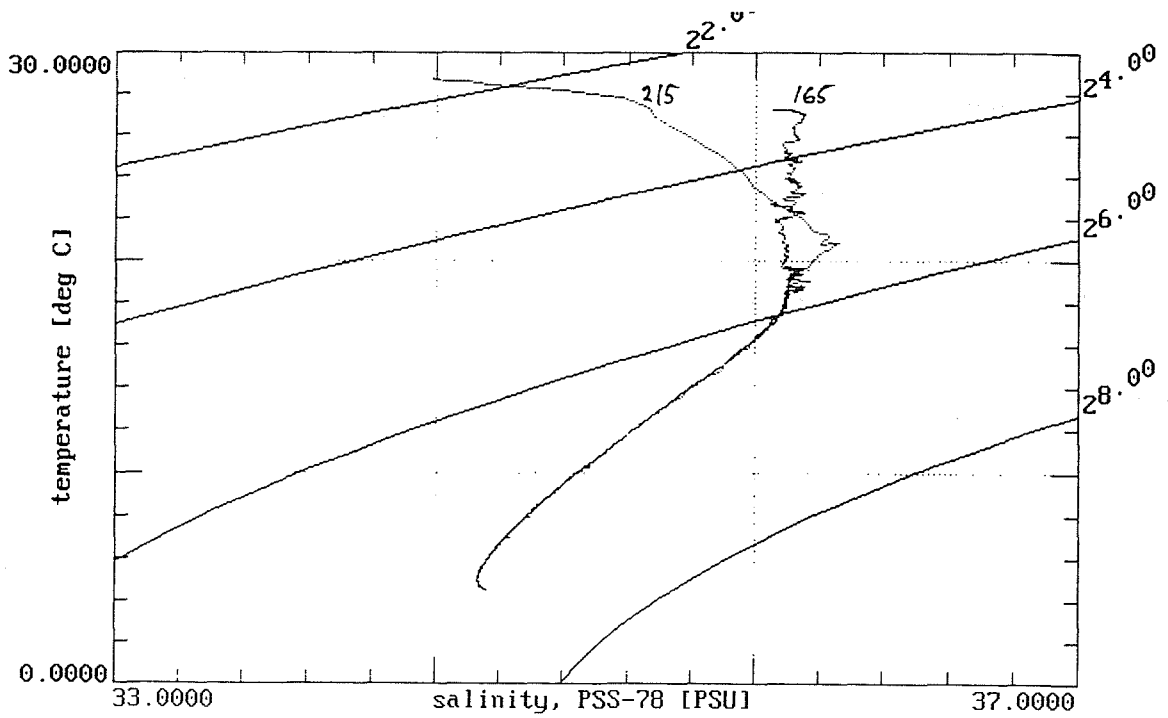


Figure 11. Temperature - salinity profiles of st. 165 and 215.

CHAPTER 3 DISTRIBUTION, COMPOSITION AND ABUNDANCE OF PELAGIC FISH

3.1 CABINDA - LUANDA

The depth range 25-200 m was surveyed almost throughout the area. Only between Ambriz and N'Zeto, where the inner shelf is rather narrow, the coverage was limited to approximately 80-200 m. Also, the coverage of the shallow waters (25-40 m) off Cabinda was somewhat limited because of oil extraction activities.

Sardinellas

Sardinella schools were detected only in two restricted areas (Figure 12), outside Cabeça da Cobra and in the bay north of Luanda. Both areas were surveyed thoroughly both day and night but only smaller concentrations were delineated. The bottom depth in the area where the sardinella schools were recorded was 50-70 m and the schools were, as usual, dense during daytime, dispersing and mixing with bottom dwelling fish lifting from the bottom during nighttime. Successful trawling was mainly done during the night, when the avoidance from the trawl was not severe. During daytime, the sardinella was almost impossible to catch, even with the largest pelagic trawl.

The length distributions show that large adults dominate for both species (Figure 13). In the case of *S. maderensis* there are however two modes (24 and 30 cm) while for *S. aurita* individual above 30 cm predominate.

The biomass in this area was estimated to about 100 000 t and the biological sampling shows that the proportions of flat and round sardinella were about 95 and 5 % respectively.

Cunene horse mackerel

No typical schools of Cunene horse mackerel were detected in this area. A few were caught by trawling outside N'Zeto (Figure 14). These few individuals did not in any significant way show up as schools during daytime. No estimate of the abundance was attempted for this region because of the very low level of S_A -values attributable to this group.

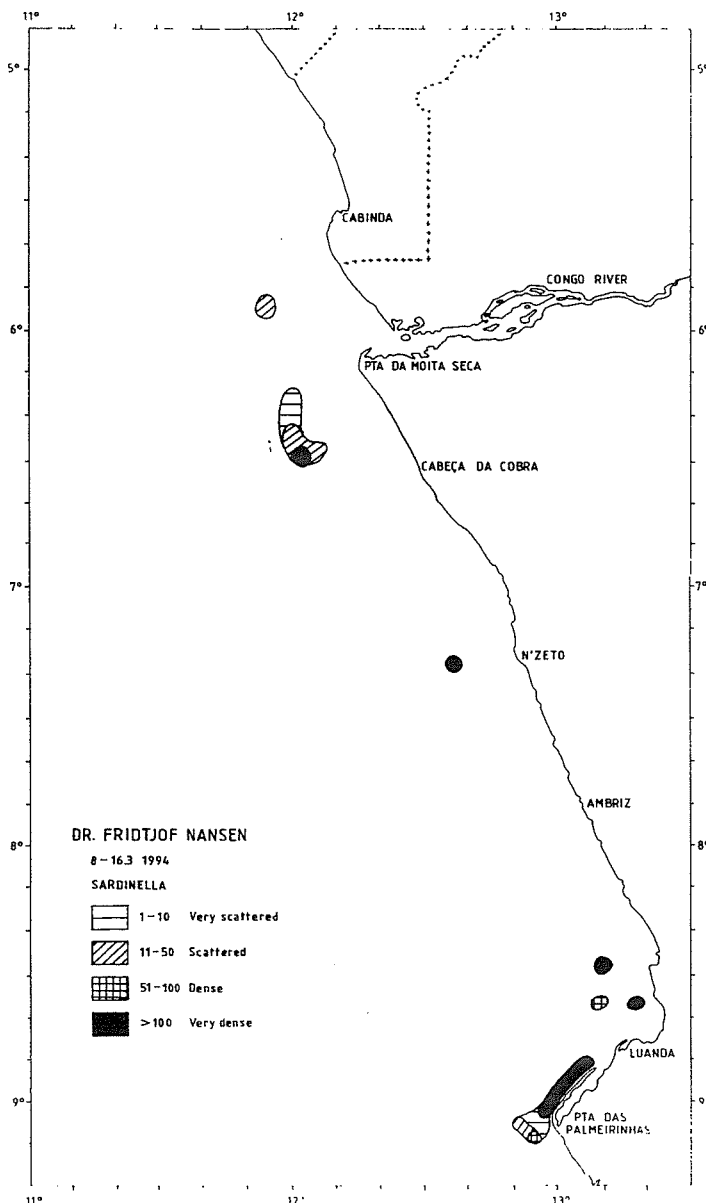


Figure 12. Distribution and abundance (tonnes) of sardinella, Cabinda-Luanda.

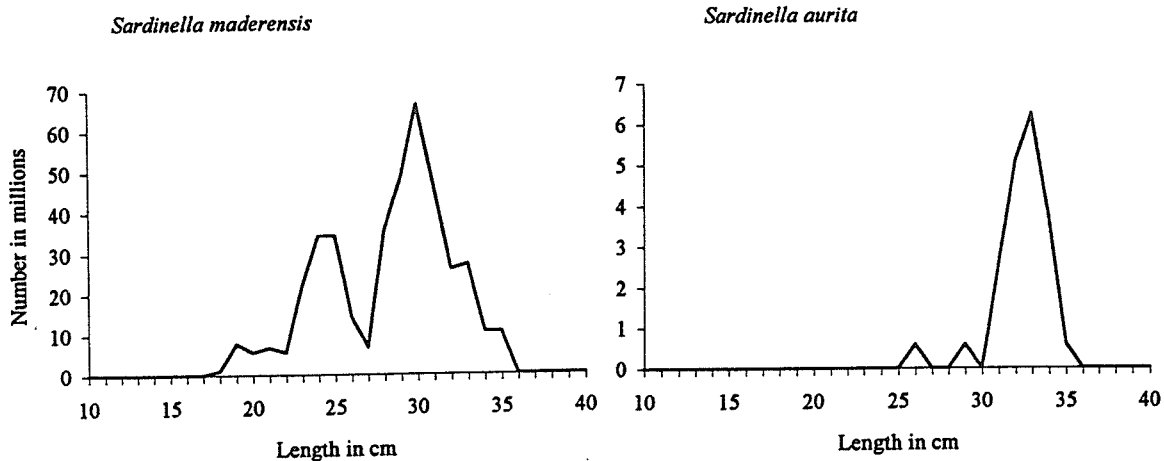


Figure 13. Total length distribution of sardinella, Cabinda-Luanda.

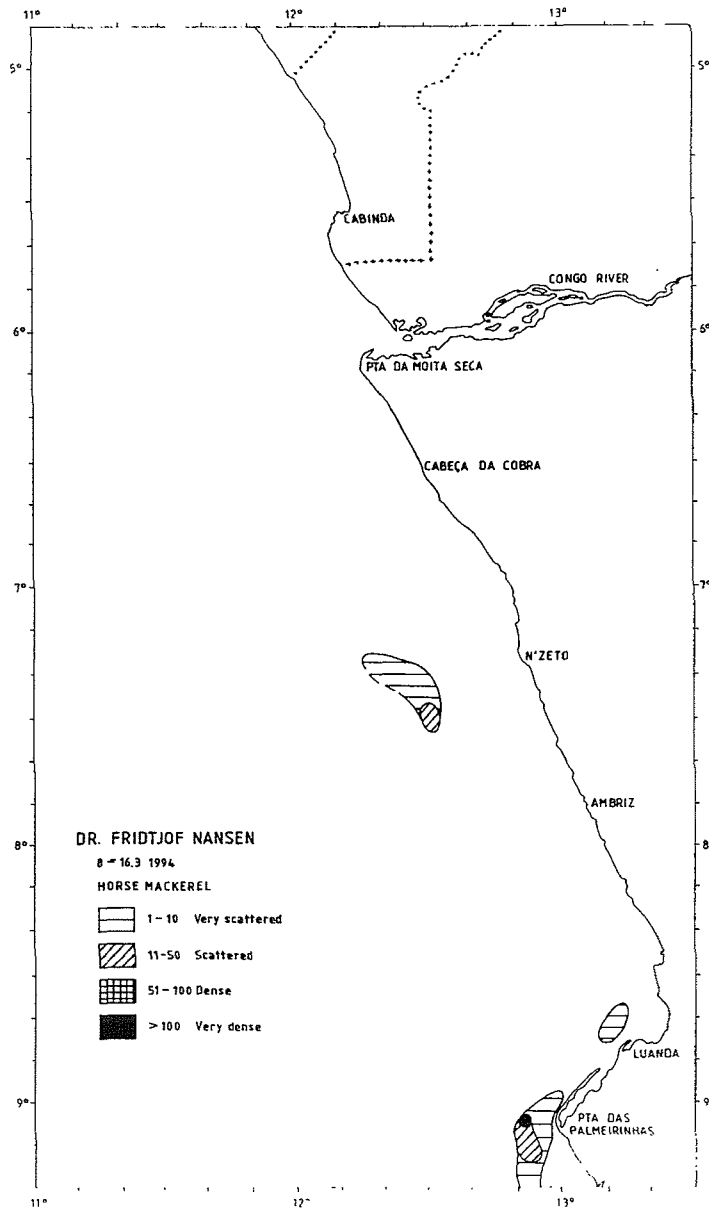


Figure 14. Distribution of horse mackerel, Cabinda-Luanda.

Pelagic fish type 2 (P2: carangids, scombrids, barracudas and hairtail)

These species were recorded in most of the surveyed area. However, the level of the S_A -values assigned to this group was very low and no estimate was made. This group consisted mainly of lookdown and hairtail.

3.2 LUANDA - BENGUELA

The area was surveyed thoroughly both at daytime and at night because of continuous registrations of pelagic fish. Close to shore, in waters shallower than 30 m, very scattered registrations of P2 type fish were detected. In areas with bottom depth around 55-65 m, sardinellas were often recorded in dense schools, usually close to the surface. Some distance further out from the coast and closer to the bottom, Cunene horse mackerel schools and schools of other fish of the P2 group were detected. Here the schools of P2 group fish consisted mainly of carangids. During the night the pattern changed in the way that the schools dispersed and the species mixed. Demersal fish lifted from the bottom and mixed with the pelagic species. The main concentrations of sardinellas were still found in bottom depths of 50 to 70 m.

Sardinellas

The sardinellas were distributed in several smaller areas as shown in Figure 15. Most sardinellas consisted of large, adult individuals for both species (Figure 16). Recruits (size 16-20 cm) were almost absent from the samples. Juvenile fish of sardinellas are often observed in inshore waters, close to the bottom and are therefore often difficult to catch and assess. For this reason this group is probably not well covered by our surveys. On the other hand the observed pattern seems to be consistent with the hypothesis that the main nursery areas are found off Congo and recruitment to the Angolan stocks takes place as a southward migration from Congolese waters. This is also confirmed by the high concentrations of juvenile sardinella found off Congo in the course of the same survey (see separate report).

Occasionally sardinella schools occurred very close to the surface during daytime. These schools were not recorded by the echosounder system and were therefore not measured and counted. However, if the number of schools spotted by eye and sonar was significant, these were sampled by trawling and included in the abundance estimation. This was done in the area outside Pta das Palmeirinhas where many schools were spotted but only very few were measured by the echosounder system.

The total biomass in this area was estimated to 410 000 t. The dominating species was the flat sardinella which in this area made up 80% of the catch in terms of weight.

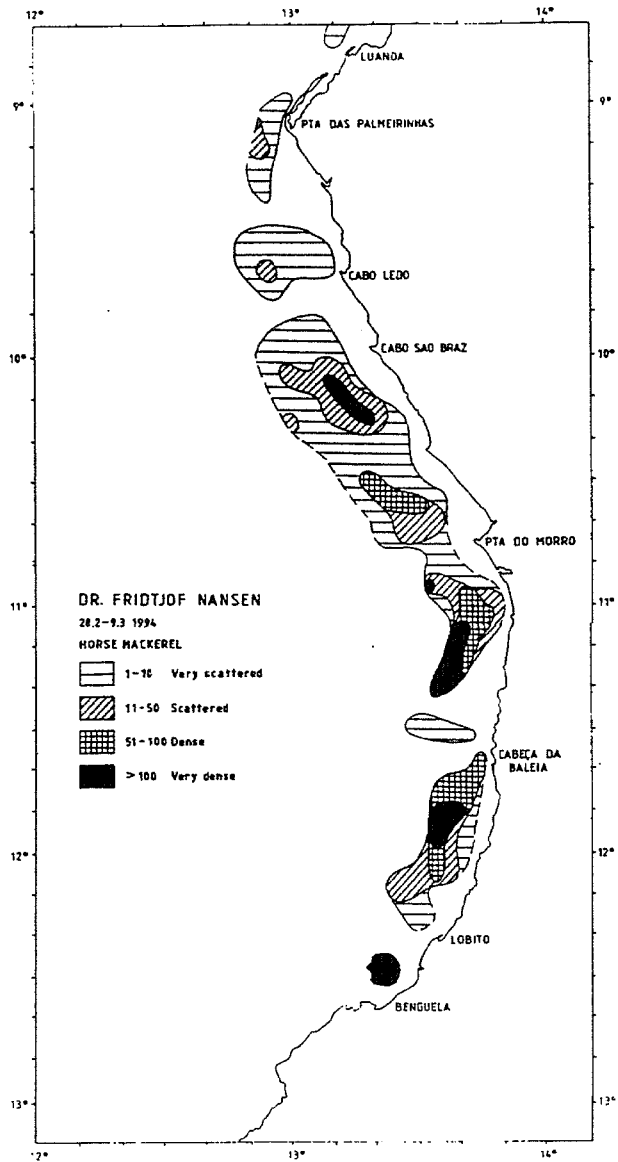


Figure 15. Distribution and abundance (1000 tonnes) of sardinella, Luanda-Benguela.

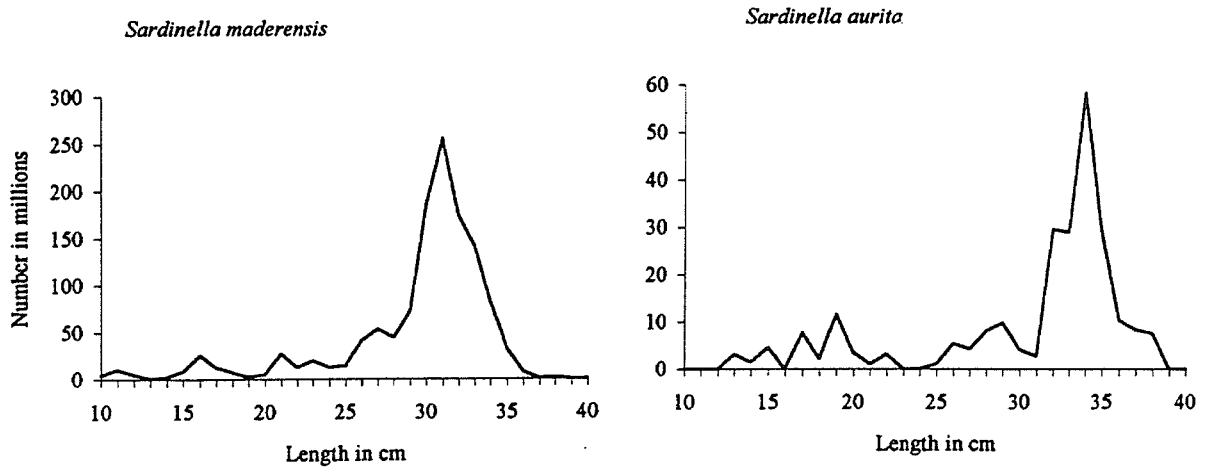


Figure 16. Length distributions of sardinellas, Luanda-Benguela.

Cunene horse mackerel

Figure 17 shows the distribution of Cunene horse mackerel in this area, forming a band in areas with bottom depth between 60 and 150 m. The densest concentrations were recorded in the southern part of the region, outside Benguela, between Benguela and Cabeça da Baleia and south of Pta do Morro. The highest abundance was estimated from south of Pta do Morro to Cabo sao Braz. Figure 18 shows the total length distribution weighted by numbers in the area. Three main cohorts are found, one with modal length at 15 cm, another with modal length at 27 and the third with modal length at 36 cm. The smallest individuals were the most abundant.

The total biomass in the area was estimated to 238 000 t.

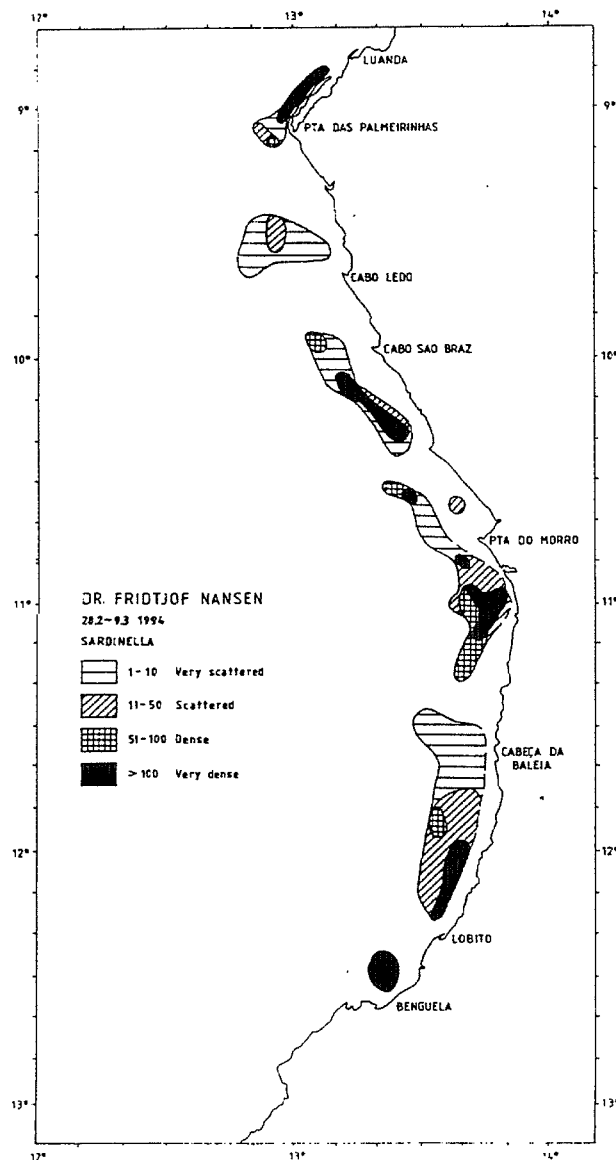


Figure 17. Distribution of horse mackerel, Luanda-Benguela.

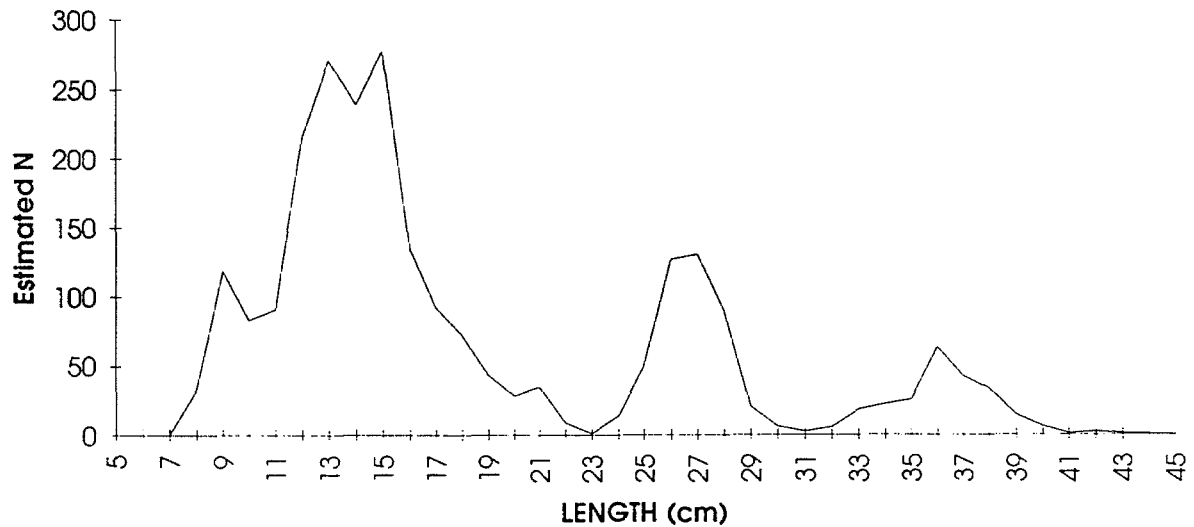


Figure 18. Total length distribution of horse mackerel, Luanda-Benguela.

Pelagic fish type 2 (P2: carangids, scombrids, barracudas and hairtail)

This group of fish was distributed from shallow waters to depths of 150-170 m. The carangids often aggregated in schools close to the bottom at depths around 70-80 m. The most dominating species were the hairtails, while the bumper (*Brachydeuterus auritus*) was the second most abundant in the catches. No separate acoustic estimate was carried out on this group of fish.

3.3 TOMBUA-CUNENE

This area was surveyed during the first 4 days of the cruise. No sardinellas were recorded and Cunene horse mackerel were caught in such low numbers that no biomass estimate was attempted. Estimates were made for the pilchard, the dominant species, and the anchovy.

Sardine

Concentrations of this species could not be analyzed in detail because of the limited time available. The biomass estimate, calculated to 223 000 t (Figure 19), might therefore suffer for insufficient sampling. The length frequency distribution in the samples (Fig. 20) shows two modes of about 20 and 25 cm.

Anchovy

Two main concentrations of anchovy were recorded, one outside the Peninsula dos Tigres and another north of Baia dos Tigres. The total biomass of the two was estimated to 30 000 t.

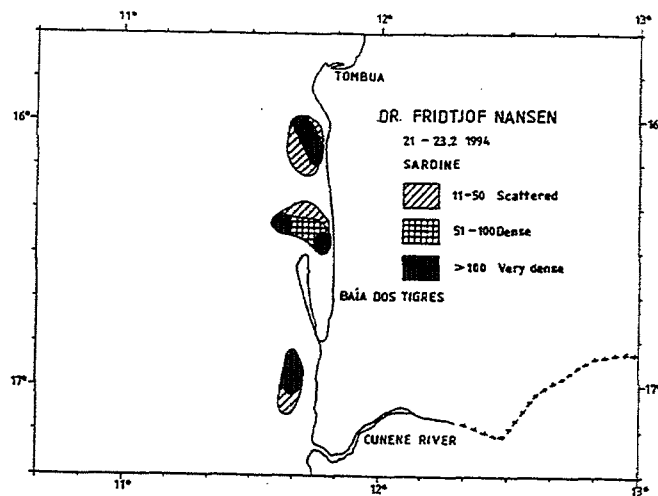


Figure 19. Distribution of sardine (pilchard), Tombua-Cunene.

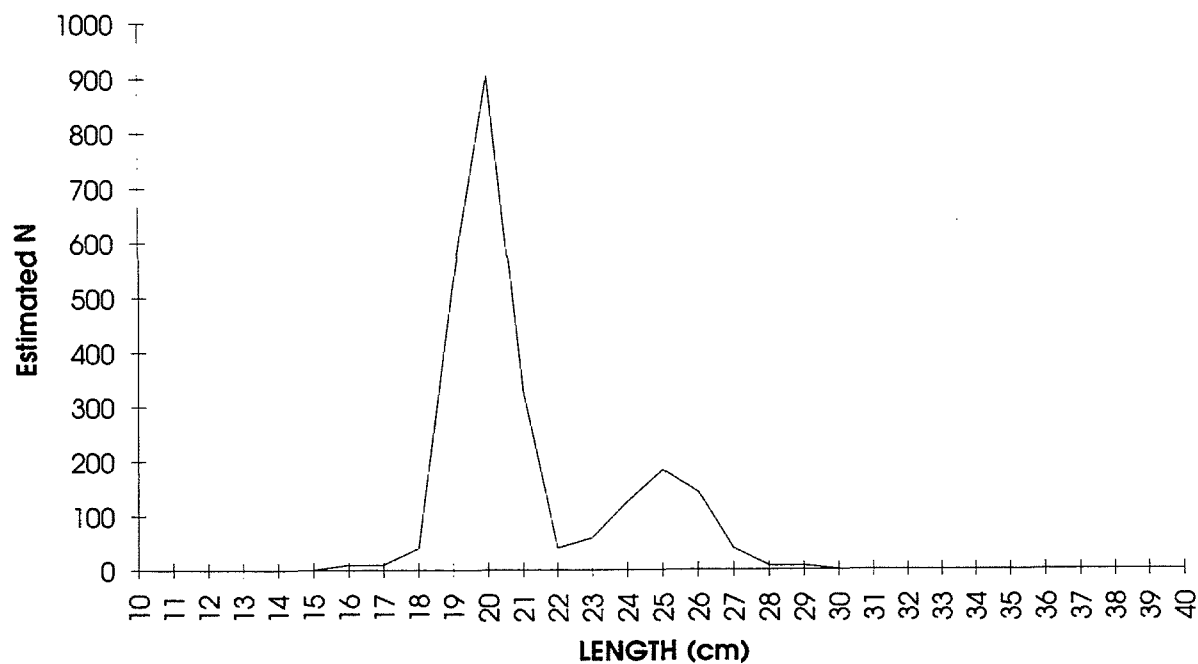


Figure 20. Total length distribution of sardine, Tombua-Cunene.

3.4 ON-THE-JOB TRAINING

All the Angolan biologists participated in sampling the catches (identification of species caught, counting, weighing and measuring) and were also responsible for entering the survey data using NAN-SIS.

Antonio Fontes, who has participated in a training course on the use of the EKO500 and the BEI system in Norway, often joined in the daily scrutinizing of the echograms as well as in the conversion of the acoustic output into biomass estimates.

CHAPTER 4 REVIEW OF THE RESULTS BY MAIN STOCKS

Sardine

Three dense school areas of sardine were delineated in the area around Baia dos Tigres. The total biomass estimate of 223 000 t is however based on a single coverage only. Table 1 shows the estimated biomass of sardine in the area since 1985.

Year	Jan-Mar	Apr-Jun	Aug-Sep	Oct-Dec
1985	25	0	120	10
1986	0	0		
1989	50	10		5
1991		26	131	122
1992		50	210	
1993	45	98		
1994	225			

The present estimate constitutes a record for this region, even more so considering that the season of highest occurrence of this species off southern Angola is usually in August-September, i.e. when upwelling is strongest in Angola and the frontal region of the Benguela Current reaches its northernmost limit. The survey of the RV 'Benguela' off northern Namibia, that took place a few days before the coverage off southern Angola, and carried out in collaboration with fishing vessels, could not detect any sardine in that region. It would therefore appear that the stock was concentrated further north, although this does not usually happens in this season.

Sardinellas

Sardinellas were found in relative high abundance in the area between Luanda and Benguela. The proportions of the flat and round sardinella were about 80 and 20 % respectively, for the whole shelf. The fish was found in areas with bottom depth at 55-65 m. In some areas the sardinellas occurred near surface. This was especially the case outside Pta das Palmeirinhas.

The total biomass estimate of 510 000 t obtained in the area from Cabinda to Benguela (Table 2) indicates a clear recovery of the stock as compared to 1992.

The observed distribution (with highest biomass in the central region) seems to confirm early hypotheses that sardinella stocks along the Angolan coast concentrate in its central part during the warm season and move northwards during the cold season (Anon., 1980). The dominance of large adults is consistent with the hypothesis that sardinellas recruit from Congo, where the main nursery area is located.

These patterns have been observed also in earlier 'Dr. Fridtjof Nansen' surveys and will be further investigated.

Survey	Cunene-Benguela	Benguela-Luanda	Luanda-Cabinda	Benguela-Cabinda	TOTAL
1/85	25	220	80	300	325
2/85	110	190	180	370	480
3/85	0	70	190	260	260
4/85	0	200	110	310	310
1/86	10	140	110	250	260
2/86	10	130	130	260	270
1/89	40	200	60	260	300
2/89	20	40	130	170	190
3/89	40	100	60	160	200
1/91	+	180	120	300	300
2/91	+	68	154	222	222
1/92	+	119	161	280	280
1/94	-	410	100	510	500

Cunene horse mackerel

Cunene horse mackerel was found in rather high abundance only in the area between Luanda and Benguela (Table 3). The stock consists of a mixture of different cohorts and the younger individuals dominate. The area between Tombua and Cunene was surveyed only in its shallow part (within 15 to 20 naut. miles from the shore) and therefore the two species of horse mackerel occurring here were not properly covered.

Survey	Cunene-Benguela	Benguela-Luanda	Luanda-Cabinda	Benguela-Cabinda	TOTAL
1/85	30	195	40	235	265
3/85	50	90	40	130	180
4/851/86	100	125	20	145	245
1/89	35	55	40	95	130
3/89	170	40	35	75	245
1/91	100	80	20	100	200
2/91	100	70	30	100	200
1/92	98	86	80	166	264
1/94	*	335	1	336	336

* not surveyed

Literature cited:

(Anon., 1980). Report on the *ad hoc* working group on *Sardinella* stocks from Congo to southern Angola (20-24 August 1979). CECAF INT/79/019

ANNEX I Records of fishing stations

PROJECT STATION: 1
 DATE: 22/ 2/94 GEAR TYPE: PT No:7 POSITION: Lat S 1702 Long E 1136
 start stop duration
 TIME :03:01:00 03:20:00 19 (min) Purpose code: 1
 LOG :3647.10 3648.30 1.20 Area code :
 FDEPTH: 25 25 GearCond.code: 2
 BDEPTH: 80 88 Validity code: 3
 Towing dir: 270° Wire out: 100 m Speed: 38 kn*10
 Sorted: 18 Kg Total catch: 72.60 CATCH/HOUR: 229.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	228.63	11975	99.73	1
Trachurus trecae	0.38	13	0.17	
Dicologlossa cuneata	0.25	13	0.11	
Total	229.26		100.01	

PROJECT STATION: 2
 DATE: 22/ 2/94 GEAR TYPE: PT No:7 POSITION: Lat S 1653 Long E 1142
 start stop duration
 TIME :07:50:00 08:20:00 30 (min) Purpose code: 1
 LOG :3689.70 3691.10 1.40 Area code :
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 15 20 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 31 kn*10
 Sorted: 29 Kg Total catch: 4000.00 CATCH/HOUR: 8000.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	5503.58	293888	68.79	3
Trachurus capensis	1423.02	94504	17.79	5
Sardinops ocellata	639.12	8194	7.99	2
Etrumeus whiteheadi	284.06	10378	3.55	4
Trachurus trecae	150.22	8468	1.88	6
Total	8000.00		100.00	

PROJECT STATION: 3
 DATE: 22/ 2/94 GEAR TYPE: PT No:7 POSITION: Lat S 1622 Long E 1146
 start stop duration
 TIME :19:45:00 20:15:00 30 (min) Purpose code: 1
 LOG :3812.00 3813.50 1.50 Area code :
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 17 15 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 33 kn*10
 Sorted: 17 Kg Total catch: 17.50 CATCH/HOUR: 35.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinops ocellata	19.10	132	54.57	7
Trachurus trecae	15.90	222	45.43	8
Total	35.00		100.00	

PROJECT STATION: 4
 DATE: 28/ 2/94 GEAR TYPE: PT No:1 POSITION: Lat S 1234 Long E 1223
 start stop duration
 TIME :14:40:00 15:03:00 23 (min) Purpose code: 1
 LOG :4666.60 4668.10 1.50 Area code : 2
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 48 45 Validity code:
 Towing dir: 60° Wire out: 150 m Speed: 39 kn*10
 Sorted: 120 Kg Total catch: 119.93 CATCH/HOUR: 312.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Euthynnus alletteratus	118.96	97	38.02	13
Sarda sarda	79.96	39	25.56	12
Trachinotus ovatus	64.15	180	20.50	11
Sardinella maderensis	26.09	73	8.34	9
Chloroscombrus chrysurus	11.95	63	3.82	10
Selene dorsalis	4.64	8	1.48	
Uraspis secunda	3.39	3	1.08	
Decapterus punctatus	2.53	5	0.81	
Sardinella aurita	1.20	3	0.38	
Total	312.87		99.99	

PROJECT STATION: 5
 DATE: 28/ 2/94 GEAR TYPE: PT No:1 POSITION: Lat S 1232 Long E 1315
 start stop duration
 TIME :16:43:00 17:16:00 33 (min) Purpose code: 1
 LOG :4680.50 4682.40 1.90 Area code : 2
 FDEPTH: 200 170 GearCond.code:
 BDEPTH: 419 236 Validity code:
 Towing dir: 100° Wire out: 550 m Speed: 42 kn*10
 Sorted: 38 Kg Total catch: 619.79 CATCH/HOUR: 1126.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	1073.45	770935	95.26	
Trichurus lepturus	28.80	5178	2.56	
Taractes rubescens	20.73	13	1.84	
PARALEPIDIDAE	2.91	29	0.26	
TRACHIPTERIDAE	1.00	2	0.09	
Total	1126.89		100.01	

PROJECT STATION: 6
 DATE: 28/ 2/94 GEAR TYPE: PT No:4 POSITION: Lat S 1230 Long E 1322
 start stop duration
 TIME :20:00:00 20:30:00 30 (min) Purpose code: 1
 LOG :4700.90 4702.80 1.90 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 62 80 Validity code:
 Towing dir: 253° Wire out: 200 m Speed: 42 kn*10
 Sorted: 119 Kg Total catch: 2383.40 CATCH/HOUR: 4766.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	2992.00	6706	62.77	14
Sardinella maderensis	1146.00	3480	24.04	15
Scomber japonicus	304.80	360	6.39	
Sardinella aurita	238.00	490	4.99	16
Trichurus lepturus	53.20	120	1.12	
Trachurus trecae	16.00	600	0.34	
Pagellus bellottii	9.60	80	0.20	
Dentex macrophthalmus	7.20	40	0.15	
Total	4766.80		100.00	

PROJECT STATION: 7
 DATE: 1/ 3/94 GEAR TYPE: PT No:1 POSITION: Lat S 1213 Long E 1332
 start stop duration
 TIME :02:36:00 02:48:00 12 (min) Purpose code: 1
 LOG :4747.60 4748.30 0.70 Area code : 2
 FDEPTH: 20 17 GearCond.code:
 BDEPTH: 72 72 Validity code:
 Towing dir: 12° Wire out: 150 m Speed: 4 kn*10
 Sorted: 55 Kg Total catch: 430.06 CATCH/HOUR: 2150.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	1410.00	5510	65.57	19
Sardinella aurita	386.25	1010	17.96	18
Brachydeuterus auritus	150.40	975	6.99	17
Trachurus capensis	145.50	410	6.77	20
Spondyliosoma cantharus	39.40	40	1.83	
Trachinotus ovatus	14.25	75	0.66	
Trichurus lepturus	4.50	40	0.21	
Total	2150.30		99.99	

PROJECT STATION: 8
 DATE: 1/ 3/94 GEAR TYPE: PT No:1 POSITION: Lat S 1159 Long E 1337
 start stop duration
 TIME :14:04:00 14:48:00 44 (min) Purpose code: 1
 LOG :4849.80 4852.70 2.90 Area code : 2
 FDEPTH: 31 30 GearCond.code:
 BDEPTH: 66 49 Validity code:
 Towing dir: 127° Wire out: 150 m Speed: 40 kn*10
 Sorted: 48 Kg Total catch: 47.99 CATCH/HOUR: 65.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachinotus ovatus	44.18	116	67.51	21
Sardinella aurita	13.00	34	19.87	22
Sarda sarda	3.16	1	4.83	
Chloroscombrus chrysurus	3.12	22	4.77	24
Sardinella maderensis	1.69	5	2.58	23
sepiella ornata	0.29	15	0.44	
Total	65.44		100.00	

PROJECT STATION: 9
 DATE: 1/ 3/94 GEAR TYPE: PT No:2 POSITION: Lat S 1150 Long E 1355
 start stop duration
 TIME :19:30:00 20:15:00 45 (min) Purpose code: 1
 LOG :4892.20 4894.90 2.70 Area code : 2
 FDEPTH: 40 20 GearCond.code:
 BDEPTH: 96 76 Validity code:
 Towing dir: 120° Wire out: 250 m Speed: 4 kn*10
 Sorted: 92 Kg Total catch: 920.10 CATCH/HOUR: 1226.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	822.00	2576	67.00	25
Brachydeuterus auritus	175.53	1067	14.29	27
Sardinella maderensis	110.00	307	8.97	26
Trachurus trecae, juvenile	60.27	2529	4.91	28
Trichurus lepturus	25.33	67	2.06	
Decapterus rhonchus	13.33	13	1.09	
Scomber japonicus	7.47	13	0.61	
sepiella ornata	4.27	240	0.35	
Saurida brasiliensis	3.60	880	0.29	
Sardinella aurita	3.33	13	0.27	
Alloteuthis africana	0.93	427	0.08	
Bregmaceros sp.	0.67	747	0.05	
Pagellus bellottii	0.27	53	0.02	
Total	1226.80		99.99	

PROJECT STATION: 10
 DATE: 2/ 3/94 GEAR TYPE: PT No:1 POSITION:Lat S 1158
 start stop duration
 TIME :02:00:00 02:35:00 15 (min) Purpose code: 1 Long E 1335
 LOG :4950.80 4951.70 0.90 Area code : 2
 FDEPTH: 25 25 GearCond.code: 2
 BDEPTH: 75 71 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 3 kn*10
 Sorted: 51 Kg Total catch: 1242.63 CATCH/HOUR: 4970.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	3279.40	10560	65.98	29
Sardinella maderensis	813.20	3420	16.36	31
Brachydeuterus auritus	748.60	7144	15.06	30
Trichiurus lepturus	106.40	456	2.14	
Sepia officinalis hierredda	16.72	76	0.34	
Euthynnus alletteratus	6.20	4	0.12	
Total	4970.52		100.00	

PROJECT STATION: 11
 DATE: 2/ 3/94 GEAR TYPE: PT No:1 POSITION:Lat S 1204
 start stop duration
 TIME :05:14:00 05:33:00 19 (min) Purpose code: 1 Long E 1334
 LOG :4977.10 4979.30 2.20 Area code : 2
 FDEPTH: 20 20 GearCond.code: 2
 BDEPTH: 74 73 Validity code:
 Towing dir: 14° Wire out: 150 m Speed: 4 kn*10
 Sorted: 62 Kg Total catch: 624.30 CATCH/HOUR: 1971.47

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	920.53	6493	46.69	32
Trachurus trecae	382.11	2021	19.38	33
Sardinella maderensis	353.68	1074	17.94	35
sarda sarda	102.32	63	5.19	
Sardinella aurita	61.58	189	3.12	34
Trachurus trecae, juvenile	55.89	2526	2.83	36
Trichiurus lepturus	47.05	126	2.39	
Selene dorsalis	26.84	63	1.36	
Decapterus rhonchus	16.42	32	0.83	
Sepiella ornata	5.05	347	0.26	
Total	1971.47		99.99	

PROJECT STATION: 12
 DATE: 2/ 3/94 GEAR TYPE: PT No:5 POSITION:Lat S 1206
 start stop duration
 TIME :09:00:00 09:35:00 35 (min) Purpose code: 1 Long E 1336
 LOG :5009.40 5012.30 2.90 Area code : 2
 FDEPTH: 20 20 GearCond.code: 2
 BDEPTH: 64 48 Validity code:
 Towing dir: 180° Wire out: 300 m Speed: 4 kn*10
 Sorted: 119 Kg Total catch: 320.72 CATCH/HOUR: 549.81

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	269.06	693	48.94	37
Sardinella maderensis	180.51	804	32.83	38
Trachinotus ovatus	75.43	197	13.72	39
Sarda sarda	16.54	7	3.01	
Chloroscombrus chrysurus	5.88	34	1.07	40
Sepiella sp.	1.15	65	0.21	
Trichiurus lepturus	0.79	2	0.14	
Auxis thazard	0.45	2	0.08	
Total	549.81		100.00	

PROJECT STATION: 13
 DATE: 2/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1133
 start stop duration
 TIME :19:40:00 20:10:00 30 (min) Purpose code: 1 Long E 1340
 LOG :5115.00 5116.00 1.90 Area code : 2
 FDEPTH: 10 10 GearCond.code: 2
 BDEPTH: 25 37 Validity code:
 Towing dir: 256° Wire out: 200 m Speed: 36 kn*10
 Sorted: 110 Kg Total catch: 416.58 CATCH/HOUR: 833.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	658.50	5340	79.04	43
Sardinella maderensis	33.30	120	4.00	42
Pagellus bellottii	22.26	60	2.67	
Sphyraena guachancho	17.76	16	2.13	
Trichiurus lepturus	16.26	82	1.95	
Sphyraena sphyraena	15.66	46	1.88	
Sepia officinalis hierredda	13.04	8	1.57	
Chloroscombrus chrysurus	9.14	38	1.10	
Uraspis secunda	8.40	8	1.01	
Lagocephalus laevis	6.60	8	0.79	
Engraulis encrasicolus	6.36	1260	0.76	41
Pomadasys jubelini	5.40	8	0.65	
Lithognathus mormyrus	4.60	8	0.55	
Panulirus regius	3.80	2	0.46	
Alloteuthis africana	3.66	382	0.44	
Trachurus trecae, juvenile	3.20	390	0.38	
Decapterus rhonchus	2.84	8	0.34	
Ilisha africana	0.90	8	0.11	
Pagellus bellottii	0.82	232	0.10	
Boops boops	0.60	16	0.07	
Selene dorsalis	0.06	46	0.01	
Epigonus telescopus	0.00	8		
Total	833.16		100.01	

PROJECT STATION: 14
 DATE: 2/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1142
 start stop duration
 TIME :23:35:00 23:55:00 20 (min) Purpose code: 1 Long E 1339
 LOG :5143.30 5145.20 1.90 Area code : 2
 FDEPTH: 10 10 GearCond.code: 2
 BDEPTH: 62 47 Validity code:
 Towing dir: 106° Wire out: 200 m Speed: 3 kn*10
 Sorted: 23 Kg Total catch: 503.84 CATCH/HOUR: 1511.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	903.60	12480	59.78	44
Trachurus trecae	283.20	1368	18.74	43
Trachurus trecae, juvenile	151.68	6144	10.03	45
Trichiurus lepturus	60.48	576	4.00	
Chloroscombrus chrysurus	48.72	264	3.22	
Sardinella aurita	21.84	72	1.44	
Sphyraena guachancho	19.20	24	1.27	
Pagellus bellottii	17.04	96	1.13	
Sepia officinalis hierredda	2.64	24	0.17	
Engraulis encrasicolus	1.68	384	0.11	
Sepiella sp.	1.44	840	0.10	
Total	1511.52		99.99	

PROJECT STATION: 15
 DATE: 3/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1129
 start stop duration
 TIME :02:32:00 03:02:00 30 (min) Purpose code: 1 Long E 1331
 LOG :5170.40 5172.10 1.70 Area code : 2
 FDEPTH: 10 10 GearCond.code: 2
 BDEPTH: 80 75 Validity code:
 Towing dir: 360° Wire out: 200 m Speed: 3 kn*10
 Sorted: 60 Kg Total catch: 241.45 CATCH/HOUR: 482.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	206.40	936	42.74	46
Selene dorsalis	180.00	472	37.27	
Trichiurus lepturus	58.40	272	12.09	47
Trachurus trecae, juvenile	23.68	928	4.90	
Sardinella maderensis	11.20	32	2.32	
Sepiella ornata	1.76	744	0.36	
Chloroscombrus chrysurus	1.36	8	0.28	
Total	482.80		99.96	

PROJECT STATION: 16
 DATE: 3/ 3/94 GEAR TYPE: PT No:6 POSITION:Lat S 1108
 start stop duration
 TIME :13:04:00 13:36:00 32 (min) Purpose code: 1 Long E 1344
 LOG :5267.30 5269.20 1.90 Area code : 2
 FDEPTH: 10 10 GearCond.code: 2
 BDEPTH: 63 58 Validity code:
 Towing dir: 350° Wire out: 200 m Speed: 4 kn*10
 Sorted: Kg Total catch: 4.42 CATCH/HOUR: 8.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Auxis thazard	5.04	11	60.80	
Sardinella maderensis	1.69	6	20.39	
Sepia officinalis hierredda	1.03	99	12.42	
Chloroscombrus chrysurus	0.53	4	6.39	
Total	8.29		100.00	

PROJECT STATION: 17
 DATE: 3/ 3/94 GEAR TYPE: PT No:1 POSITION:Lat S 1106
 start stop duration
 TIME :15:48:00 16:56:00 68 (min) Purpose code: 1 Long E 1336
 LOG :5288.20 5292.50 4.30 Area code : 2
 FDEPTH: 90 70 GearCond.code: 2
 BDEPTH: 135 121 Validity code:
 Towing dir: 250° Wire out: 450 m Speed: 3 kn*10
 Sorted: 16 Kg Total catch: 15.60 CATCH/HOUR: 13.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Maurolicus muelleri	7.06		51.31	
Sepia officinalis hierredda	4.01	141	29.14	
Trichiurus lepturus	2.62	30	19.04	
Illex coindetii	0.08	2	0.58	
Total	13.77		100.07	

PROJECT STATION: 18
 DATE: 3/ 3/94 GEAR TYPE: PT No:6 POSITION:Lat S 1102
 start stop duration
 TIME :19:23:00 19:59:00 36 (min) Purpose code: 1 Long E 1345
 LOG :5312.30 5314.40 2.10 Area code : 2
 FDEPTH: 0 0 GearCond.code: 2
 BDEPTH: 54 65 Validity code:
 Towing dir: 275° Wire out: 180 m Speed: 3 kn*10
 Sorted: 118 Kg Total catch: 1892.16 CATCH/HOUR: 3153.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	970.67	6230	30.78	55
Sardinella maderensis	642.67	2720	20.38	45
Trachurus trecae	606.67	3307	19.24	50
Chloroscombrus chrysurus	517.33	4160	16.40	51
Sardinella aurita	208.80	827	6.62	48
Trichiurus lepturus	202.67	1600	6.43	
Selene dorsalis	4.00	27	0.13	
Sepiella ornata	0.80	27	0.03	
Total	3153.61		100.01	

PROJECT STATION: 19
 DATE: 3/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1051
 start stop duration
 TIME :23:33:00 00:03:00 30 (min) Purpose code: 1 Long E 1340
 LOG :5344.40 5345.90 1.50 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 51 57 Validity code:
 Towing dir: 344* Wire out: 180 m Speed: 3 kn*10
 Sorted: 70 Kg Total catch: 175.48 CATCH/HOUR: 350.96

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	147.26	1674	41.96	53
Sardinella maderensis	86.76	306	24.72	54
Trichurus lepturus	53.26	246	15.18	
Trachurus trecae	23.36	54	6.66	56
Chloroscombrus chrysurus	18.66	140	5.32	
Sardinella aurita	14.96	116	4.26	55
Sphyrna guanchancho	4.70	6	1.34	
Sepia officinalis hierredda	1.50	16	0.43	
Engraulis encrasicolus	0.50	140	0.14	
Total	350.96		100.01	

PROJECT STATION: 20
 DATE: 4/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 1035
 start stop duration
 TIME :13:54:00 14:24:00 30 (min) Purpose code: 1 Long E 1332
 LOG :5482.60 5484.10 1.50 Area code : 2
 FDEPTH: 47 41 GearCond.code:
 BDEPTH: 47 41 Validity code:
 Towing dir: 75* Wire out: 200 m Speed: 31 kn*10
 Sorted: 120 Kg Total catch: 2529.03 CATCH/HOUR: 5058.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	2683.80	33344	53.06	57
Trichurus lepturus	697.20	1974	13.78	
Trachurus trecae	543.90	1512	10.75	58
Chloroscombrus chrysurus	335.16	1890	6.63	
Decapterus rhonchus	183.96	294	3.64	
Pagellus bellottii	123.90	3318	2.45	60
Trachurus trecae, juvenile	107.10	3236	2.12	59
Spondyliosoma cantharus	106.26	84	2.10	
Dentex barnardi	59.22	546	1.17	
Selene dorsalis	59.22	252	1.17	
Engraulis encrasicolus	46.20	6468	0.91	
Chaetodon hoeffleri	30.24	252	0.60	
Pomadasy incisus	26.46	126	0.52	
Atractoscion aequidens	22.26	42	0.44	
Pseudupeneus prayensis	9.66	42	0.19	
Torpedo torpedo	9.24	42	0.18	
Sepiella sp.	8.40	3696	0.17	
Citharus linguatula	5.04	126	0.10	
Boops boops	0.84	42	0.02	
Total	5058.06		100.00	

PROJECT STATION: 21
 DATE: 4/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1028
 start stop duration
 TIME :20:20:00 20:53:00 33 (min) Purpose code: 1 Long E 1316
 LOG :5546.50 5548.10 1.60 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 99 101 Validity code:
 Towing dir: 129* Wire out: 180 m Speed: 3 kn*10
 Sorted: 65 Kg Total catch: 589.41 CATCH/HOUR: 1071.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	700.36	6229	65.35	62
Trachurus trecae	289.64	8933	27.03	61
Selene dorsalis	32.73	82	3.05	
Trichurus lepturus	30.76	49	2.87	
Saurida brasiliensis	16.04	3616	1.50	
Sepiella ornata	1.31	65	0.12	
Bregmaceros sp.	0.82	425	0.08	
Total	1071.66		100.00	

PROJECT STATION: 22
 DATE: 4/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1019
 start stop duration
 TIME :23:15:00 23:45:00 30 (min) Purpose code: 1 Long E 1327
 LOG :5567.30 5568.90 1.60 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 23 31 Validity code:
 Towing dir: 202* Wire out: 180 m Speed: 3 kn*10
 Sorted: 94 Kg Total catch: 660.59 CATCH/HOUR: 1321.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sphyrna guanchancho	589.40	1288	44.61	
Engraulis encrasicolus	319.20	71756	24.16	
Trachurus trecae, juvenile	74.76	3152	5.66	63
Selene dorsalis	42.28	140	3.20	
Trichurus lepturus	39.48	126	2.99	
Spondyliosoma cantharus	39.34	42	2.98	
Sardinella maderensis	38.92	994	2.95	65
Pentheroscion mbizi	33.74	28	2.55	
Brachydeuterus auritus	29.50	434	2.23	64
Galeoides decadactylus	29.12	70	2.20	
Chloroscombrus chrysurus	21.84	154	1.65	
Pomadasy incisus	20.02	56	1.52	
Sepia officinalis hierredda	12.88	28	0.97	
Ilisha africana	11.48	126	0.87	
Pagellus bellottii	8.26	14	0.63	
Trachurus trecae	6.72	14	0.51	
Sphyrna lewini	4.08	2	0.31	
Total	1321.02		99.99	

PROJECT STATION: 23
 DATE: 5/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1032
 start stop duration
 TIME :03:25:00 03:55:00 30 (min) Purpose code: 3 Long E 1330
 LOG :5601.00 5602.60 1.60 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 43 42 Validity code:
 Towing dir: 335* Wire out: 180 m Speed: 3 kn*10
 Sorted: 55 Kg Total catch: 221.70 CATCH/HOUR: 443.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	148.00	1490	33.38	66
Pagellus bellottii	114.00	2688	25.71	67
Spondyliosoma cantharus	33.84	40	7.63	
Sphyrna guanchancho	31.60	32	7.13	
Trachurus trecae	29.60	72	6.68	
Trachurus trecae, juvenile	26.88	1410	6.06	68
Trichurus lepturus	13.92	24	3.14	
Decapterus rhonchus	13.44	24	3.03	
Pomadasy incisus	10.64	40	2.40	
Galeoides decadactylus	8.32	16	1.88	
Chelidonichthys gabonensis	6.08	48	1.37	
Selene dorsalis	4.16	16	0.94	
Sepiella ornata	0.80	16	0.18	
Citharus linguatula	0.72	24	0.16	
Total	442.00		99.69	

PROJECT STATION: 24
 DATE: 5/ 3/94 GEAR TYPE: PT No:5 POSITION:Lat S 1012
 start stop duration
 TIME :09:05:00 09:35:00 30 (min) Purpose code: 1 Long E 1316
 LOG :5653.00 5654.70 1.70 Area code : 2
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 57 56 Validity code:
 Towing dir: 325* Wire out: 150 m Speed: 4 kn*10
 Sorted: Kg Total catch: 44.72 CATCH/HOUR: 89.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	71.00	272	79.38	69
Sarda sarda	11.40	8	12.75	
Sardinella aurita	4.60	16	5.14	70
Trachinotus ovatus	1.92	4	2.15	
Selene dorsalis	0.52	2	0.58	
Total	89.44		100.00	

PROJECT STATION: 25
 DATE: 5/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 1014
 start stop duration
 TIME :11:12:00 11:42:00 30 (min) Purpose code: 1 Long E 1318
 LOG :5666.00 5667.60 1.60 Area code : 2
 FDEPTH: 56 66 GearCond.code:
 BDEPTH: 56 66 Validity code:
 Towing dir: 225* Wire out: 300 m Speed: 3 kn*10
 Sorted: 123 Kg Total catch: 4996.20 CATCH/HOUR: 9992.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	3304.00	38024	33.07	73
Trachurus trecae	2428.00	13372	24.30	71
Chloroscombrus chrysurus	1424.00	9760	14.25	
Trachurus trecae, juvenile	1304.00	35384	13.05	72
Pagellus bellottii	848.00	6160	8.49	74
Selene dorsalis	449.60	2640	4.50	
Dasyatis centroura	130.00	2	1.30	
Raja miraletus	48.00	80	0.48	
Sardinella maderensis	23.20	80	0.23	
Zeus faber	16.00	80	0.16	
Chelidonichthys gabonensis	9.60	80	0.10	
Citharus linguatula	8.00	320	0.08	
Total	9992.40		100.01	

PROJECT STATION: 26
 DATE: 5/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 955
 start stop duration
 TIME :22:55:00 23:25:00 30 (min) Purpose code: 1 Long E 1308
 LOG :5778.50 5780.20 1.70 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 64 49 Validity code:
 Towing dir: 81* Wire out: 200 m Speed: 3 kn*10
 Sorted: 61 Kg Total catch: 61.10 CATCH/HOUR: 122.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae, juvenile	62.70	2152	51.31	75
Trichurus lepturus	19.60	36	16.04	
Sardinella maderensis	11.50	70	9.41	76
Saurida brasiliensis	10.80	1928	8.84	
Brachydeuterus auritus	6.82	60	5.58	77
Sardinella aurita	3.12	12	2.55	
Alloteuthis africana	2.48	688	2.03	
Selene dorsalis	2.28	16	1.87	
Engraulis encrasicolus	2.04	364	1.67	
Chloroscombrus chrysurus	0.60	4	0.49	
Sepiella ornata	0.26	4	0.21	
Total	122.20		100.00	

PROJECT STATION: 27
 DATE: 6/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 1000 Long E 1311
 start stop duration
 TIME :03:49:00 04:49:00 60 (min) Purpose code: 1
 LOG :5820.80 5824.30 3.50 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 40 57 Validity code:
 Towing dir: 360° Wire out: 200 m Speed: 4 kn*10
 Sorted: 125 Kg Total catch: 15000.00 CATCH/HOUR: 15000.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Brachydeuterus auritus	10673.30 82247	71.16	81
Trachurus trecae	1657.23 10769	11.05	78
Trachurus trecae, juvenile	1310.23 46262	8.73	79
Sphyræna guachancho	694.00 838	4.63	
Euthynnus alletteratus	440.33 239	2.94	
Sardinella maderensis	128.03 598	0.85	80
Pomadasys incisus	37.10 100	0.25	
Chloroscombrus chrysurus	35.90 838	0.24	
Boops boops	23.90 119	0.16	
Total	15000.02	100.01	

PROJECT STATION: 28
 DATE: 6/ 3/94 GEAR TYPE: PT No:5 POSITION:Lat S 1009 Long E 1312
 start stop duration
 TIME :08:55:00 09:25:00 30 (min) Purpose code: 1
 LOG :5857.70 5859.40 1.70 Area code : 2
 FDEPTH: 35 35 GearCond.code:
 BDEPTH: 65 72 Validity code:
 Towing dir: 266° Wire out: 150 m Speed: 4 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
N O C A T C H	0.00		
Total			

PROJECT STATION: 29
 DATE: 6/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 940 Long E 1304
 start stop duration
 TIME :19:50:00 20:20:00 30 (min) Purpose code: 1
 LOG :5968.10 5970.00 1.90 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 52 67 Validity code:
 Towing dir: 279° Wire out: 150 m Speed: 3 kn*10
 Sorted: Kg Total catch: 87.22 CATCH/HOUR: 174.44

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trichiurus lepturus	107.40 314	61.57	
Trachurus trecae, juvenile	49.90 2338	28.61	82
Alloteuthis africana	7.68 4694	4.40	
Saurida brasiliensis	5.40 1530	3.10	
Sepia berthelotii	1.80 14	1.03	
Brachydeuterus auritus	1.24 16	0.71	
Sardinella aurita	0.60 4	0.34	
Sepiella ornata	0.42 22	0.24	
Total	174.44	100.00	

PROJECT STATION: 30
 DATE: 7/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 931 Long E 1258
 start stop duration
 TIME :01:39:00 02:09:00 30 (min) Purpose code: 1
 LOG :6020.00 6021.70 1.70 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 71 78 Validity code:
 Towing dir: 279° Wire out: 150 m Speed: 3 kn*10
 Sorted: 87 Kg Total catch: 1244.84 CATCH/HOUR: 2489.68

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trichiurus lepturus	1674.00 3554	67.24	
Brachydeuterus auritus	443.00 4174	17.79	83
Sardinella aurita	243.00 888	9.76	84
Sardinella maderensis	90.00 402	3.61	
Selene dorsalis	29.00 86	1.16	
Trachurus trecae, juvenile	8.00 230	0.32	
Sarda sarda	2.68 2	0.11	
Total	2489.68	99.99	

PROJECT STATION: 31
 DATE: 7/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 928 Long E 1248
 start stop duration
 TIME :04:14:00 04:44:00 30 (min) Purpose code: 1
 LOG :6041.00 6043.20 2.20 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 112 102 Validity code:
 Towing dir: 80° Wire out: 150 m Speed: 4 kn*10
 Sorted: 101 Kg Total catch: 135.00 CATCH/HOUR: 270.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Selene dorsalis	141.06 362	52.24	
Sardinella maderensis	52.66 150	19.50	86
Trichiurus lepturus	34.92 48	12.93	
Trachinotus ovatus	23.20 66	8.59	
Brachydeuterus auritus	18.16 98	6.73	85
Sarda sarda	1.10 2	0.41	
Total	271.10	100.40	

PROJECT STATION: 32
 DATE: 7/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 906 Long E 1249
 start stop duration
 TIME :19:20:00 19:50:00 30 (min) Purpose code: 1
 LOG :6174.20 6176.20 2.00 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 114 55 Validity code:
 Towing dir: 216° Wire out: 150 m Speed: 4 kn*10
 Sorted: 235 Kg Total catch: 235.64 CATCH/HOUR: 471.28

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Selene dorsalis	146.00 422	30.98	91
Sardinella maderensis	132.00 436	28.01	89
Sphyræna guachancho	96.20 106	20.41	87
Trachurus trecae	41.20 70	8.74	90
Euthynnus alletteratus	26.10 26	5.54	88
Trichiurus lepturus	12.10 28	2.57	
Synagrops microlepis	5.64 766	1.20	
Sarda sarda	3.40 2	0.72	
Uraspis secunda	3.06 2	0.65	
Decapterus rhonchus	1.92 2	0.41	
Trachinotus ovatus	1.86 4	0.39	
Alloteuthis africana	0.74 238	0.16	
Sardinella aurita	0.70 2	0.15	
Trachurus trecae, juvenile	0.32 40	0.07	
Sepiella ornata	0.02 2		
Saurida brasiliensis	0.02 4		
Total	471.28	100.00	

PROJECT STATION: 33
 DATE: 7/ 3/94 GEAR TYPE: PT No:1 POSITION:Lat S 903 Long E 1258
 start stop duration
 TIME :23:40:00 00:10:00 30 (min) Purpose code: 1
 LOG :6208.60 620.70 7.90 Area code : 2
 FDEPTH: 15 10 GearCond.code:
 BDEPTH: 66 46 Validity code:
 Towing dir: 210° Wire out: 200 m Speed: 4 kn*10
 Sorted: 133 Kg Total catch: 2945.58 CATCH/HOUR: 5891.16

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Sardinella maderensis	5768.40 18668	97.92	92
Trichiurus lepturus	49.28 264	0.84	
Engraulis encrasicolus	41.36 8712	0.70	
Sardinella aurita	26.84 88	0.46	
Trachurus trecae, juvenile	5.28 352	0.09	
Total	5891.16	100.01	

PROJECT STATION: 34
 DATE: 8/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 917 Long E 1254
 start stop duration
 TIME :04:10:00 04:40:00 30 (min) Purpose code: 1
 LOG :6247.00 6248.70 1.70 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 45 49 Validity code:
 Towing dir: 160° Wire out: 150 m Speed: 4 kn*10
 Sorted: 124 Kg Total catch: 124.20 CATCH/HOUR: 248.40

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Selene dorsalis	70.50 176	28.38	95
Scomberomorus tritor	61.40 22	24.72	
Trachurus trecae, juvenile	37.10 2190	14.94	93
Brachydeuterus auritus	32.90 264	13.24	94
Sphyræna guachancho	15.88 14	6.39	
Saurida brasiliensis	8.86 1808	3.57	
Alloteuthis africana	7.24 3430	2.91	
Alectis alexandrinus	5.64 4	2.27	
Chloroscombrus chrysurus	3.54 24	1.43	
Trachurus trecae	2.08 8	0.84	
Trichiurus lepturus	1.66 4	0.67	
Bregmaceros sp.	0.86 832	0.35	
Sardinella maderensis	0.74 2	0.30	
Total	248.40	100.01	

PROJECT STATION: 35
 DATE: 8/ 3/94 GEAR TYPE: PT No:1 POSITION:Lat S 901 Long E 1258
 start stop duration
 TIME :16:15:00 16:39:00 24 (min) Purpose code: 1
 LOG :6369.40 6370.90 1.50 Area code : 2
 FDEPTH: 17 15 GearCond.code:
 BDEPTH: 59 134 Validity code:
 Towing dir: 103° Wire out: 200 m Speed: 3 kn*10
 Sorted: Kg Total catch: 6.05 CATCH/HOUR: 15.13

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Chloroscombrus chrysurus	10.75 40	71.05	
Trichiurus lepturus	4.38 3	28.95	
Total	15.13	100.00	

PROJECT STATION: 36
 DATE: 8/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 830
 start stop duration Long E 1312
 TIME :23:05:00 23:35:00 30 (min) Purpose code: 1
 LOG :6433.40 6435.30 1.90 Area code : 3
 FDEPTH: 10 10 GearCond.code: 3
 BDEPTH: 61 51 Validity code:
 Towing dir: 90° Wire out: 150 m Speed: 3 kn*10
 Sorted: 54 Kg Total catch: 247.46 CATCH/HOUR: 494.92

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sphyræna guachancho	119.60	136	24.17
Selene dorsalis	109.60	576	22.14
Trichiurus lepturus	65.60	160	13.25
Brachydeuterus auritus	56.96	536	11.51
Sphyræna barracuda	53.40	2	10.79
Engraulis encrasicolus	33.68	5768	6.81
Sardinella maderensis	17.68	88	3.57
Trachurus trecae, juvenile	9.60	408	1.94
Sardinella aurita	7.84	16	1.58
Saurida brasiliensis	6.08	1920	1.23
Alectis alexandrinus	5.58	2	1.13
Chloroscombrus chrysurus	2.64	24	0.53
Alloteuthis africana	2.16	560	0.44
Ilisa africana	1.84	16	0.37
Bregmaceros sp.	1.60	160	0.32
Atractoscion aequidens	1.06	2	0.21
Total	494.92	99.99	

PROJECT STATION: 41
 DATE: 9/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 807
 start stop duration Long E 1306
 TIME :23:48:00 00:18:00 30 (min) Purpose code: 1
 LOG :6649.30 6651.10 1.80 Area code : 3
 FDEPTH: 10 10 GearCond.code: 3
 BDEPTH: 48 51 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 3 kn*10
 Sorted: 65 Kg Total catch: 236.56 CATCH/HOUR: 473.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae, juvenile	149.80	2496	31.66
Brachydeuterus auritus	87.50	2450	18.49
Sphyræna guachancho	75.60	112	15.98
Trichiurus lepturus	51.10	230	10.80
Engraulis encrasicolus	41.58	7000	8.79
Scomberomorus tritor	21.20	20	4.48
Alectis alexandrinus	12.50	10	2.64
Saurida brasiliensis	8.90	1106	1.88
Selene dorsalis	8.34	84	1.76
Sardinella aurita	6.86	20	1.45
Sardinella maderensis	6.72	28	1.42
Sepia officinalis hierredda	2.18	90	0.46
Alloteuthis africana	0.64	224	0.14
Bregmaceros sp.	0.20	210	0.04
Total	473.12	99.99	

PROJECT STATION: 37
 DATE: 9/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 823
 start stop duration Long E 1300
 TIME :02:09:00 02:39:00 30 (min) Purpose code: 1
 LOG :6456.30 6457.90 1.60 Area code : 3
 FDEPTH: 5 5 GearCond.code: 3
 BDEPTH: 109 110 Validity code:
 Towing dir: 293° Wire out: 150 m Speed: 3 kn*10
 Sorted: 78 Kg Total catch: 180.39 CATCH/HOUR: 360.78

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichiurus lepturus	359.04	1104	99.52
Chloroscombrus chrysurus	1.34	8	0.37
Brachydeuterus auritus	0.40	4	0.11
Total	360.78	100.00	

PROJECT STATION: 42
 DATE: 10/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 808
 start stop duration Long E 1249
 TIME :03:03:00 03:33:00 30 (min) Purpose code: 1
 LOG :6672.50 6674.30 1.80 Area code : 3
 FDEPTH: 5 5 GearCond.code: 3
 BDEPTH: 112 116 Validity code:
 Towing dir: 160° Wire out: 200 m Speed: 3 kn*10
 Sorted: Kg Total catch: 22.45 CATCH/HOUR: 44.90

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Saurida brasiliensis	21.20	474	47.22
Trichiurus lepturus	12.04	32	26.82
Euthynnus alletteratus	5.06	6	11.27
Sphyræna guachancho	2.62	4	5.84
Echeneis naucrates	1.64	2	3.65
GOBIIDAE	0.80	300	1.78
Sardinella maderensis	0.66	2	1.47
Sepia officinalis hierredda	0.54	22	1.20
Alloteuthis africana	0.34	44	0.76
Total	44.90	100.01	

PROJECT STATION: 38
 DATE: 9/ 3/94 GEAR TYPE: PT No:5 POSITION:Lat S 836
 start stop duration Long E 1311
 TIME :08:20:00 08:50:00 30 (min) Purpose code: 1
 LOG :6500.50 6502.40 1.90 Area code : 3
 FDEPTH: 35 45 GearCond.code: 3
 BDEPTH: 66 77 Validity code:
 Towing dir: 270° Wire out: 200 m Speed: 40 kn*10
 Sorted: 46 Kg Total catch: 496.00 CATCH/HOUR: 992.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Chloroscombrus chrysurus	630.00	5572	63.51
Sardinella maderensis	147.00	620	14.82
Trichiurus lepturus	68.00	160	6.85
Sarda sarda	63.00	36	6.35
Selene dorsalis	50.00	260	5.04
Trachinotus ovatus	34.00	40	3.43
Total	992.00	100.00	

PROJECT STATION: 43
 DATE: 10/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 719
 start stop duration Long E 1224
 TIME :19:40:00 20:10:00 30 (min) Purpose code: 1
 LOG :6841.70 6843.60 1.90 Area code : 3
 FDEPTH: 10 10 GearCond.code: 3
 BDEPTH: 110 110 Validity code:
 Towing dir: 263° Wire out: 150 m Speed: 38 kn*10
 Sorted: 69 Kg Total catch: 69.67 CATCH/HOUR: 139.34

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichiurus lepturus	46.80	114	33.59
Synagrops microlepis	23.44	3026	16.82
Euthynnus alletteratus	20.34	24	14.60
Saurida brasiliensis	18.30	5294	13.13
Selene dorsalis	12.00	30	8.61
Auxis thezard	8.96	12	6.43
Echeneis naucrates	3.86	8	2.77
Katsuwonus pelamis	3.54	2	2.54
Trachurus trecae, juvenile	1.94	78	1.39
Illex coindetii	0.16	12	0.11
Total	139.34	99.99	

PROJECT STATION: 39
 DATE: 9/ 3/94 GEAR TYPE: PT No:5 POSITION:Lat S 853
 start stop duration Long E 1305
 TIME :14:01:00 14:43:00 42 (min) Purpose code: 1
 LOG :6559.90 6563.00 3.10 Area code : 3
 FDEPTH: 20 20 GearCond.code: 3
 BDEPTH: 78 83 Validity code:
 Towing dir: 200° Wire out: 190 m Speed: 4 kn*10
 Sorted: Kg Total catch: 47.20 CATCH/HOUR: 67.43

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Euthynnus alletteratus	40.07	37	59.42
Trachinotus ovatus	27.36	67	40.58
Total	67.43	100.00	

PROJECT STATION: 44
 DATE: 10/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 710
 start stop duration Long E 1231
 TIME :22:57:00 23:27:00 30 (min) Purpose code: 1
 LOG :6866.60 6868.50 1.90 Area code : 3
 FDEPTH: 10 10 GearCond.code: 3
 BDEPTH: 49 42 Validity code:
 Towing dir: 55° Wire out: 10 m Speed: 3 kn*10
 Sorted: 58 Kg Total catch: 117.76 CATCH/HOUR: 235.52

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sardinella maderensis	51.60	192	21.91
Boops boops	50.00	5104	21.23
Pellonula leonensis	29.36	3580	12.47
Trachurus trecae, juvenile	26.08	4098	11.07
Brachydeuterus auritus	22.20	320	9.43
Saurida brasiliensis	20.32	6144	8.63
Sardinella aurita	20.16	60	8.56
Trichiurus lepturus	7.20	16	3.06
Sphyræna guachancho	6.96	8	2.96
Alloteuthis africana	1.20	160	0.51
Engraulis encrasicolus	0.32	52	0.14
Scomber japonicus	0.12	4	0.05
Total	235.52	100.02	

PROJECT STATION: 40
 DATE: 9/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 816
 start stop duration Long E 1305
 TIME :19:05:00 19:35:00 30 (min) Purpose code: 1
 LOG :6607.90 6609.60 1.70 Area code : 3
 FDEPTH: 10 10 GearCond.code: 3
 BDEPTH: 68 76 Validity code:
 Towing dir: 265° Wire out: 150 m Speed: 34 kn*10
 Sorted: 129 Kg Total catch: 594.75 CATCH/HOUR: 1189.50

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Brachydeuterus auritus	620.00	5960	52.12
Selene dorsalis	277.50	1088	23.33
Trichiurus lepturus	123.50	470	10.38
Trachurus trecae, juvenile	81.00	1950	6.81
Trachurus trecae	30.20	140	2.54
Sardinella maderensis	28.50	90	2.40
Sphyræna guachancho	19.60	22	1.65
Scomberomorus tritor	4.20	2	0.35
Sarda sarda	2.90	2	0.24
Saurida brasiliensis	1.20	350	0.10
Bregmaceros sp.	0.60	280	0.05
Alloteuthis africana	0.30	160	0.03
Total	1189.50	100.00	

PROJECT STATION: 45
 DATE: 11/ 3/94 GEAR TYPE: PT No:2 POSITION: Lat S 710 Long E 1217
 start stop duration
 TIME : 02:32:00 03:02:00 30 (min) Purpose code: 1
 LOG : 6896.60 6896.40 1.80 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 110 112 Validity code:
 Towing dir: 260° Wire out: 150 m Speed: 3 kn*10

Sorted: Kg Total catch: 7.44 CATCH/HOUR: 14.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	8.22	22	55.24	
Sardinella aurita	2.28	6	15.32	
Caranx crysos	1.96	2	13.17	
Sardinella maderensis	1.70	6	11.42	
Echeneis naucrates	0.72	2	4.84	
Total	14.88		99.99	

PROJECT STATION: 46
 DATE: 11/ 3/94 GEAR TYPE: PT No:6 POSITION: Lat S 632 Long E 1206
 start stop duration
 TIME : 19:14:00 19:44:00 30 (min) Purpose code: 1
 LOG : 7062.40 7064.10 1.70 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 58 71 Validity code:
 Towing dir: 250° Wire out: 150 m Speed: 34 kn*10

Sorted: 78 Kg Total catch: 78.72 CATCH/HOUR: 157.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	77.00	594	48.91	111
Saurida brasiliensis	23.36	6356	14.84	
Trichiurus lepturus	21.00	44	13.34	
Trachurus trecae, juvenile	16.50	1300	10.48	112
Sphyaena guachancho	7.80	8	4.95	
Alectis alexandrinus	5.60	2	3.56	
Sepia orbignyana	2.74	4	1.74	
Alloteuthis africana	2.62	1742	1.66	
Sardinella maderensis	0.52	2	0.33	
Sepiella ornata	0.24	20	0.15	
Lagocephalus laevigatus	0.02	2	0.01	
Engraulis encrasicolus	0.02	2	0.01	
Bregmaceros sp.	0.02	12	0.01	
Total	157.44		99.99	

PROJECT STATION: 47
 DATE: 11/ 3/94 GEAR TYPE: PT No:6 POSITION: Lat S 631 Long E 1156
 start stop duration
 TIME : 23:00:00 23:32:00 32 (min) Purpose code: 1
 LOG : 7093.50 7095.60 2.10 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 103 99 Validity code:
 Towing dir: 46° Wire out: 150 m Speed: 4 kn*10

Sorted: 25 Kg Total catch: 50.22 CATCH/HOUR: 94.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	83.06	300	88.21	
Saurida brasiliensis	6.08	3244	6.46	
Euthynnus alletteratus	3.94	11	4.18	
Brachydeuterus auritus	1.09	11	1.16	
Total	94.17		100.01	

PROJECT STATION: 48
 DATE: 12/ 3/94 GEAR TYPE: PT No:1 POSITION: Lat S 624 Long E 1202
 start stop duration
 TIME : 01:08:00 01:40:00 32 (min) Purpose code: 1
 LOG : 7105.00 7107.30 2.30 Area code : 3
 FDEPTH: 20 17 GearCond.code:
 BDEPTH: 66 78 Validity code:
 Towing dir: 230° Wire out: 200 m Speed: 4 kn*10

Sorted: 93 Kg Total catch: 1513.57 CATCH/HOUR: 2837.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	825.00	2820	29.07	
Brachydeuterus auritus	781.50	6030	27.54	115
Sardinella maderensis	735.00	2970	25.90	113
Sardinella aurita	291.00	930	10.25	114
Trachurus trecae	89.10	540	3.14	
Sphyaena guachancho	33.90	30	1.19	
Saurida brasiliensis	28.50	3150	1.00	
Sphyaena barracuda	27.84	2	0.98	
Chloroscombrus chrysurus	26.10	150	0.92	
Total	2837.94		99.99	

PROJECT STATION: 49
 DATE: 12/ 3/94 GEAR TYPE: PT No:2 POSITION: Lat S 623 Long E 1159
 start stop duration
 TIME : 03:23:00 03:53:00 30 (min) Purpose code: 1
 LOG : 7120.70 7122.50 1.80 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 69 77 Validity code:
 Towing dir: 252° Wire out: 150 m Speed: 4 kn*10

Sorted: 89 Kg Total catch: 603.10 CATCH/HOUR: 1206.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	615.00	2002	50.99	
Sardinella maderensis	274.80	2058	22.78	118
Brachydeuterus auritus	121.60	1460	10.08	117
Sphyaena barracuda	75.60	6	6.27	
Saurida brasiliensis	41.20	7220	3.42	
Sphyaena guachancho	26.60	26	2.21	
Trachurus trecae, juvenile	19.80	748	1.64	116
Trachurus trecae	19.00	102	1.58	
Trichiurus lepturus	8.20	26	0.68	
Chloroscombrus chrysurus	4.40	50	0.36	
Total	1206.20		100.01	

PROJECT STATION: 50
 DATE: 13/ 3/94 GEAR TYPE: PT No:6 POSITION: Lat S 602 Long E 1150
 start stop duration
 TIME : 22:50:00 23:24:00 34 (min) Purpose code: 1
 LOG : 7357.70 7360.10 2.40 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 1174 595 Validity code:
 Towing dir: 252° Wire out: 200 m Speed: 4 kn*10

Sorted: 29 Kg Total catch: 125.58 CATCH/HOUR: 221.61

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	144.71	655	65.30	
Diaphus dumerilli	42.78	24314	19.30	
Aristeus varidens	14.54	16964	6.56	
Sardinella maderensis	11.12	25	5.02	
Saurida brasiliensis	5.72	708	2.58	
Trachurus trecae, juvenile	1.41	35	0.64	
Loligo vulgaris	0.99	282	0.45	
Total	221.27		99.85	

PROJECT STATION: 51
 DATE: 14/ 3/94 GEAR TYPE: PT No:2 POSITION: Lat S 602 Long E 1139
 start stop duration
 TIME : 02:15:00 02:45:00 30 (min) Purpose code: 1
 LOG : 7383.50 7385.40 1.90 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 571 735 Validity code:
 Towing dir: 52° Wire out: 200 m Speed: 3 kn*10

Sorted: 117 Kg Total catch: 323.31 CATCH/HOUR: 646.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	633.06	1918	97.90	
Diaphus dumerilli	10.78	4790	1.67	
Euthynnus alletteratus	2.72	2	0.42	
Saurida brasiliensis	0.06	16	0.01	
Total	646.62		100.00	

PROJECT STATION: 52
 DATE: 14/ 3/94 GEAR TYPE: PT No:2 POSITION: Lat S 554 Long E 1152
 start stop duration
 TIME : 04:29:00 04:59:00 30 (min) Purpose code: 1
 LOG : 7396.80 7398.50 1.70 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 59 53 Validity code:
 Towing dir: 80° Wire out: 200 m Speed: 36 kn*10

Sorted: 87 Kg Total catch: 116.26 CATCH/HOUR: 232.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	201.86	766	86.81	119
Trichiurus lepturus	8.00	26	3.44	
Trichiurus lepturus	8.00	26	3.44	
Sphyaena guachancho	5.80	6	2.49	
Selar crumenophthalmus	4.82	10	2.07	
Trachurus trecae, juvenile	4.60	134	1.98	120
Selene dorsalis	2.92	14	1.26	
Saurida brasiliensis	2.32	430	1.00	
Echeneis naucrates	2.20	2	0.95	
Total	240.52		103.44	

PROJECT STATION: 53
 DATE: 14/ 3/94 GEAR TYPE: PT No:6 POSITION: Lat S 530 Long E 1148
 start stop duration
 TIME : 19:20:00 19:50:00 30 (min) Purpose code: 1
 LOG : 7543.00 7545.10 2.10 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 64 64 Validity code:
 Towing dir: 180° Wire out: 150 m Speed: 39 kn*10

Sorted: 13 Kg Total catch: 13.15 CATCH/HOUR: 26.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida brasiliensis	13.36	2672	50.80	
Brachydeuterus auritus	7.16	232	27.22	122
Trichiurus lepturus	2.08	74	7.91	
Trachurus trecae, juvenile	1.78	66	6.77	121
Alloteuthis africana	0.76	358	2.89	
Sarda sarda	0.38	2	1.44	
Sepiella ornata	0.28	18	1.06	
Pteroscion peli	0.22	8	0.84	
Selene dorsalis	0.18	2	0.68	
Engraulis encrasicolus	0.06	10	0.23	
Bregmaceros sp.	0.04	58	0.15	
Total	26.30		99.99	

PROJECT STATION: 54
 DATE: 14/ 3/94 GEAR TYPE: PT No:6 POSITION: Lat S 542 Long E 1136
 start stop duration
 TIME : 22:28:00 22:58:00 30 (min) Purpose code: 1
 LOG : 7568.40 7570.40 2.00 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 170 197 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 3 kn*10

Sorted: 23 Kg Total catch: 162.62 CATCH/HOUR: 325.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	324.10	798	99.65	
MYCTOPHIDAE	0.56	672	0.17	
Trachurus trecae, juvenile	0.42	14	0.13	
Sardinella maderensis	0.20	2	0.06	
Total	325.28		100.01	

PROJECT STATION: 55
 DATE:15/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 539
 start stop duration Purpose code: 2
 TIME :06:12:00 00:42:00 30 (min) Long E 1133
 LOG :573.00 574.80 1.80 Area code : 3
 FDEPTH: 230 245 GearCond.code:
 BDEPTH: 230 245 Validity code:
 Towing dir: 353° Wire out: 660 m Speed: 4 kn*10
 Sorted: 77 Kg Total catch: 103.07 CATCH/HOUR: 206.14

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Pterothrissus bellocci	64.00	498	31.05
Synagrops microlepis	43.00	2224	20.86
Chlorophthalmus atlanticus	34.80	1406	16.88
Parapenaeus longirostris	18.60	7770	9.02
Todaropsis eblanæ	15.40	282	7.47
Bembrops sp.	15.40	332	7.47
Trichiurus lepturus	4.04	22	1.96
Merluccius polli	3.06	66	1.48
Pseudotolithus senegalensis	2.84	18	1.38
Solenocera africana	2.68	276	1.30
Lamprogrammus sp.	0.44	10	0.21
Nezumia aequalis	0.42	10	0.20
Cynoponticus ferox	0.40	16	0.19
Peristedion cataphractum	0.40	56	0.19
Munida sp.	0.34	90	0.16
Scylliorhinus stellaris	0.20	2	0.10
Coeliorhinus coeliorhincus	0.12	16	0.06
Total	206.14	99.98	

PROJECT STATION: 56
 DATE:15/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 538
 start stop duration Purpose code: 2
 TIME :02:05:00 02:35:00 30 (min) Long E 1125
 LOG :7584.80 7586.40 1.60 Area code : 3
 FDEPTH: 411 416 GearCond.code:
 BDEPTH: 411 416 Validity code:
 Towing dir: 10° Wire out:1220 m Speed: 3 kn*10
 Sorted: 71 Kg Total catch: 71.03 CATCH/HOUR: 142.06

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Merluccius polli	96.60	184	68.00
Centrophorus granulosus	23.40	6	16.47
Macrurus caninus	2.82	22	1.99
Todaropsis eblanæ	2.62	40	1.84
Laemonema laureysi	1.56	32	1.10
Synagrops microlepis	1.48	96	1.04
Epigonus telescopus	1.46	8	1.03
Trichiurus lepturus	1.26	18	0.89
Deania profundorum	1.22	2	0.86
Zenopsis conchifer	1.20	2	0.84
Aristeus varidens	1.12	106	0.79
Malacocephalus occidentalis	1.10	12	0.77
Yarella blackfordi	0.96	104	0.68
Geryon maritæ	0.96	2	0.68
Illex coindetii	0.76	4	0.53
Peristedion cataphractum	0.62	66	0.44
Etmopterus pusillus	0.42	2	0.30
Malacocephalus laevis	0.42	2	0.30
Chlorophthalmus atlanticus	0.42	14	0.30
Parapenaeus longirostris	0.36	38	0.25
Trigla lyra	0.30	2	0.21
Chaunax pictus	0.28	4	0.20
Stereomastis sp.	0.28	20	0.20
Bembrops sp.	0.16	4	0.11
Munida sp.	0.10	20	0.07
Nezumia aequalis	0.10	2	0.07
Solenocera africana	0.08	8	0.06
Total	142.06	100.02	

PROJECT STATION: 57
 DATE:15/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 535
 start stop duration Purpose code: 2
 TIME :03:43:00 04:13:00 30 (min) Long E 1124
 LOG :7592.70 7594.30 1.60 Area code : 3
 FDEPTH: 510 513 GearCond.code:
 BDEPTH: 510 513 Validity code:
 Towing dir: 10° Wire out:1520 m Speed: 3 kn*10
 Sorted: 41 Kg Total catch: 103.82 CATCH/HOUR: 207.64

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Merluccius polli	127.50	674	61.40
Malacocephalus occidentalis	39.44	130	18.99
Malacocephalus laevis	20.34	240	9.80
Macrurus caninus	10.10	168	4.86
Etmopterus pusillus	3.08	6	1.48
Hoplostethus sp.	1.94	30	0.93
Yarella blackfordi	1.60	194	0.77
Halosaurus sp.	1.54	40	0.74
Conger conger	1.00	34	0.48
Parapenaeus longirostris	0.60	94	0.29
Chaunax pictus	0.44	50	0.21
Total	207.58	99.95	

PROJECT STATION: 58
 DATE:15/ 3/94 GEAR TYPE: PT No:2 POSITION:Lat S 536
 start stop duration Purpose code: 1
 TIME :05:38:00 06:08:00 30 (min) Long E 1131
 LOG :7602.10 7603.80 1.70 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 306 272 Validity code:
 Towing dir: 90° Wire out: 200 m Speed: 3 kn*10
 Sorted: 33 Kg Total catch: 32.93 CATCH/HOUR: 65.86

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Ethynnus alletteratus	28.30	24	42.97
Auxis thazard	15.14	14	22.99
MESOPELAGIC MIX	11.86	19	11.99
Katsuwonus pelamis	7.36	4	11.18
Trichiurus lepturus	3.20	20	4.86
Total	65.86	100.01	

PROJECT STATION: 59
 DATE:15/ 3/94 GEAR TYPE: PT No:6 POSITION:Lat S 531
 start stop duration Purpose code: 1
 TIME :20:08:00 20:43:00 35 (min) Long E 1139
 LOG :7738.70 7741.10 2.40 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 128 128 Validity code:
 Towing dir: 180° Wire out: 150 m Speed: 4 kn*10
 Sorted: 41 Kg Total catch: 138.22 CATCH/HOUR: 236.95

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichiurus lepturus	210.69	1665	88.92
MYCTOPHIDAE	9.09	6483	3.84
Echeneis naucrates	4.53	5	1.91
Synagrops microlepis	3.77	274	1.59
Auxis thazard	3.12	2	1.32
Saurida brasiliensis	2.35	411	0.99
Small squids	2.18	722	0.92
Micacorvina angolensis	0.91	10	0.38
COBILIDAE	0.27	27	0.11
Sepiella ornata	0.05	5	0.02
Total	236.96	100.00	

PROJECT STATION: 60
 DATE:15/ 3/94 GEAR TYPE: PT No:6 POSITION:Lat S 525
 start stop duration Purpose code: 1
 TIME :22:34:00 23:06:00 32 (min) Long E 1144
 LOG :7756.00 7758.30 2.30 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 83 83 Validity code:
 Towing dir: 344° Wire out: 150 m Speed: 4 kn*10
 Sorted: 16 Kg Total catch: 40.33 CATCH/HOUR: 75.62

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Brachydeuterus auritus	31.99	1039	42.30
Trichiurus lepturus	16.91	563	22.36
Pentheroscion mbizi	11.64	182	15.39
MESOPELAGIC MIX	5.01	3754	6.63
Sardinella aurita	3.75	13	4.96
Saurida brasiliensis	3.43	686	4.54
Trachurus trecae, juvenile	2.55	101	3.37
Auxis thazard	0.34	2	0.45
Total	75.62	100.00	

PROJECT STATION: 61
 DATE:16/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 526
 start stop duration Purpose code: 2
 TIME :00:48:00 00:59:00 11 (min) Long E 1135
 LOG :7770.30 7770.90 0.60 Area code : 3
 FDEPTH: 237 238 GearCond.code:
 BDEPTH: 237 238 Validity code:
 Towing dir: 360° Wire out: 690 m Speed: 3 kn*10
 Sorted: 3 Kg Total catch: 7.05 CATCH/HOUR: 38.45

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Centrophorus granulosus	18.55	5	48.24
Parapenaeus longirostris	5.95	622	15.47
Solenocera africana	3.00	316	7.80
Pterothrissus bellocci	2.78	16	7.23
Myliobatis aquila	1.58	5	4.11
Pseudotolithus senegalensis	1.09	5	2.83
Aristeus varidens	1.04	475	2.70
Conger conger	0.76	11	1.98
MYCTOPHIDAE	0.65	213	1.69
Chaunax pictus	0.49	55	1.27
Bembrops sp.	0.49	49	1.27
Merluccius polli	0.44	5	1.14
Illex coindetii	0.38	5	0.99
Synagrops microlepis	0.38	16	0.99
Coeliorhinus coeliorhincus	0.33	5	0.86
Chlorophthalmus atlanticus	0.27	11	0.70
Malacocephalus laevis	0.27	5	0.70
Total	38.45	99.97	

PROJECT STATION: 62
 DATE:16/ 3/94 GEAR TYPE: BT No:1 POSITION:Lat S 528
 start stop duration Purpose code: 2
 TIME :02:06:00 02:14:00 8 (min) Long E 1130
 LOG :7777.60 7777.90 0.30 Area code : 3
 FDEPTH: 398 397 GearCond.code:
 BDEPTH: 398 397 Validity code:
 Towing dir: 180° Wire out:1200 m Speed: 2 kn*10
 Sorted: 15 Kg Total catch: 16.20 CATCH/HOUR: 121.50

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Merluccius polli	101.25	308	83.33
Trichiurus lepturus	5.33	30	4.39
Deania profundorum	4.13	8	3.40
Malacocephalus laevis	3.60	15	2.96
Todaropsis eblanæ	2.25	15	1.85
Parapenaeus longirostris	1.35	83	1.11
Yarella blackfordi	1.05	113	0.86
Peristedion cataphractum	0.75	30	0.62
Synagrops microlepis	0.53	30	0.44
Conger conger	0.53	8	0.44
Malacocephalus occidentalis	0.45	8	0.37
Myliobatis aquila	0.30	8	0.25
Total	121.52	100.02	

ANNEX II Instruments and fishing gear used.

Acoustic instruments

The SIMRAD EK500/38 KHz scientific sounder was used during the survey for estimation of fish density. The EK500 has a built- in digital echo integrator, but the Bergen Echo Integrator system (BEI) was used throughout the survey. The details of the instrument settings are as follows:

Transceiver settings:

Bandwidth	Wide (3.8 KHz)
Pulse length	Medium (1 ms)
Max Power	2000 Watt
Sv Transducer gain	27.8 dB
Ts Transducer gain	28.1 dB

Printer settings:

Range	0 - 100 or 0 - 250 m
TVG	20 log R
TS Colour min	- 50 dB
Sv Colour min	- 64 dB

An ES38B with a 6.8° -3dB beamwidth transducer was used for integration.

A calibration experiment using a standard copper sphere, performed in Baia dos Tigres 23/2 1994 gave the following results: Sv Transducer gain 27.8 dB, Ts Transducer gain 28.1 dB.

Glossary:

Sv Transducer gain: Peak transducer gain assumed during computation of volume backscattering strength.

Ts Transducer gain: Peak transducer gain assumed during computation of target strength.

Ts Colour min : Lower limit of colour scale relative to target strength.

Sv Colour min : Lower limit of colour scale relative to Volume back scattering.

Hydrography

Conductivity, temperature, density and oxygen were sampled regularly at CTD stations with a Seabird CTD-sonde. The salinity was calculated by a computer.

Fishing gear

Two different sized pelagic trawls and one bottom trawl were used during the survey. The following drawings show the size of these trawls.

F/F Dr. Fridtjof Nansen

OVER/UNDER/SIDER

OVERDEL:
50 STK 11" PLASTKULER

UNDERDEL:
14 M/M WIRE OMSP. MED
14 M/M BLYTAU
+ KJETTING.

TOTAL VEKT UNDER 400 KG.

SIDER:

1/2 HOGG 5,00 MTR
STRF. 6,00 MTR
ARM 6,00 MTR
TAMP 2,60 MTR
TOT. 36,00 MTR
22 M/M Ø COMB. TAU

1/2 HOGG 4,00 MTR
STRF. 6,00 MTR
ARM 22,40 MTR
TAMP 2,60 MTR
TOT. 35,00 MTR
28 M/M Ø
FL. DANLINE

2H1-2
3H1-1

2,6
8,0
2 MSK
NR 480

MASKER TRAAD LENGDE MASKER
M/M NR. I MTR. I EVING

3200.0 240 22.4 4

3200.0 240 32.0 4 9.5L

1620.0 160 13.0 4

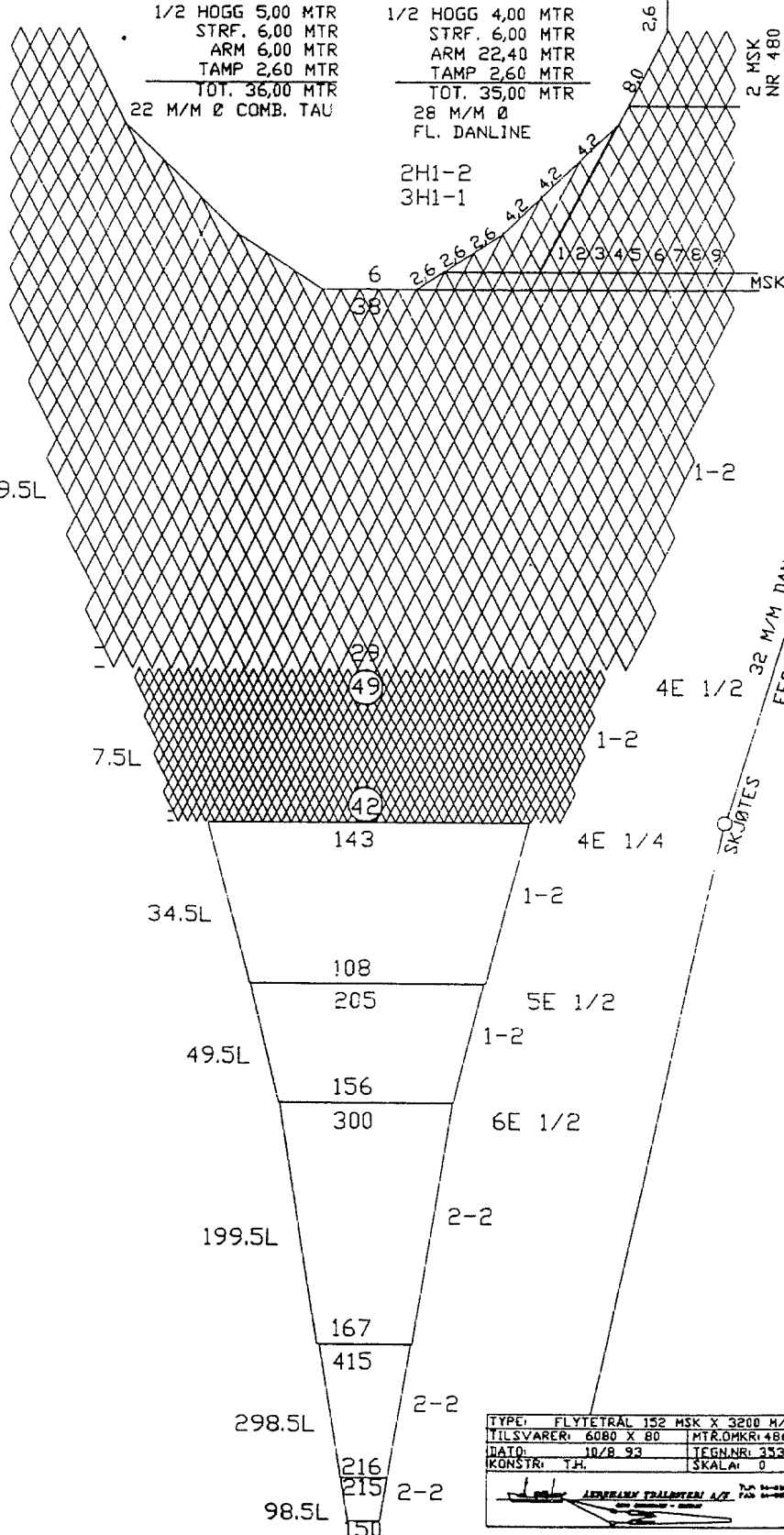
400.0 48 14.0 4

200.0 32 10.00 4

100.0 24 20.0 4

38.0 12 11.4 4

38.0 18 3.76 4



32 M/M DANLINETAU
FESTES FOR HVER 40 CM
2 1/2 KORTERE ENN NOTLIN

TYPE:	FLYTETRAL 152 MSK X 3200 M/M
TILSVARER:	6080 X 80 MTR.OMKR: 486,4
DATO:	10/8 93 TEGNR: 353NY
KONSTR:	T.H. SKALA: 0

F/F Dr. Fridtjof Nansen

OVER/UNDER

SIDER

MASKER TRAAD LENGDE MASKER

M/H NR. I MTR. I EVING

OVERDEL:
50 STK 11' KULER
ONSLUTTET AV NETT.

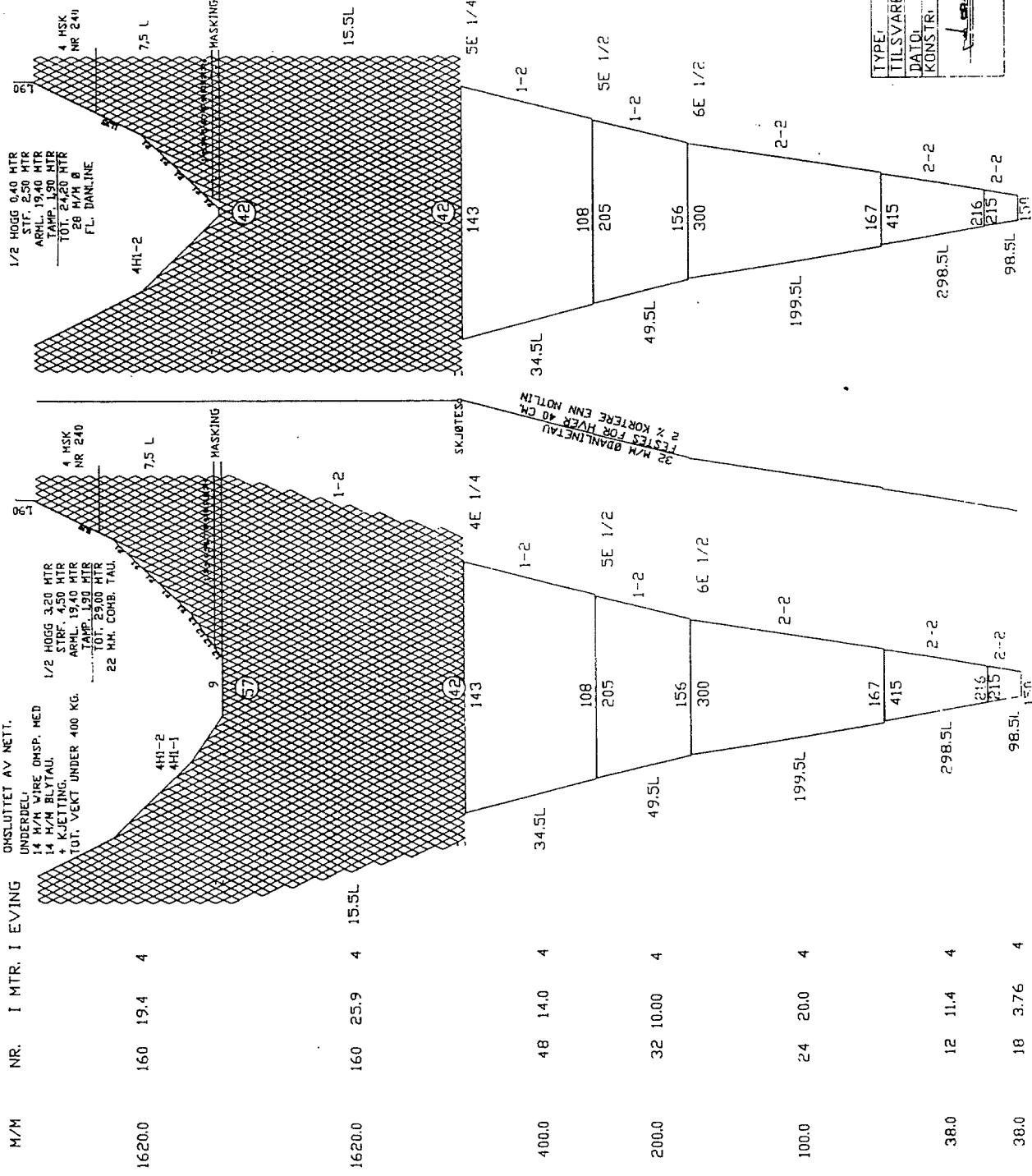
UNDERDEL:
14 M/M WIRE OHSP. MED
14 M/M BLITAU.
+ KJETTING.
ARHL. 19.40 MTR
TOT. VEKT UNDER 400 KG.
TOT. 2300 MTR
82 MM. COMB. TALL.

1/2 HOGG 0.40 MTR
STF. 2.50 MTR
ARHL. 19.40 MTR
TAMP. 1.90 MTR
TOT. 24.20 MTR
28 M/M Ø
F.L. DANLINE

4 HSK
NR 240

1/2 HOGG 3.20 MTR
STRF. 4.50 MTR
ARHL. 19.40 MTR
TAMP. 1.90 MTR
TOT. 2300 MTR
82 MM. COMB. TALL.

4 HSK
NR 240

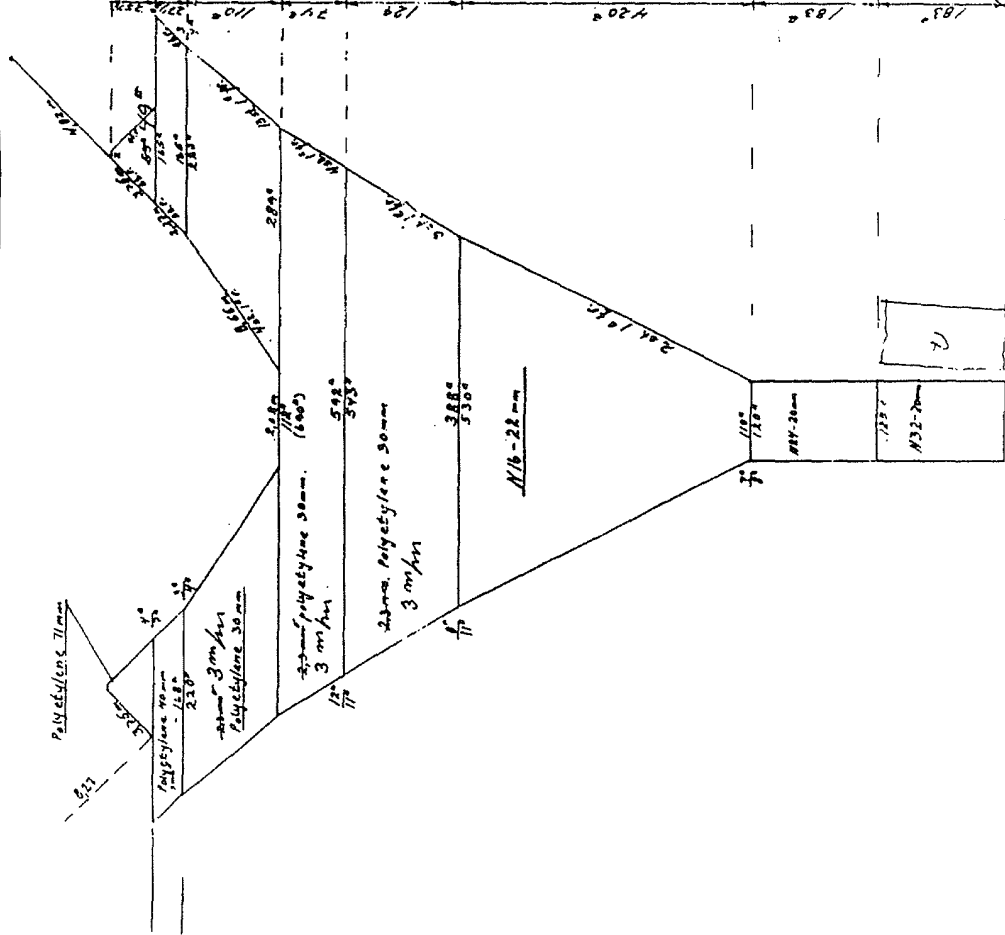


TYPE:	FLYETRAL 198 MSK X 1620 M/H
TILSVARER:	4010 X 80 MTR.ØMKR. 320
DATO:	23/6 93
KONSTR:	T-H
TEGNNR:	510
SKALA:	0

TLP. 11-11591
FAX 11-85975

Mønning: 19 på 5 mm, 20 på 1,42 m, r. 14 på 5 mm = 2,02 m
 (Falt på 12 mm
 1/2" wire klyvet
 og benet på 51
 Fiskekline 47,20 m
 Headline 40,80 m

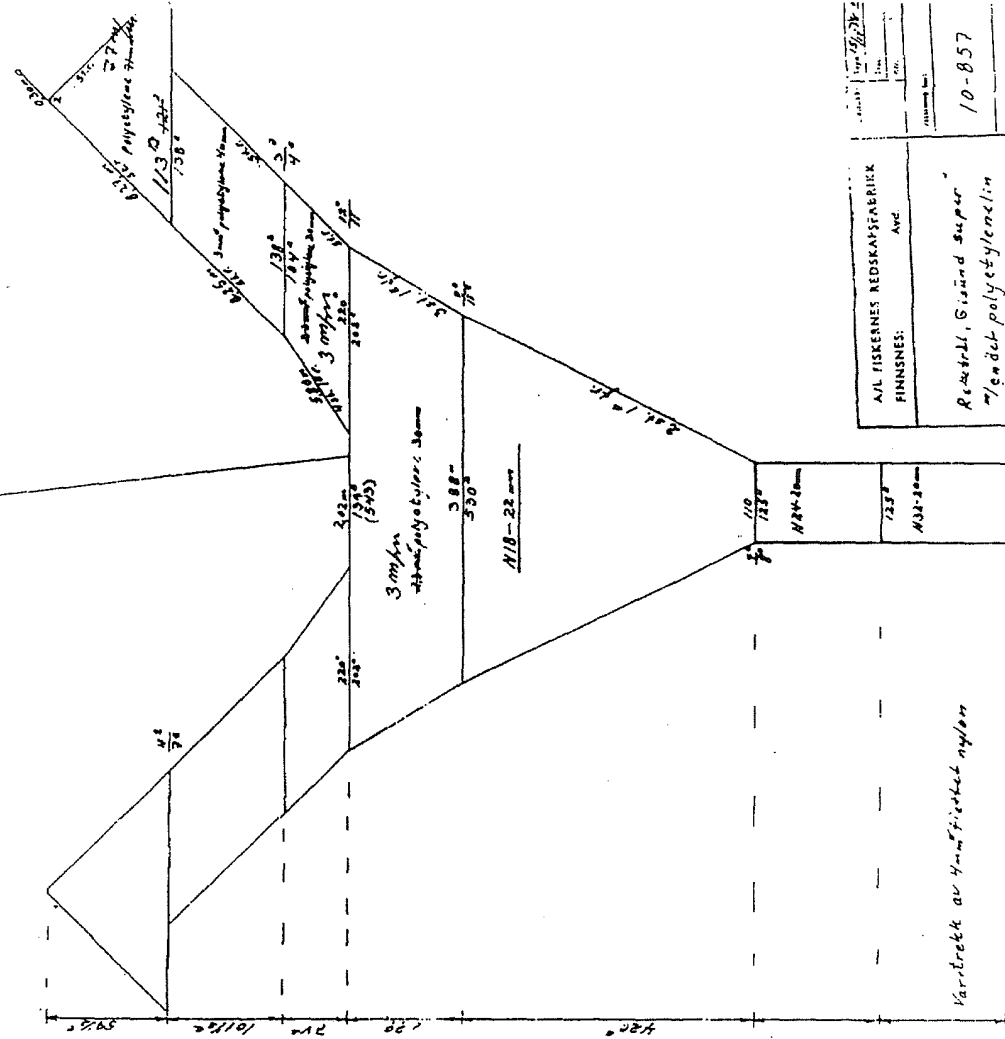
Overdel



2) Innernett H. 6 - 69. 73 omf.
 Ek. 8 m/lyn

Mønning: 19 på 5 mm, 20 på 1,42 m, r. 14 på 5 mm = 2,02 m
 (Falt på 12 mm
 1/2" wire klyvet
 og benet på 51
 Fiskekline 47,20 m

Undersø



Varetekt av 4-m-fisket nylon

A/L FISKERNES REDSKAPFABRIK FINNSNES:	
AVE:	
Rektet, Giønd super	
7-fendert polyetylene 30	
10-857	

