

**SURVEYS OF FISH RESOURCES OF NAMIBIA**

**Cruise Report No 3/96**

**Survey of the horse mackerel resources**

**4 - 23 June 1996**



CRUISE REPORT "DR. FRIDTJOF NANSEN"

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**4 - 23 June 1996**

by

**J. Hamre and S. Floen**

Institute of Marine Research  
P. O. Box 1870 Nordnes  
N-5024 Bergen, Norway

**E. Klingelhoeffter and A. Lehmensiek**

National Marine Information and Research Centre  
Swakopmund  
Namibia

**Institute of Marine Research  
Bergen, Norway**





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# CHAPTER 1 INTRODUCTION

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## 1.1 Objectives

1. Carry out a hydro-acoustic survey on the pelagic and mid-water horse mackerel (*Trachurus capensis*), to:

determine the abundance and spatial and vertical distribution of the exploited stock

determine the size composition of the stock

obtain total length\total weight\gutted weight relationships

obtain sex, reproductive stages and gonad weight

2. determine size composition and distribution of the other small pelagic species (pilchard, anchovy and round herring)

3. Collect data on the basic oceanographic parameters per degree latitude, namely:

temperature

dissolved oxygen

salinity

nutrients

## 1.2 Participation

The scientific staff from the National Marine Information and Research Centre (NatMIRC), Swakopmund, Namibia were:

Ekkehard KLINGELHOEFFER (Team leader), Anke LEHMENSIEK, Heidrun PLARRE, Aina IITA, Hilma ASINO and Justina SHIFIDI.

The scientific staff from the Institute of Marine Research (IMR), Bergen, Norway, were:

Johannes HAMRE (Cruise leader), Svein FLOEN, Bjarte KVINDE and Jarle KRISTIANSEN.

### 1.3 Schedule

The RV 'Dr. Fridtjof Nansen' left Walvis Bay at 1700 on 4 June 1996 and steamed southward to 26°00' S. From 25°15' S on the way south the survey was initiated inshore and the integrator values per five nautical miles were recorded. The first CTD line commenced inshore at 26°00' S.

The survey followed a systematic parallel grid of 20 nautical miles (NM) apart for the offshore regions from 26°00' S to 21°00' S. For the inshore region at less than 100 m bottom depth a survey grid of systematic square tracks was used. In the region between 21°00' S and 17°15' S the same grid pattern was used except that the distance between the offshore grid lines was reduced from 20 NM to 15 NM. The grid pattern was somewhat modified between 21°00' S and 23°00' S, due to an unexpected break of the survey on 14 June (Figure 1a).

The RV 'Dr. Fridtjof Nansen' arrived in Walvis Bay on 23 June 1996 at 1800. A total of 4964 NM were steamed.

### 1.4 Survey effort

The course track with the trawl stations and CTD stations is presented in Figure 1a and b.

The number of hauls and CTD stations by area and gear type are listed in the table below:

Area	Bottom trawls	Mid-water trawls	Surface trawls	Trawl failures	Total no. of trawls	CTD stations
26°00'-21°00'	5	22	1	3	31	35
21°00'-17°15'	21	23	2	2	48	26
TOTAL	26	45	3	5	79	61

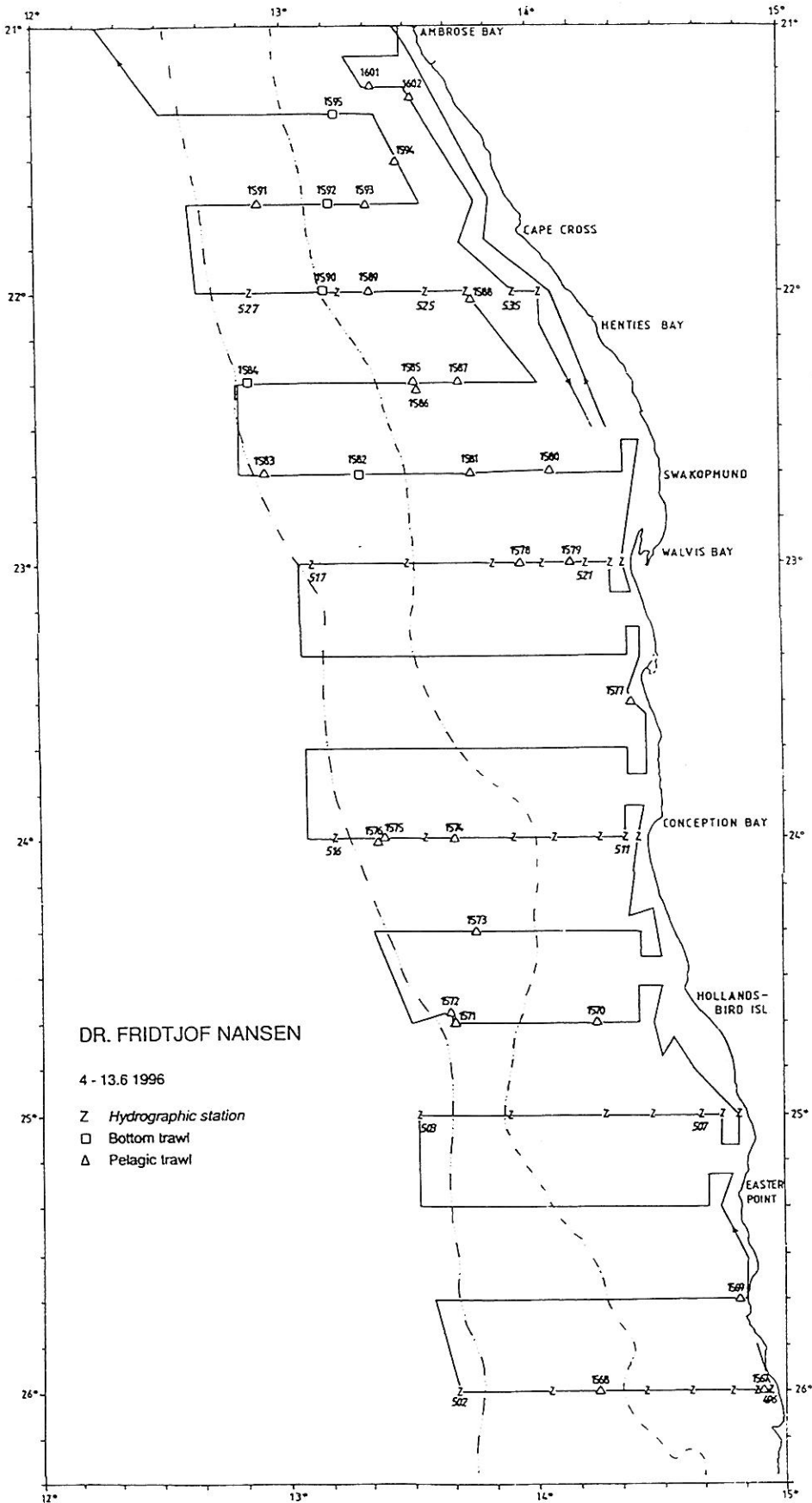


Figure 1a. Course track and fishing stations, Dolphin Head to Ambrose Bay.

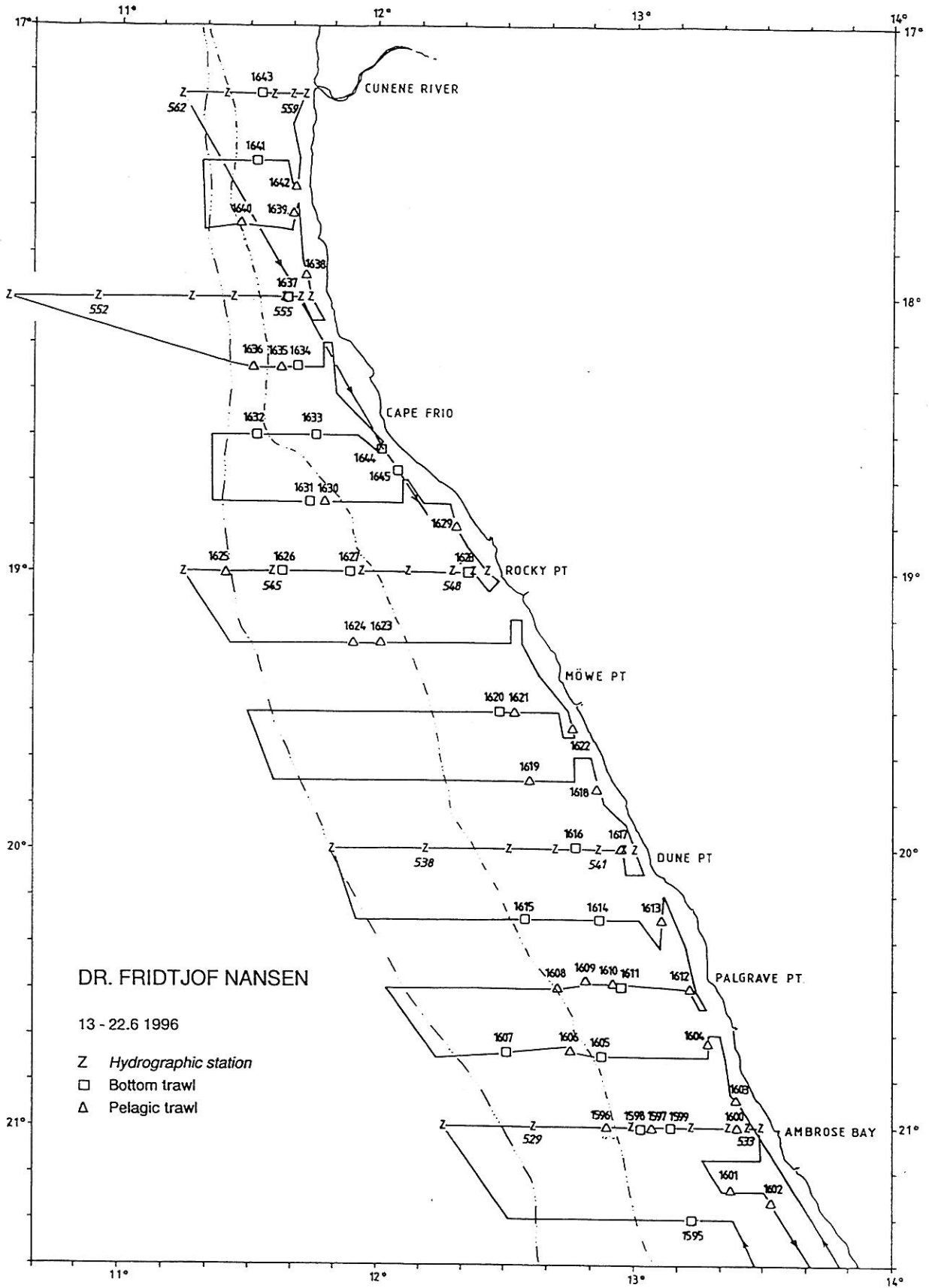


Figure 1b. Course track and fishing stations, Ambrose Bay to Cunene River.

## CHAPTER 2 METHODS

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### 2.1 Hydrographic sampling

#### 2.1.1 Hydrography

A Seabird 911+ CTD probe was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done using the Seabird Seasave software installed on a PC. A total of 61 CTD stations were worked along 10 hydrographic sections from 26°00' S to 17°15' S (Annex II). At each degree latitude CTD stations were carried out at the following distances from the coast: 2, 5, 10, 20, 30, 50 and 70 NM. At each station two Niskin bottles were triggered for water samples, one near the surface and one near the bottom. In order to calibrate the oxygen and salinity sensors, these samples were analysed for dissolved oxygen using the Winkler method and salinity using a PORTASAL mod. 8410 salinometer.

Sea temperature at 5 m depth was recorded continuously during the cruise (Annex II).

#### 2.1.2 Nutrient sampling

Nutrient samples were taken at the same stations as the oxygen samples i.e. taken at 5 m from the surface and at bottom depth. Two additional samples were taken between near surface and bottom depth. The water samples were collected in the 500 ml plastic bottles and filtered immediately, in order to remove most of the plankton. The filtered samples were then stored in plastic test tubes and placed in the freezer. The analyses of the nutrients are to be carried out at the laboratory at NatMIRC.

### 2.2 Distribution and abundance estimation

#### 2.2.1 Survey area

The limits of the survey area were determined from the previous data of pelagic and mid-water fish distribution, i.e. the area from the Lüderitz upwelling cell (26°00' S) to the border

between Namibia and Angola ( $17^{\circ}15' S$ ) was surveyed. The survey followed a systematic parallel grid of 20 NM apart from  $26^{\circ}00'$  to  $21^{\circ}00' S$  and 15 NM apart from  $21^{\circ}00'$  to  $17^{\circ}15' S$ , due to the greater abundance of horse mackerel in the region north of  $21^{\circ}00' S$ . The inshore area of the survey was limited to approximately 2 NM from the coast and the offshore area was covered up to the 500 m isobath. At less than 100 m bottom depth a survey grid of systematic square tracks was used to obtain a better coverage of the inshore juvenile horse mackerel.

Since the RV 'Dr. Fridtjof Nansen' had to be in the harbour of Walvis Bay on 14 June for half a day the offshore transects between  $23^{\circ}00' S$  and  $21^{\circ}00' S$  were completed first and then the inshore region was covered by zigzag transects while sailing to and from Walvis Bay.

To allow comparison with previous pelagic fish surveys, the region was divided into two major areas:

$26^{\circ}00'$ to $21^{\circ}00' S$	Dolphin Head to Ambrose Bay
$21^{\circ}00'$ to $17^{\circ}15' S$	Ambrose Bay to Cunene River

The course tracks with the trawling and CTD stations for the two areas are shown in Figures 1a-b, respectively.

### 2.2.2 Sampling methods and data analysis

A description of the acoustic instruments and their standard settings are given in Annex I, including a description of the fishing gear used.

An acoustic echo-integration system provided measurements of fish densities, averaged over 5 NM distances. The acoustic unit measured by this calibrated echo-integrator system is the area backscattering coefficient,  $S_A$ .

The scrutinising process of the Bergen Echo Integrator, BEI, was used to partition integrator data to species or species groups by separating echo recordings horizontally or vertically. Integrator data from fish targets were allocated to the following groups on the basis of trawl sampling and acoustic character, as recognised from the echo recordings:

Juvenile horse mackerel ( $\leq 20$  cm)



Juvenile horse mackerel (> 20 cm)  
 Pelagic 1 (pilchard, anchovy and round herring)  
 Pelagic mix  
 Gobies  
 Demersal species  
 Plankton and mesopelagic  
 Mesopelagic

In previous surveys horse mackerel above 20 cm has been classified as adults. Starting from the present survey, specimens larger than 20 cm are classified as adults only if they are mature.

Maps containing these integrator data were drawn for horse mackerel and clupeoid fishes and from these records the distribution of the fish was indicated (Figures 2a-b and 3).

Areas of fish distribution were divided into smaller units if significant differences were observed in the density of the fish and the average lengths of the fish in a specific area. The average  $S_A$ -values within an unit were then obtained by averaging all data measured during the coverage of that area, excluding those values obtained during trawling against the course line. The area was calculated in  $\text{cm}^2$  with a planimeter and converted to  $\text{NM}^2$ .

The following target strength (TS) function was applied to convert  $S_A$ -values (mean integrator value for a given area) to number of fish:

$$TS = 20 \log L - 72 \text{ [dB]}$$

where the total length of the fish,  $L$  is expressed in centimetres. This target strength to size relationship has been used for a number of fish species (horse mackerel, pilchard, anchovy and round herring), although originally derivated from early measurements of North Sea herring. Experiments in the past have been carried out to determine the validity of the target strength presently used for the Cape horse mackerel. The target strength of the North Sea herring will however, be used until a more specific target strength for horse mackerel is determined.

The number of fish in each length frequency group (cm) in an area was calculated by applying the following formula:

$$N_i = S_A \cdot A \cdot P_i / \sum_{i=1}^n (P_i / C_{Fi})$$

where

$N_i$	=	number of fish in length group $i$
$A$	=	area in $\text{NM}^2$
$S_A$	=	mean integrator value in the area
$P_i$	=	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 was then summed and the total number of fish obtained. The total biomass of fish was computed using the mean weight per length group obtained from trawl samples.

## 2.3 Biological sampling

### 2.3.1 Trawl sampling strategy

Prior to sampling a trawl, the catch was well mixed. A random sample representative of the total catch was taken. The size of the sample depended on the size of the catch. In cases where the catch was small, the total catch was sampled.

To determine the catch composition of the trawl the number and weight for each species in the random sample was recorded. This sample was then raised to the total catch.

The procedures to determine the size composition for all commercial species were as follows:

- Total length (Lt):
  - 100 horse mackerel per sample for total length
  - 50 fish per sample for: pilchard, anchovy, round herring and hake
- Measurement:
  - Recorded to the nearest 0.5 cm (below) for the pelagic species
  - and to the nearest 1.0 cm (below) for hake
- Weight:
  - Total weight of measured fish sampled in kg

### 2.3.2 Biological data

Biological data were collected for the target species, Cape horse mackerel. The biological parameters recorded included:

- Total length (Lt.) to the nearest mm
- Body weight and gutted weight to the nearest g
- Sex, gonad weight and reproductive stages

#### *Biological data sampling strategy*

The sampling procedures per degree latitude were as follows:

- Size composition:

10 fish per cm class were recorded to the nearest 1 mm below

- Fish weight:

Total and gutted weight of 10 fish per cm class were recorded to the nearest 1 mg below

- Reproductive stages and sex determination:

The seven stage category as listed in Annex IX was used to describe the reproductive stage of the horse mackerel.

Sex identification was classified as: Juvenile (0), Male (1), Female (2)

- Gonad weight:

Ovary and testes weight of 10 fish per cm class were recorded to the nearest 1 mg below.

- Otolith sampling:

Five fish per cm class

Both otoliths of the fish were collected

Otoliths were stored in envelopes

Only the station number and numerical number was recorded on the envelope. The numerical number used on the envelope corresponded to the numerical number on a work sheet containing the biological information listed above.

*Processing of biological data*

- Size composition:

The size composition of horse mackerel was pooled per two degrees latitude. Size composition of the other pelagic and demersal commercially important species, were pooled by simple adding of all stations trawled during the survey. All trawl stations and biological data were entered onto the NAN-SIS data base.

- Length\weight relationship:

The total length/total weight/gutted weight relationships for the horse mackerel were calculated by fitting power curves to the weight-length regressions. These regression relationships included fish sampled for the whole region.

The length-weight data of horse mackerel was also used to calculate the fish condition factor,  $(\text{weight} \times 100)/\text{length}^3$ , of the horse mackerel.

All data was processed on Microsoft Excel spreadsheets.

## CHAPTER 3 RESULTS

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### 3.1 Hydrography

The results of the CTD measurements are shown in Annex II.

An upwelling structure is clearly seen in the vertical sections of temperature and oxygen. The salinity in the upper layer was quite homogenous, especially in the southern and central part of the survey area, which explains why the upwelling structure was observed in this parameter. The upwelling was most pronounced at 19°S, near Rocky Point.

In the oxygen sections a minimum with values below 1ml/l was observed along the entire shelf. This feature was most pronounced at 23°S (outside Walvis Bay) where the oxygen minimum layer was about 100 m thick, with bottom values below 0.25ml/l.

The horizontal distribution of surface temperature confirm the upwelling signal along the entire coast, with SST near the coast was 14°C (13°C in the extreme south), increasing to 16 - 17°C some 80 NM from the coast.

### 3.2 Distribution

The distribution patterns of the horse mackerel and clupeoid fishes (pilchard, round herring and anchovy) are shown in Figures 2a-b and 3. The scale used in the distribution charts to illustrate different levels of density is presented in absolute acoustic units, which is the mean integrator value  $S_A$  for a given area.

Juvenile horse mackerel ( $\leq 20$  cm) was generally observed in inshore waters forming small shoals near the surface. The juvenile horse mackerel above 20 cm was found more offshore on the shelf at intermediate depths. Only immature horse mackerel occurs in northern Namibian waters. This means that the horse mackerel is migrating out of the area when reaching maturity.

### 3.2.1 Dolphin Head to Ambrose Bay

Juvenile horse mackerel were recorded mainly inshore, from Sandwich Harbour to Henties Bay and north of Cape Cross. A small shoal with a low density was found off Hollandsbird Island. Fairly dense shoals were observed in two small areas, namely off Walvis Bay and between Ambrose Bay and Henties Bay. In the close inshore region the juvenile horse mackerel had an average length between 9 and 11 cm, where as larger fish with an average length of 13 to 19 cm occurred offshore up to 200 m bottom depth.

Mid-water horse mackerel was scattered and distributed from Ambrose Bay to the south of Conception Bay. Two large and two smaller shoals were found around the 200 and 500 m isobaths. Low densities of fish were recorded in most of these areas, except for a small area off Conception Bay at 500 m bottom depth which had a fairly high concentration. Horse mackerel south of Walvis Bay were larger (30 - 35 cm) than those occurring north of Walvis Bay, which had an average length of 21 to 23 cm.

Small and low concentration shoals with of clupeoid fishes were recorded north of Hottentot Point, near Hollandsbird Island, between Swakopmund and Walvis Bay and near Ambrose Bay.

### 3.2.2 Ambrose Bay to Cunene River

Juvenile horse mackerel ( $\leq 20$  cm) were found mainly inshore along the entire northern Namibian coast from Ambrose Bay to the Cunene River. Fish with an average length of 9 to 11 cm were found between Ambrose Bay and Cape Frio. Larger juvenile fish, with an average length of 13 to 19 cm, were mainly distributed offshore at depth between 100 and 200 m north of Cape Frio and sometimes to depths up to 500 m. A few scattered areas off Cape Frio, Rocky Point and Palgrave Point had very high densities.

Juvenile horse mackerel ( $> 20$  cm) were mainly recorded between Cape Frio and Möwe Point at 200 m and 500 m bottom depth. The average length of the fish in this area ranged between 20 and 29 cm.

Clupeoid fishes were distributed between Ambrose Bay and Palgrave Point, Dune Point and Rocky Point and to the north of Cape Frio. A number of shoals with a very high density, probably pilchard, occurred close inshore between Rocky Point and Dune Point.

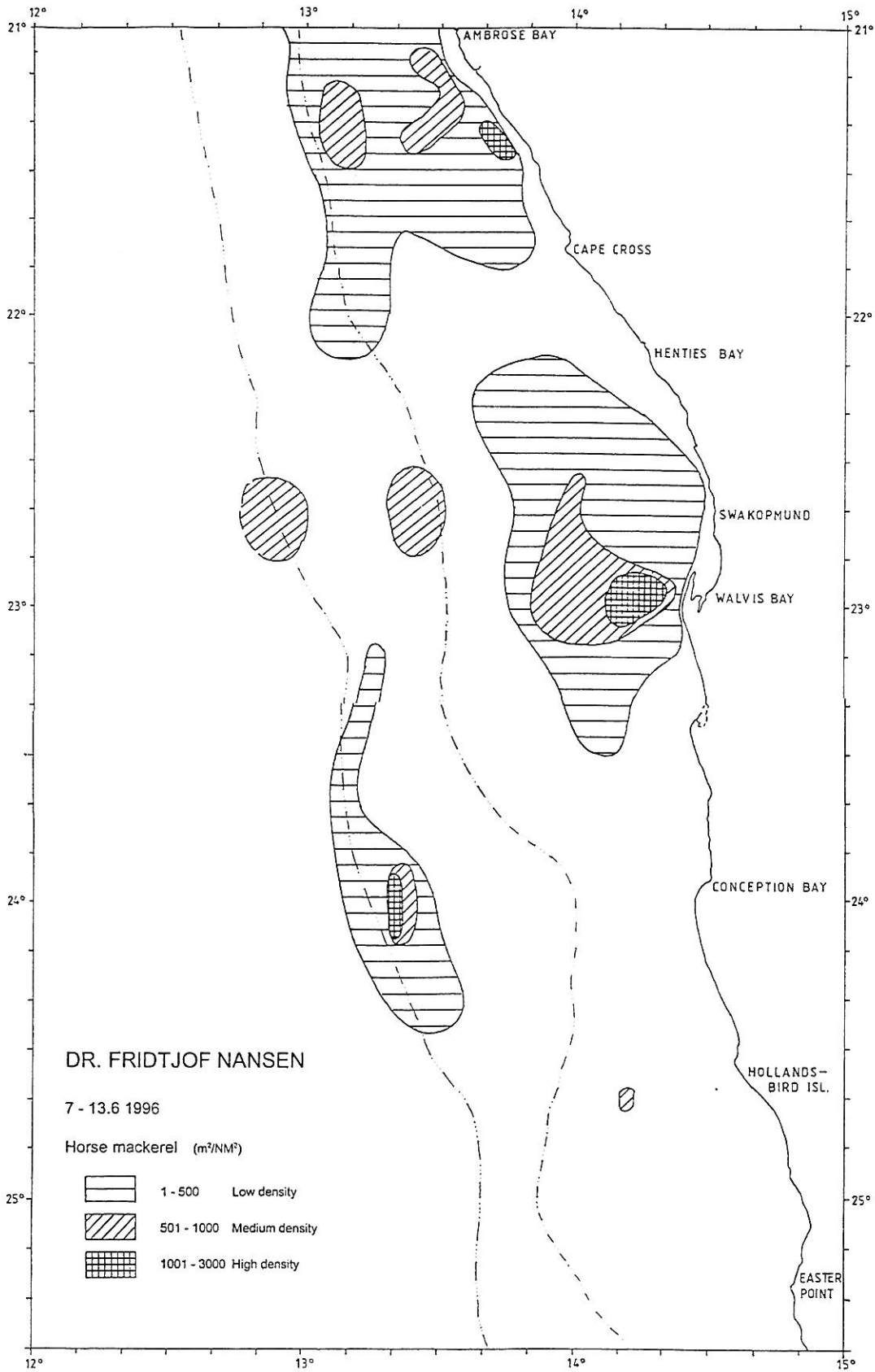


Figure 2a Distribution of horse mackerel, Dolphin Head to Ambrose Bay.

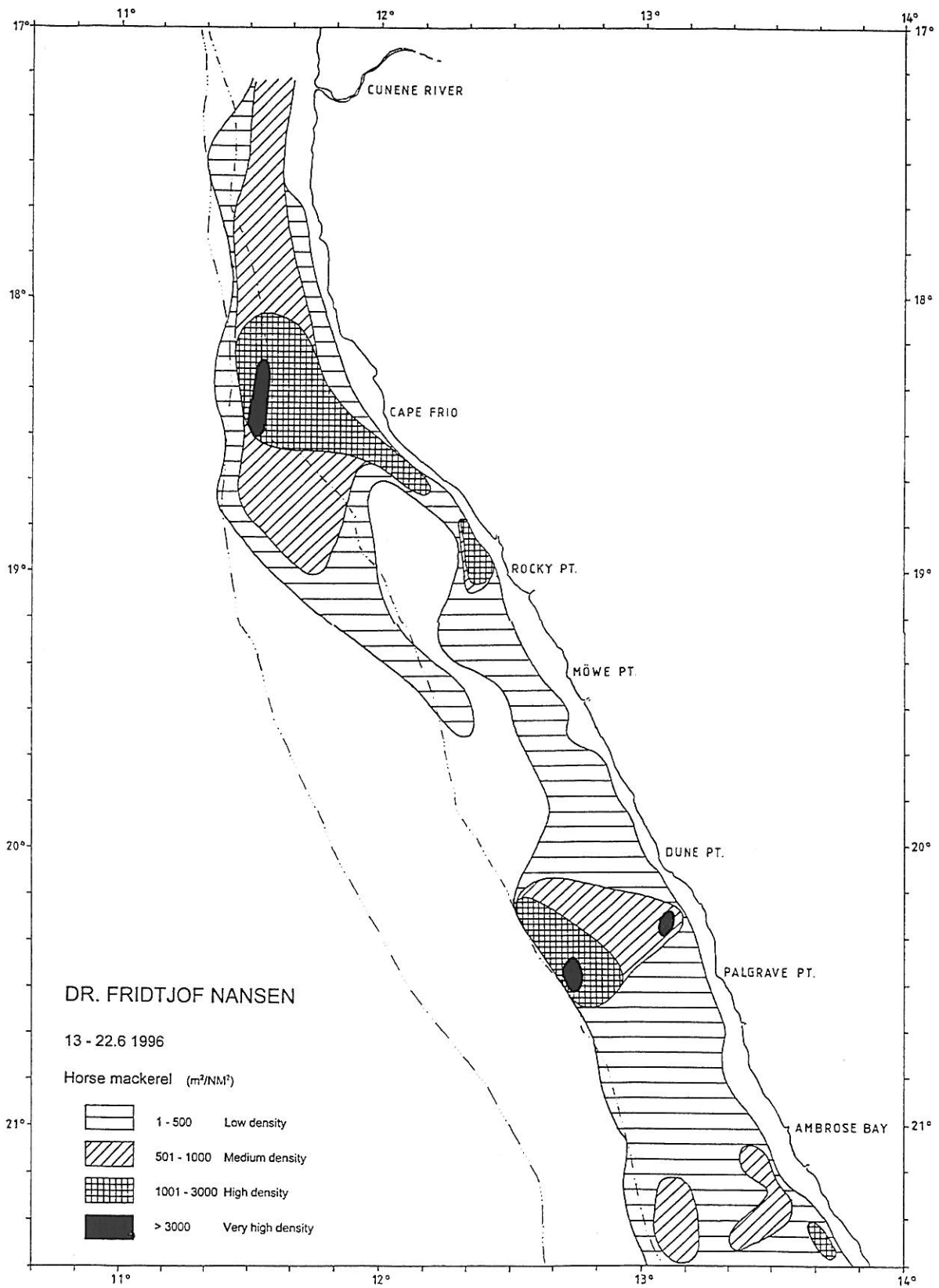


Figure 2b Distribution of horse mackerel, Ambrose Bay to Cunene River.



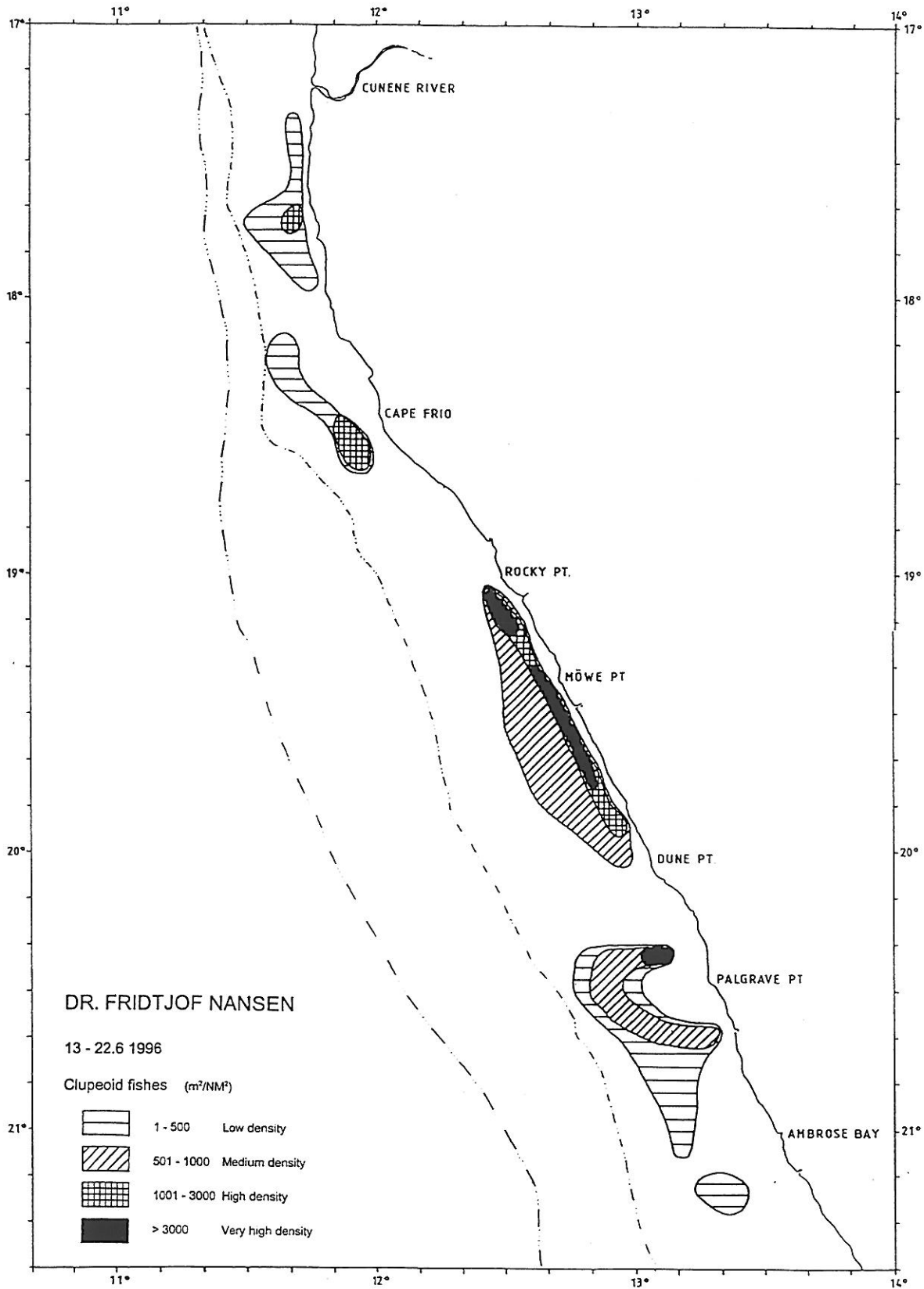


Figure 3 Distribution of clupeoid fishes, Ambrose Bay to Cunene River.

### 3.3 Abundance

The total estimated biomass of horse mackerel, juveniles ( $\leq 20$  cm) and ( $> 20$  cm), found in Namibian waters is summarised in Table 1 and provided in weight and number of fish per area in Annex III. The biomass assessment was made by region and offshore/inshore areas, and the boundary of areas was determined according to the mean length of fish in the trawl catches.

Table 1 Biomass estimates of horse mackerel per area (in tonnes).

Area	Juveniles $\leq 20$ cm	Juveniles $> 20$ cm	Total
Cunene River - Ambrose Bay	579 136	141 283	720 419
Ambrose Bay - Easter Point	107 530	146 067	253 597
Total Namibia	686 666	287 350	974 016

The total biomass of horse mackerel in Namibian waters was estimated to about 975 000 tonnes compared to 1 500 000 tonnes obtained during the RV 'Dr Fridtjof Nansen' survey in June 1995. The juvenile stock in 1995 was estimated to 697 000 tonnes, approximately the same as the present estimate, whereas this years estimate of adults is approximately 500 000 tonnes less than last years.

### 3.4 Biological analysis of fish

#### 3.4.1 Length-frequency

Annex VI shows the length-frequency of the Cape horse mackerel per  $2^\circ$  intervals, starting from  $25^\circ 00'$  S. It is evident from the size composition that the 25+ cm fish were scarce and occurred offshore at bottom depth  $> 200$  m. Two dominant modal peaks are evident for the juvenile horse mackerel: a modal peak of 9 cm and offshore a modal peak of 19 cm.

Length data of pilchard, anchovy, round herring and hake are presented in Annex VI. Two modal peaks in the pilchard stock surveyed between north of  $21^\circ 00'$  is evident, namely one modal peak at 10 cm and one peak at 21 cm. The length range for the round herring was between 9 and 18 cm with a modal peak at 11 cm and 16 cm. The modal peak for the anchovy was at 11 cm with a length range between 8 cm and 14 cm. Hake sampled mainly

from the bottom trawls ranged from 12 cm to 58 cm with two modal peaks at 18 cm and 26 cm.

#### 3.4.2 Length-weight relationship

Length-weight data (total weight and gutted weight) were pooled for the entire area 17°15' S to 26°00' S. The pooled data and the regression curves for 919 fish are presented in Annex VII. The correlation coefficient,  $r$  (0.9975) shows that the data fit well to the length-weight relationship curves.

#### 3.4.3 Condition factor

The condition factor per cm class and related parameters for the horse mackerel are presented for the entire region in Annex VII.

#### 3.4.4 Reproductive status

Results were tabulated for the Cape horse mackerel in two regions namely the central and northern region (Annex VIII). It was difficult to draw any conclusions from these results. Nevertheless the following was noted:

- 1 The sex ratio: The greater portion of the stock in both regions was comprised of females. Similar results were obtained during the June 1995 hydro-acoustic survey.
- 2 Spawning: As was expected, no spawning was recorded amongst the adult stock throughout the region.
- 3 Fish were sexually mature between 19 and 20 cm. According to the Russian scientist Sergei Lobov, AtlantNIRO (pers. comm. 1995) the sexual maturity of the Cape horse mackerel was also recorded at 19 cm in 1994. However, during the 1980's he recorded the sexual maturity of the Cape horse mackerel at 22 cm. In case the maturing fish leave the northern distribution area for spawning and do not return, a change in maturity length will effect the size of the stock in northern Namibia.
- 4 The majority of the adult fish were either between recovering (stage 7) or maturing (stage 3).

## CHAPTER 4 CONCLUDING REMARKS

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In general, conditions were favourable for surveying the inshore and offshore horse mackerel stock acoustically. Weather conditions were acceptable and the inshore and the offshore horse mackerel seemed to be distributed within the transducer range both day and night.

Dense concentrations of jellyfish occurred, particularly in the southern region. These hampered trawling and in some cases broke the net. For example, four tonnes of jelly were caught in one minute in a pelagic trawl at 25°40' S and 14°48' S. In certain areas south of Walvis Bay where fish were recorded, no trawls could be conducted due to the high concentrations of jellyfish.

The horse mackerel stock in the northern Benguela system has since 1989 been assessed by acoustic method, the estimates ranging between 1.0 mill. tonnes and 2.1 mill. tonnes (Table 2). The present estimate of 1.0 mill. tonnes is the lowest of these values. The relatively high proportion of juvenile fish less than 20 cm in the present estimate, is however a positive sign with regard to recruitment and improves to some extent the general picture of the state of the stock.

Table 2 Biomass estimates of horse mackerel, 1990 to 1996, in the northern Benguela system (1 000 tonnes).

Survey	Vessel	Horse mackerel
December 1989	Ocher (USSR)	1 200
March 1990	Nansen	1 200
June 1990	Nansen	1 700
March 1991	Nansen	1 300
November 1991	Nansen/Benguela	1 400
June 1992	Nansen/Benguela	2 100
June 1994	Benguela	1 500
June 1995	Nansen	1 500
June 1996	Nansen	1 000

From the results on abundance and size distribution it is evident that the adult horse mackerel of 24 cm and above is not well represented. This phenomenon could be explained by high exploitation, but also by the possibility that the fish emigrate south for spawning after sexual maturity is reached. This is in accordance with what we should expect in a current system where the fry and juvenile fish will drift northwards in the course of their

life, and the parent stock has to compensate for this drift by migration. It is further observed that adult horse mackerel is found in the offshore area from Walvis Bay and southward, and the average length of the fish is increasing toward the south. The largest horse mackerel is found in South African waters, where fish above 42 cm dominate the horse mackerel catches (Hecht 1990). Fish above 30 cm are normally lacking in the length distribution of fish in northern Namibia, which indicates that the horse mackerel do not return to their previous feeding area after spawning. If this is the case the total stock size and the state of exploitation cannot be assessed without including the entire distribution area of the Cape horse mackerel stock.

## References

Hecht, T. 1990. On the life history of Cape horse mackerel *Trachurus trachurus capensis* off the south-east coast of South Africa. *S. Afr. J. mar. Sci.* 9:317-326.



## Annex I Instruments and fishing gear

The Simrad scientific echo sounder EK 500/38 kHz, was used during the survey for estimation of fish density. The Bergen Echo Integrator system (BEI) logging the echogram raw data from the echo sounder, was used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data was stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the 38 kHz echo sounder were as follows:

### Transceiver-1 menu

Transducer depth	5-7 m
Absorption coeff.	10 dB/km
Pulse length	medium
Bandwidth	wide
Max. power	2 000 W
Angle sensitivity	21.9
2-way beam angle	-21.0 dB
SV transducer gain	28.1 dB
TS transducer gain	28.0 dB
3 dB Beamwidth	6.8 deg
Alongship offset	0.00 deg
Athwardship offset	0.04 deg

### Display menu

Echogram	1
Bottom range	12 m
Bottom start	10 m
TVG	20 log R
SV Colour minimum	-72 dB
TS Colour minimum	-65 dB

### Printer settings

Range	0-100, 0-250 m, 0-500 m
TVG	20 log R
Sv Colour minimum	-72 dB

### Bottom detection menu

Minimum level	-45 dB
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## **FISHING GEAR**

The vessel has two different "Åkrehamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8 (1670 kg) trawl doors were used. Complete drawings of the trawls used are included.



# 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.

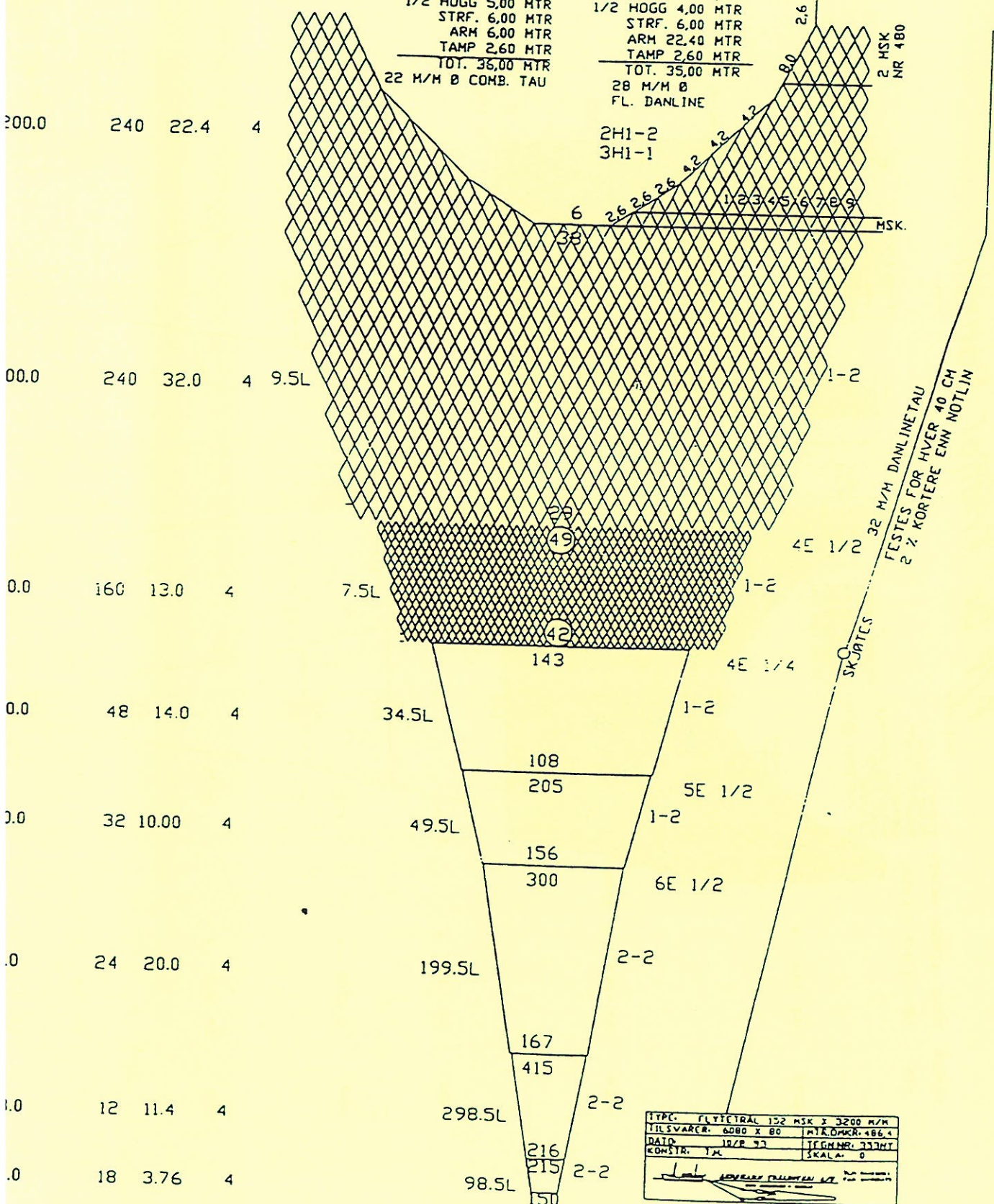
MASKER TRAAD LENGDE MASKER  
M/M NR. I MTR. I EVING

SIDER

1/2 HOGG 5,00 MTR  
STRF. 6,00 MTR  
ARM 6,00 MTR  
TAMP 2,60 MTR  
TOT. 35,00 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



TYP. FLYETRAL 152 MSK I 3200 M/M  
FILSVARER. 6080 X 80 NYK. ØMRK. 486.4  
DATO 10/8 97 TEGN. NR. 737MT  
KONSTR. T.K. SKALA 0



# F/F Dr. Fridtjof Nansen

HASKER  
M/H

TRAAD  
NR.

LENGDE  
I MTR.

HASKER  
M/H

TRAAD  
NR.

LENGDE  
I MTR.

HASKER  
M/H

TRAAD  
NR.

LENGDE  
I MTR.

16200 160 19.4 4

16200 160 25.9 4 15.5L

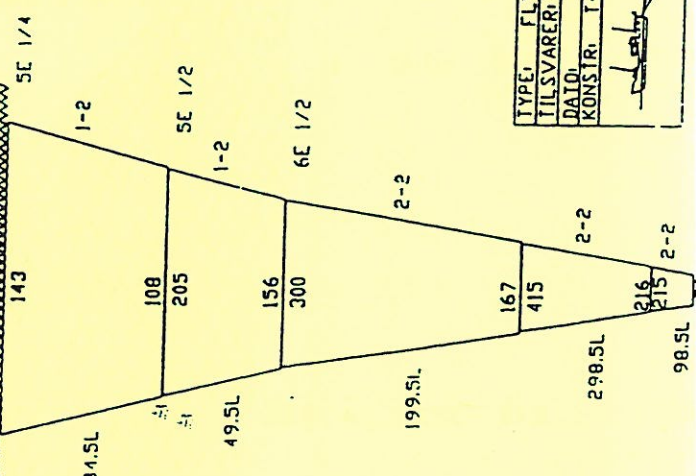
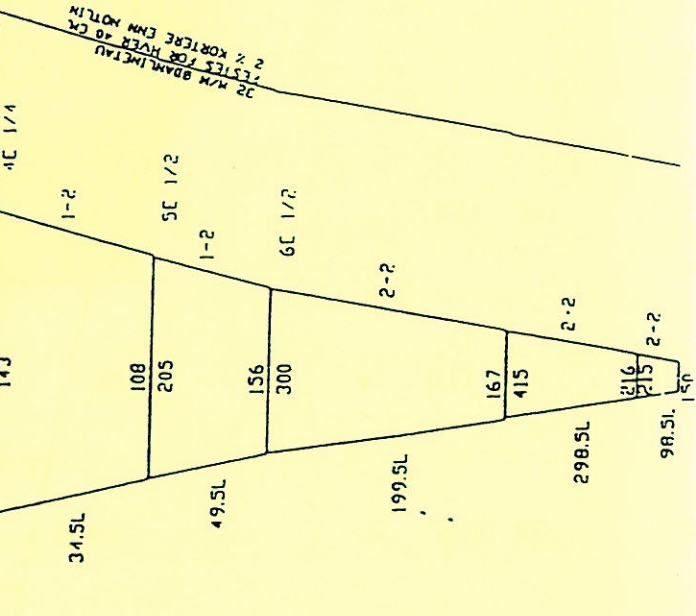
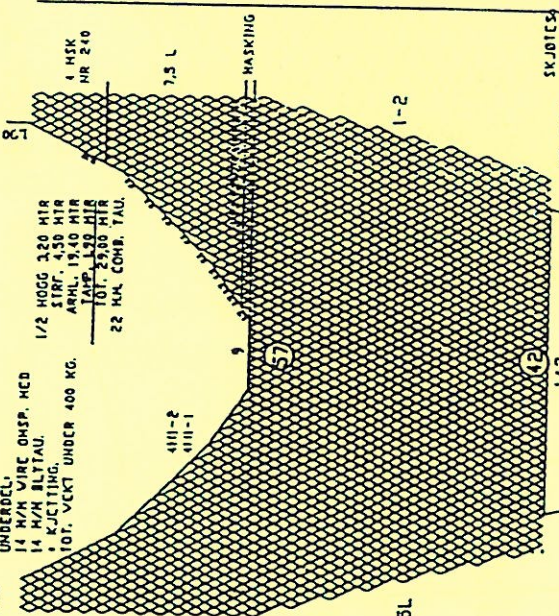
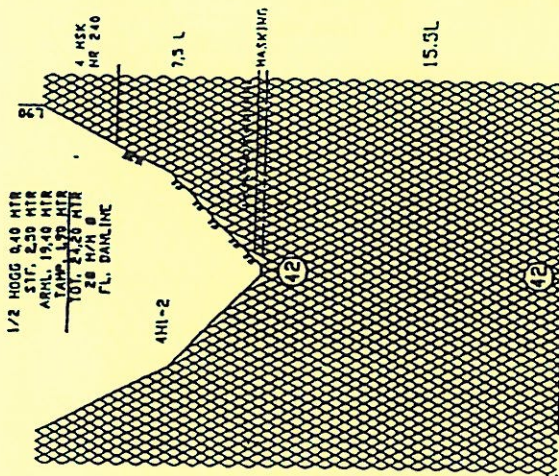
4000 48 14.0 4 34.5L

2000 32 10.00 4 49.5L

1000 24 20.0 4 199.5L

380 12 11.4 4 298.5L

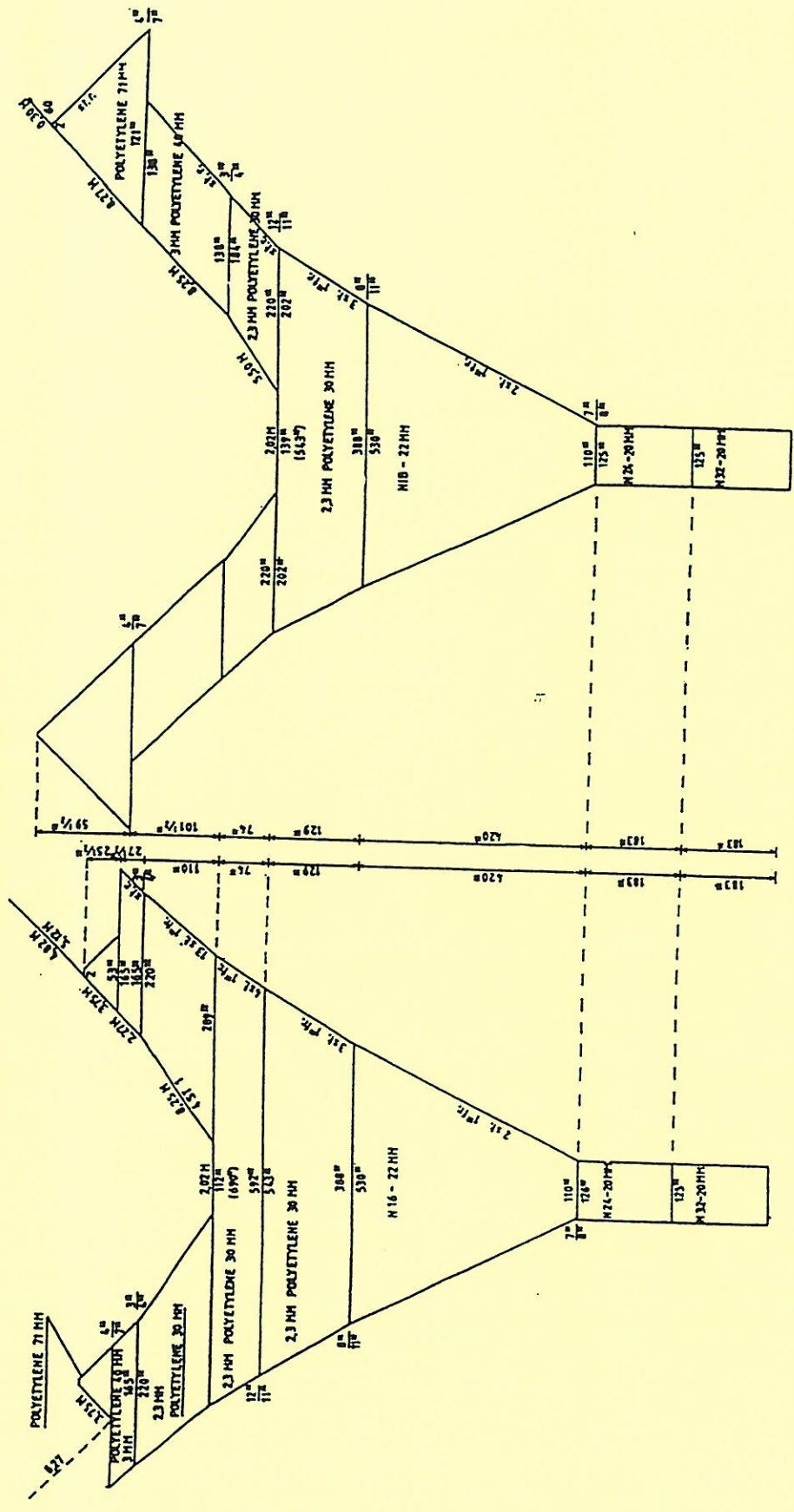
360 18 3.76 4 98.5L



TYPE:	FLYTETRAL 198 HSK X 1620 M/M
TILSVARER:	4010 X 80 MTR/OMKR. 350
DRAG:	23/6 93
KONSTR.:	T-H
SKALA:	1:0

1987  
JØRDISHAFN FALLENBERG A/S  
P.O. BOX 110  
N-2007 SANDNES

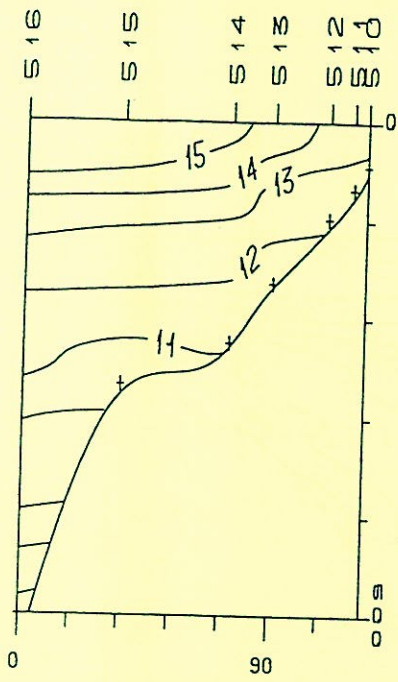
Bottom trawl: High opening shrimp and fish trawl with net headline 31m (floatline), foot-  
 rope 47m, gear with 12 cm diameter roller disks, 40 m sweeps, estimated headline height  
 6m and distance between wings during towing 18-20m.





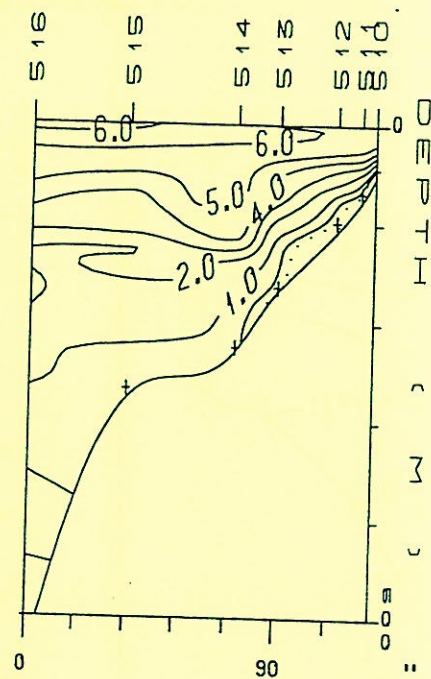
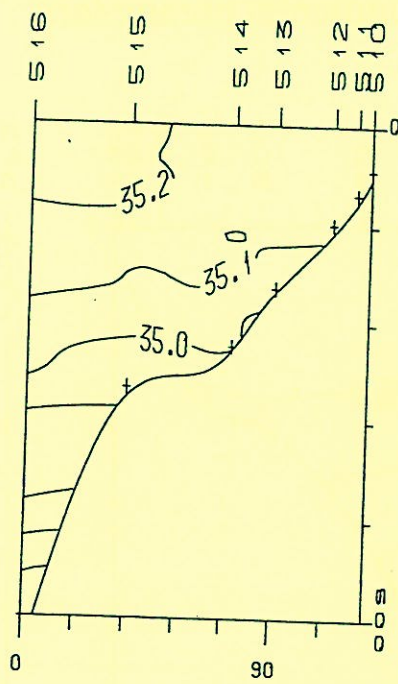




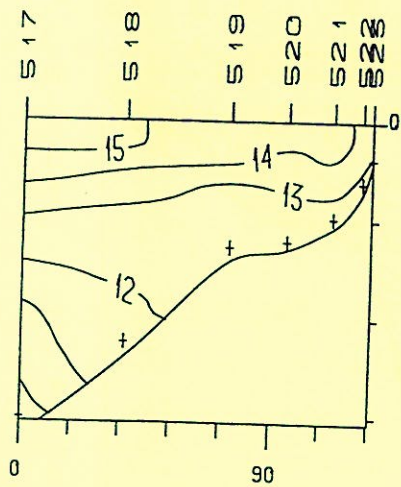


24°00' S

8. 6. 1996

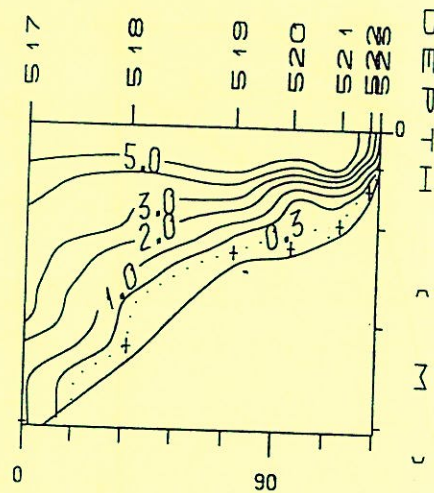
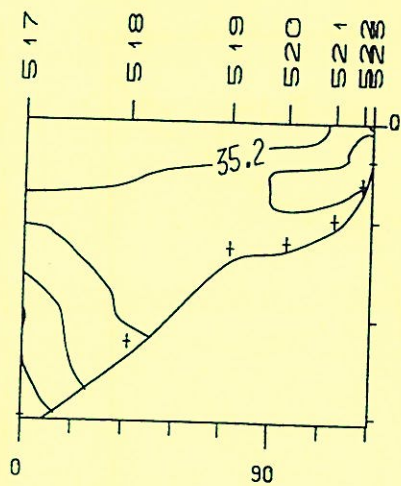


Temperature, Salinity, Oxygen profiles.



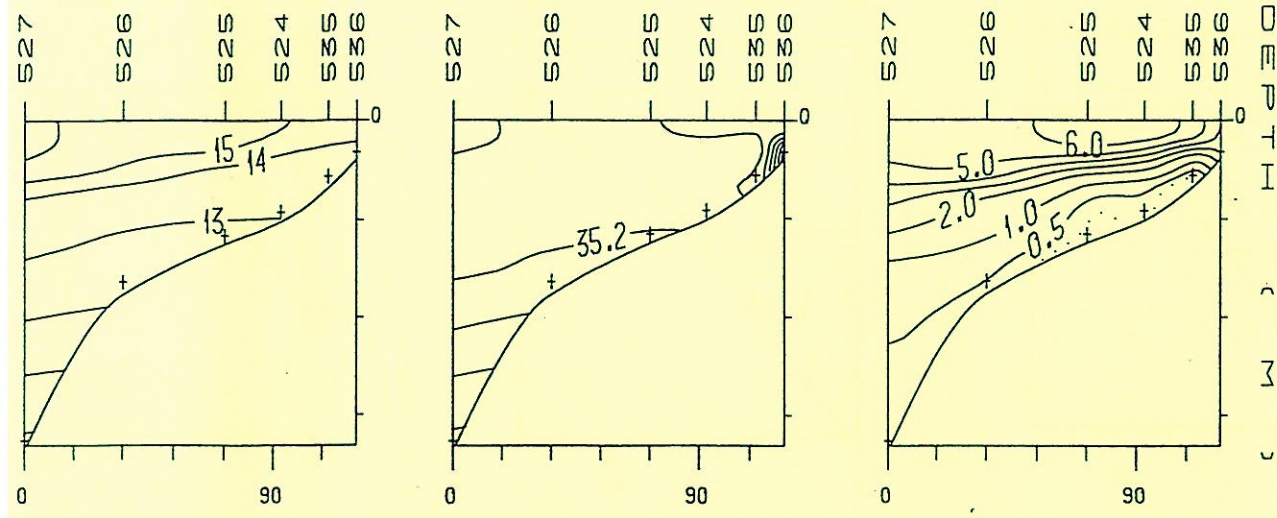
23°00' S

10. 6. 1996



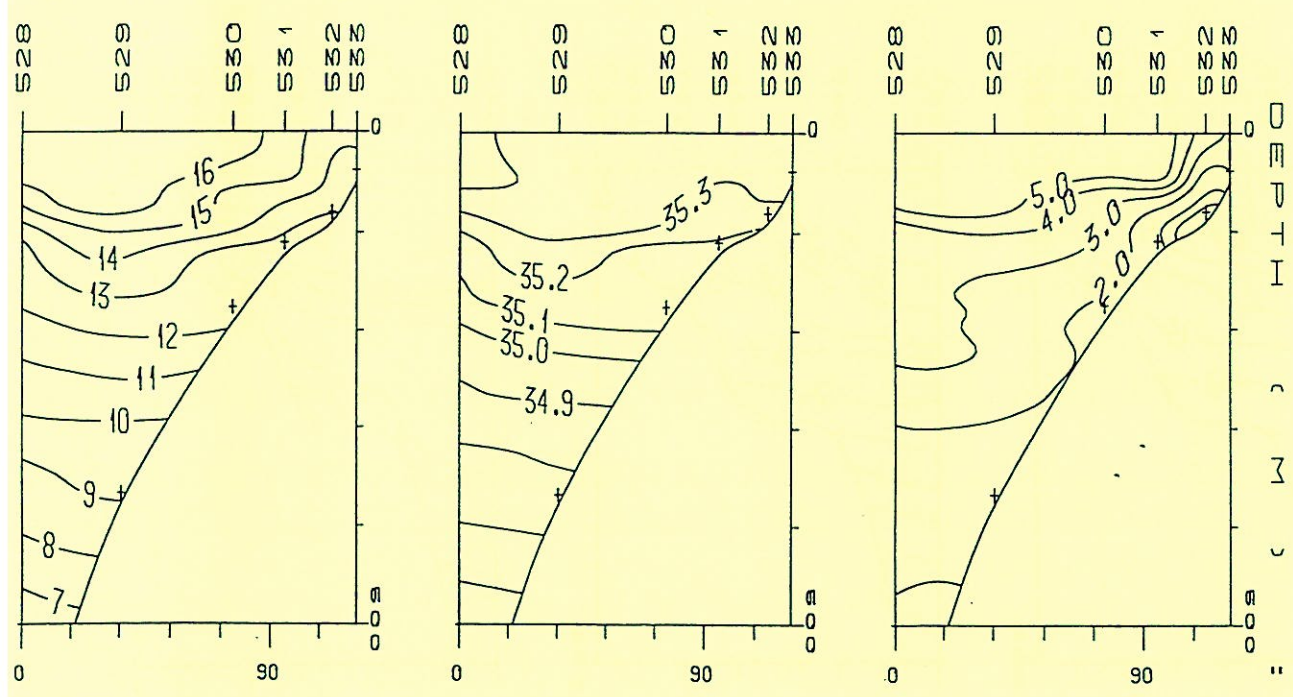
Temperature, Salinity, Oxygen profiles.





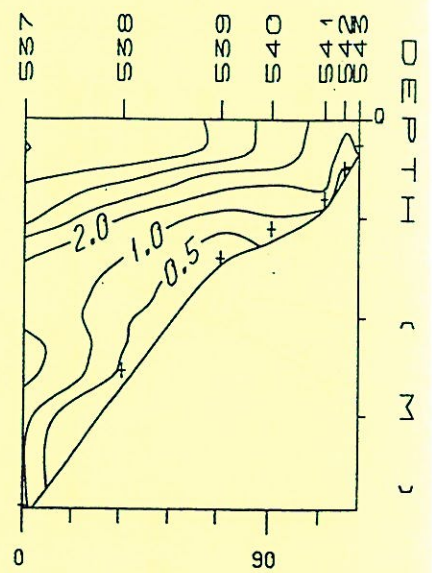
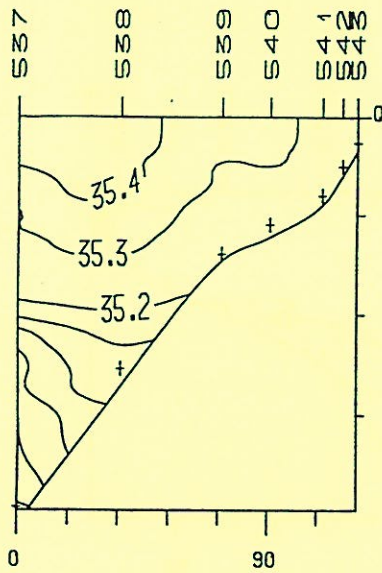
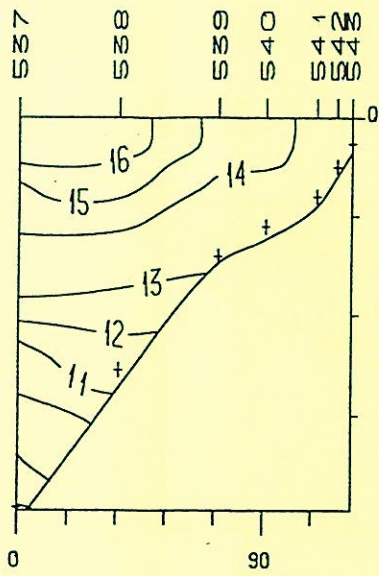
22°00' S 11. 6. 1996

Temperature, Salinity, Oxygen profiles.



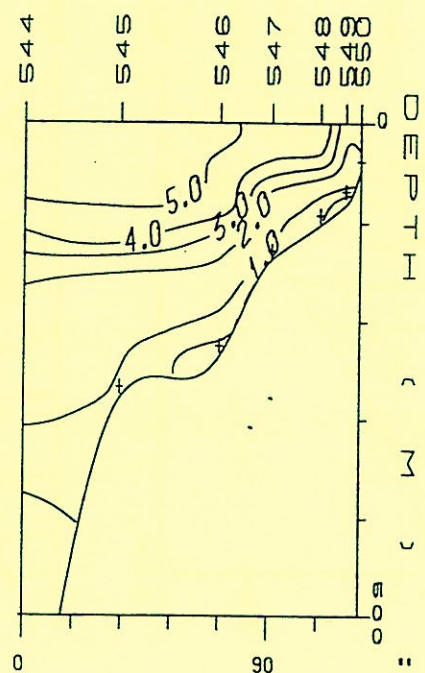
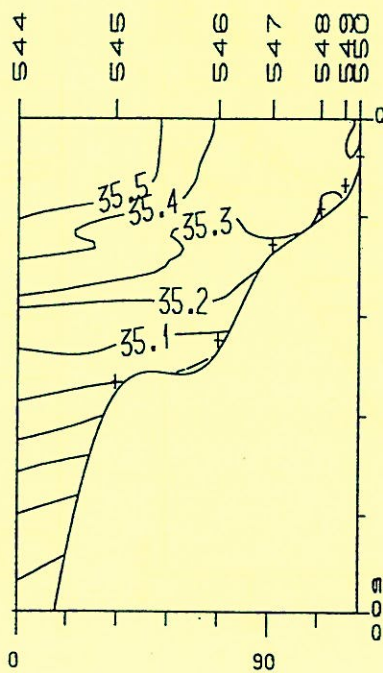
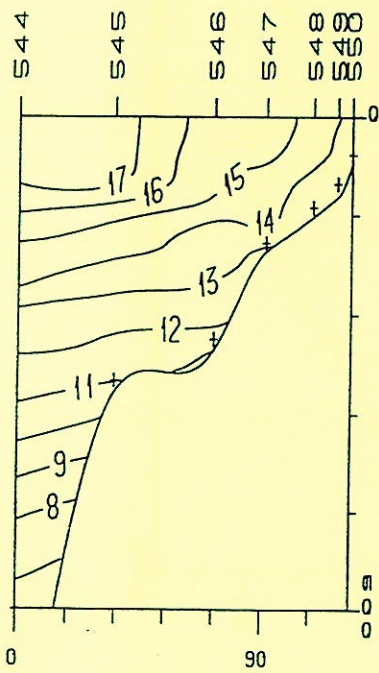
21°00' S 13. 6. 1996

Temperature, Salinity, Oxygen profiles.



20°00' S 17. 6. 1996

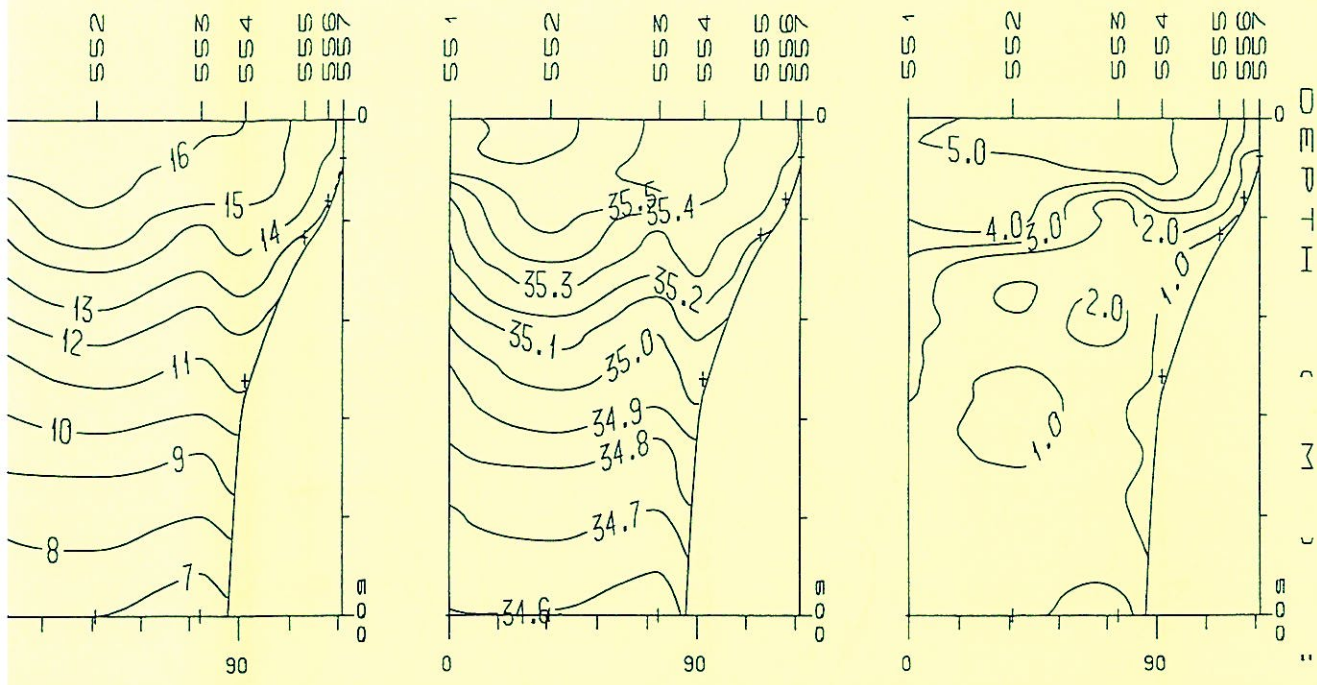
Temperature, Salinity, Oxygen profiles.



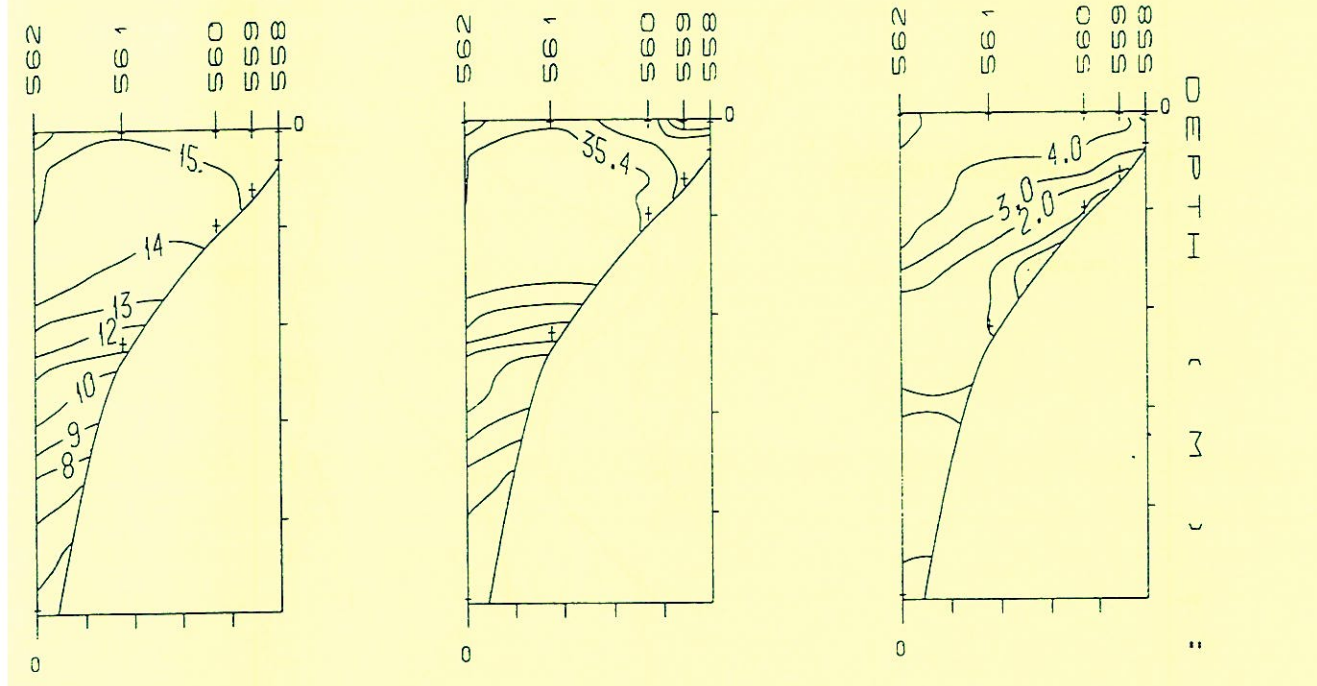
19°00' S 19. 6. 1996

Temperature, Salinity, Oxygen profiles.

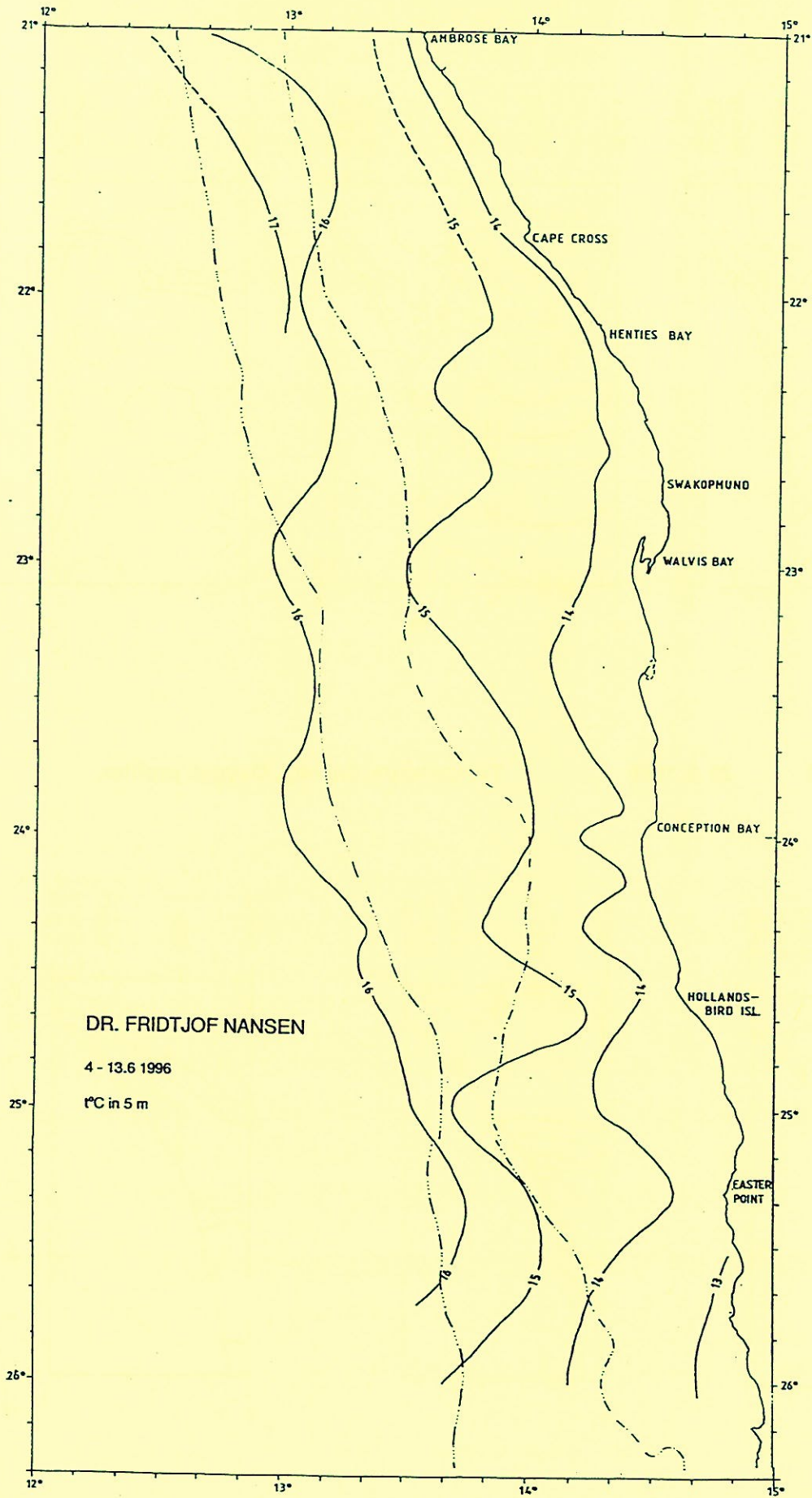




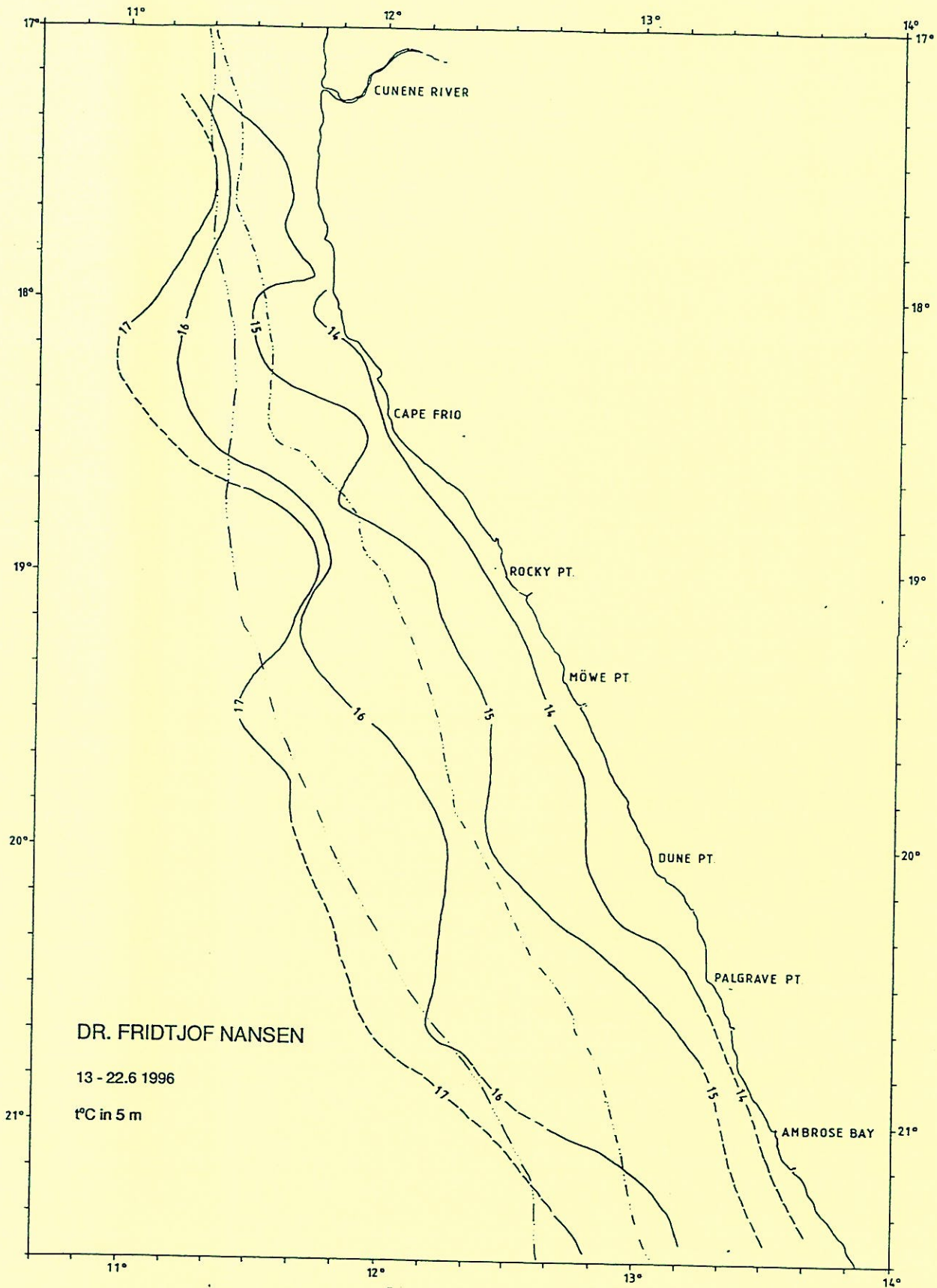
18°00' S      20. 6. 1996      Temperature, Salinity, Oxygen profiles.



17°15' S      21. 6. 1996      Temperature, Salinity, Oxygen profiles.



26°S to 21°S. Distribution of sea temperature at 5 m depth.



21° S to 17° S . Distribution of sea temperature at 5 m depth.





**Total biomass (tonnes) of > 20 cm horse mackerel, *Trachurus capensis*, and total number per 1 cm length class (in millions) per area**

Area	17°15'-18°40'		18°30'-19°30'		19°00'-19°10'		20°00'-21°00'		21°00'-22°00'		22°00'-23°00'		23°00'-24°30'		Sum
	17°15'-18°40'	18°30'-19°30'	19°00'-19°10'	19°10'-19°30'	20°00'-21°00'	21°00'-22°00'	22°00'-23°00'	23°00'-24°30'	24°30'-25°30'	25°30'-26°30'	26°30'-27°30'	27°30'-28°30'	28°30'-29°30'	29°30'-30°30'	
Size of area (nm <sup>2</sup> )	1474	1032	100	798	1076	784	363	798	4153						
Mean SA value (m <sup>2</sup> /nm <sup>2</sup> )	1 214	341	1 457	139	986	318	414	139							
Total biomass (tonnes)	22 842	71 444	1 347	45 473	45 650	48 729	41 865	55 473	287 350						
No. of fish per length class (mill.)	21	156	12	185	311	185	0	0	667						
	22	107	6	197	143	197	16	0	522						
	23	16	0	148	69	148	0	0	289						
	24	8	0	39	39	39	16	0	100						
	25	0	0	2	0	2	0	0	53						
	26	0	0	0	0	0	47	0	76						
	27	0	0	0	0	0	16	0	51						
	28	0	0	0	0	0	31	0	66						
	29	0	0	0	0	0	31	46	106						
	30	0	12	0	0	0	0	0	12						
	31	0	6	0	0	0	16	0	22						
	32	0	4	0	0	0	0	46	49						
	33	0	2	0	0	0	6	0	8						
	34	0	4	0	0	0	3	30	37						
	35	0	0	0	0	0	12	46	58						
	36	0	4	0	0	0	9	15	28						
	37	0	6	0	0	0	6	15	27						
	38	0	2	0	0	0	3	0	5						
	39	0	2	0	0	0	0	0	2						
	40	0	0	0	0	0	0	0	0						
	41	0	0	0	0	0	0	0	0						
	42	0	0	0	0	0	3	0	3						
	43	0	0	0	0	0	0	0	0						
	44	0	0	0	0	0	0	0	0						
	45	0	0	0	0	0	0	0	0						
<b>Sum</b>	<b>288</b>	<b>617</b>	<b>18</b>	<b>571</b>	<b>563</b>	<b>571</b>	<b>215</b>	<b>197</b>	<b>2 181</b>						

**Total biomass (tonnes) of juvenile horse mackerel, *Trachurus capensis*, and total number per 1 cm length class (in millions) per area**

	17°15'-18°40'		17°30'-19°00'		18°30'-19°30'		19°00'-19°10'		19°00'-22°00'		20°00'-21°00'		21°00'-22°00'		22°00'-23°30'		24°30'-24°40'		Sum	
	17°15'-18°40'	17°30'-19°00'	18°30'-19°30'	19°00'-19°10'	19°00'-22°00'	19°30'-20°00'	20°00'-21°00'	21°00'-22°00'	22°00'-23°30'	23°30'-24°30'	24°30'-24°40'	Sum								
Area	1474	350	1032	100	2545	1076	784	2137	50	9548										
Size of area (nm <sup>2</sup> )	1 214	847	341	1 457	424	986	318	497	820	686 666										
Mean SA value (m <sup>2</sup> /nm <sup>2</sup> )	273 044	27 749	9 660	22 942	107 801	134 555	3 385	106 640	890											
Total biomass (tonnes)																				
No. of fish per length class (mill.)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	9	0	0	0	36	0	45	0	0	0	0	0	0	0	0	0
	6	0	64	0	80	0	0	0	250	7	400	0	0	0	0	0	0	0	0	0
	7	8	691	0	188	0	0	0	751	81	1 719	0	0	0	0	0	0	0	0	0
	8	0	1 502	0	979	0	0	0	858	305	3 645	0	0	0	0	0	0	0	0	0
	9	74	691	0	3 443	10	0	0	5 539	258	10 016	0	0	0	0	0	0	0	0	0
	10	57	358	0	2 869	10	0	0	4 467	14	7 775	0	0	0	0	0	0	0	0	0
	11	16	262	0	2 146	108	0	0	1 751	0	4 285	0	0	0	0	0	0	0	0	0
	12	222	151	0	1 583	498	0	0	465	0	2 925	0	0	0	0	0	0	0	0	0
	13	337	79	12	356	770	0	0	107	0	1 662	0	0	0	0	0	0	0	0	0
	14	345	87	29	89	558	0	0	0	0	1 109	0	0	0	0	0	0	0	0	0
	15	591	72	70	59	138	0	0	36	0	967	0	0	0	0	0	0	0	0	0
	16	1 266	32	94	39	74	0	0	36	0	1 540	0	0	0	0	0	0	0	0	0
	17	1 594	8	129	20	133	0	0	0	0	1 885	0	0	0	0	0	0	0	0	0
	18	1 455	8	88	9	440	0	0	0	0	2 003	0	0	0	0	0	0	0	0	0
	19	846	0	117	0	612	225	0	0	0	1 845	0	0	0	0	0	0	0	0	0
	20	328	0	23	0	548	3160	0	0	0	4 171	0	0	0	0	0	0	0	0	0
Sum	7 142	4 005	160	568	11 871	3 900	3 385	14 295	665	45 991										



## Annex IV Summary of trawl stations

Trawl number	Latitude (°S)	Bottom depth (m)	Headrope depth (m)	Catch by species (% of total catch)					Total catch (kg)
				<i>Trachurus c.</i>	<i>Sardinops o.</i>	<i>Engraulis c.</i>	<i>Etrumeus w.</i>	<i>Merluccius c.</i>	
1567	26.00	60	10	0	0	0	0	0	No catch
1568	26.00	254	45	0	0	0	0	0	3.00
1569	25.40	50	10	0	0	0	0	0	No catch
1570	24.40	143	59	84.3	0	0	0	0	1.52
1571	24.40	379	231	0	0	0	0	0	43.90
1572	24.39	387	50	0	0	0	0	0	32.64
1573	24.20	303	149	0.6	0	0	0	0.23	30.49
1574	24.00	261	146	0	0	0	0	0	10.00
1575	24.00	294	240	2.6	0	0	0	2.66	47.12
1576	24.00	295	195	9.2	0	0	0	0	41.27
1577	23.29	51	17	0	0	0	0	0	4.69
1578	23.00	139	80	56.6	0	0	0.07	0	13.08
1579	23.00	115	45	61.6	0	2.44	9.87	0.81	4.87
1580	22.40	104	28	87.3	0	0.78	0	0	19.25
1581	22.40	131	75	0.2	0	0	0.06	0.06	30.70
1582	22.40	279	279	1.1	0	0	0	64.37	193.54
1583	22.40	314	151	15.6	0	0	0	0.44	36.18
1584	22.20	344	344	0.2	0	0	0	89.11	202.00
1585	22.21	148	0	94.0	0	0	0	0	2.49
1586	22.22	142	86	0	0	0	0	0	5.99
1587	22.21	127	49	0.8	0	0	0.03	0	154.02
1588	22.02	101	40	2.4	0	2.31	0	0.13	7.36
1589	22.00	169	130	0	0	0	0	68.21	17.95
1590	22.00	200	200	34.4	0	0	0	64.82	722.81
1591	21.40	294	245	0	0	0	0	0	5.82
1592	21.40	160	160	27.8	0	0	0	71.76	291.26
1593	21.40	120	15	88.8	0	0	11.16	0	68.74
1594	21.30	112	67	26.7	0	0	0	0	3.75
1595	21.20	133	133	87.0	0	0	0	12.54	1228.00
1596	21.00	259	17	0.4	0	0	0	0	25.27
1597	21.00	129	85	100.0	0	0	0	0	0.01
1598	21.00	133	133	79.0	0	0	0	19.5	188.73
1599	21.00	124	124	71.3	15.17	0	0.31	11.86	1534.35
1600	21.00	70	23	100.0	0	0	0	0	632.10
1601	21.14	106	40	14.81	0	25.4	1.06	0	3.78
1602	21.17	77	38	100.0	0	0	0	0	240.00
1603	20.55	37	20	0	0	0	0	0	No catch
1604	20.42	52	15	97.78	0	0	2.22	0	1.35
1605	20.45	176	176	12.44	0	0	0	72.57	46.78
1606	20.44	269	153	0	0	0	0	0	0.86
1607	20.44	325	325	0	0	0	82.88	0	167.66
1608	20.30	200	0	7.59	0	0	0	0	0.79
1609	20.29	137	113	8.83	2.03	0	27.63	23.21	3.40
1610	20.29	132	34	0.56	0	0	99.44	0	25.34
1611	20.30	127	127	94.95	0	0	0	4.04	2475.00
1612	20.30	55	28	99.16	0.13	0.65	0.06	0	185.76
1613	20.16	54	29	98.73	0	0.15	1.12	0	3312.00
1614	20.15	120	120	96.0	0	0	0	3	1200.00
1615	20.15	157	157	64.26	0	0	0	28.67	25.29
1616	20.00	105	105	98.0	0	0	0	1.86	34.95
1617	20.00	60	38	64.5	33.86	0.74	0	0	72.56
1618	19.47	45	27	7.94	0.58	0.26	91.23	0	93.72
1619	19.45	116	0	100.0	0	0	0	0	0.74
1620	19.30	120	119	100.0	0	0	0	0	0.33
1621	19.30	108	30	38.65	4.36	0.25	56.73	0	216.54
1622	19.35	47	27	0	26.81	72.92	0.28	0	115.20
1623	19.15	250	95	65.44	0	0	0	4.97	1.85
1624	19.15	283	148	4.55	0	0	0	0	2.66

Trawl number	Latitude (°S)	Bottom depth (m)	Headrope depth (m)	Catch by species (% of total catch)					Total catch (kg)
				<i>Trachurus c.</i>	<i>Sardinops o.</i>	<i>Engraulis c.</i>	<i>Etrumeus w.</i>	<i>Merluccius c.</i>	
1625	19.00	436	200	0	0	0	0	0	11.28
1626	19.00	297	297	4.62	0	0	0	44.82	1106.57
1627	19.00	239	239	32.53	0	0	0	2.49	1530.81
1628	19.00	80	80	100.0	0	0	0	0	992.8
1629	18.50	49	15	100.0	0	0	0	0	576.6
1630	18.45	216	123	43.75	0	0	0	0	0.16
1631	18.44	233	233	61.85	0	0	0	18.4	1608.3
1632	18.30	225	225	51.81	0	0	0	17.84	374.42
1633	18.30	140	140	100.0	0	0	0	0	4500
1634	18.15	133	133	77.14	0	0	0	10.67	1291.47
1635	18.15	141	31	88.12	0	0	11.88	0	169.28
1636	18.15	247	111	97.51	0	0	0.3	0	349.51
1637	18.00	125	125	69.81	0	0	0	8.66	1200
1638	17.56	72	40	47.76	0.27	33.28	18.54	0	435.5
1639	17.42	88	50	1.77	1.49	0.11	96.63	0	289.36
1640	17.44	200	103	66.17	0	0	28.36	0	43.9
1641	17.30	153	153	53.43	0	0	0	13.26	264.38
1642	17.35	71	25	1.55	0.07	95.92	1.29	0.07	138.29
1643	17.15	120	120	88.52	0	0	0	1.49	2245.73
1644	18.34	41	41	99.34	0	0	0.4	0	1415.89
1645	18.40	44	44	98.95	0	0	1.05	0	1507.56



# Annex V Records of fishing stations

PROJECT STATION:1567  
 DATE: 5/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2600  
 start stop duration Long E 1453  
 TIME :15:00:00 15:01:00 1 (min) Purpose code: 1  
 LOG : 468.00 468.10 0.10 Area code : 1  
 FDEPTH: 10 10 GearCond.code: 9  
 BDEPTH: 60 60 Validity code: 9  
 Towing dir: 270° Wire out: 100 m Speed: 31 kn\*10

Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Chrysaora sp.	0.00	160020			
Total					

PROJECT STATION:1568  
 DATE: 5/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2600  
 start stop duration Long E 1413  
 TIME :18:57:00 19:09:00 12 (min) Purpose code: 1  
 LOG : 6509.10 6509.30 0.20 Area code : 1  
 FDEPTH: 45 45 GearCond.code: 9  
 BDEPTH: 255 253 Validity code: 4  
 Towing dir: 100° Wire out: 200 m Speed: 30 kn\*10

Sorted: 1 Kg Total catch: 3.00 CATCH/HOUR: 15.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	14.55	21715	97.00		
Krill	0.45	215	3.00		
Chrysaora sp.	0.00	665			
Aequorea aequorea	0.00	70175			
Total	15.00		100.00		

PROJECT STATION:1569  
 DATE: 6/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2540  
 start stop duration Long E 1448  
 TIME :08:27:00 08:30:00 3 (min) Purpose code: 1  
 LOG : 6632.00 6632.10 0.10 Area code : 1  
 FDEPTH: 10 10 GearCond.code: 8  
 BDEPTH: 50 50 Validity code: 9  
 Towing dir: 270° Wire out: 100 m Speed: 30 kn\*10

Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Chrysaora sp.	0.00	132000			
Total					

PROJECT STATION:1570  
 DATE: 7/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2440  
 start stop duration Long E 1414  
 TIME :13:53:00 14:10:00 17 (min) Purpose code: 1  
 LOG : 6928.70 6929.50 0.80 Area code : 2  
 FDEPTH: 63 55 GearCond.code: 9  
 BDEPTH: 143 142 Validity code: 9  
 Towing dir: 92° Wire out: 260 m Speed: 30 kn\*10

Sorted: 1 Kg Total catch: 1.52 CATCH/HOUR: 5.36

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus. Juveniles	4.52	762	84.33	5290	
Schedophilus huttoni	0.85	4	15.86		
Aequorea aequorea	0.00	30553			
Chrysaora sp.	0.00	1165			
Total	5.37		100.19		

PROJECT STATION:1571  
 DATE: 7/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2440  
 start stop duration Long E 1340  
 TIME :18:02:00 18:22:00 20 (min) Purpose code: 1  
 LOG : 6965.30 6966.40 1.10 Area code : 1  
 FDEPTH: 222 240 GearCond.code: 1  
 BDEPTH: 384 374 Validity code: 1  
 Towing dir: 90° Wire out: 500 m Speed: 32 kn\*10

Sorted: 8 Kg Total catch: 43.90 CATCH/HOUR: 131.70

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	54.90	14406	41.69		
APOGONIDAE	40.80	2874	30.98		
Photichthys argenteus	12.54	1605	9.52		
Krill	10.98	18300	8.34		
NONCU00	4.68	18	3.55		
Todarodes sagittatus	3.12	21	2.37		
Todaropsis eblanae	3.12	501	2.37		
PARALEPIDIDAE	1.56	27	1.18		
Chrysaora sp.	0.00	18			
Total	131.70		100.00		

PROJECT STATION:1572  
 DATE: 7/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2439  
 start stop duration Long E 2439  
 TIME :19:00:00 19:20:00 20 (min) Purpose code: 1  
 LOG : 6968.00 6969.10 1.10 Area code : 1  
 FDEPTH: 50 50 GearCond.code: 1  
 BDEPTH: 382 391 Validity code: 1  
 Towing dir: 270° Wire out: 200 m Speed: 32 kn\*10

Sorted: 8 Kg Total catch: 32.64 CATCH/HOUR: 97.92

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	92.82	14064	94.79		
Krill	3.06	15300	3.13		
Todaropsis eblanae	1.02	237	1.04		
Brama brama	1.02	9	1.04		
Aequorea aequorea	0.00	72			
Total	97.92		100.00		

PROJECT STATION:1573  
 DATE: 8/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2420  
 start stop duration Long E 1346  
 TIME :01:06:00 01:13:00 7 (min) Purpose code: 1  
 LOG : 7027.10 7027.50 0.40 Area code : 2  
 FDEPTH: 147 150 GearCond.code: 9  
 BDEPTH: 302 303 Validity code: 1  
 Towing dir: 261° Wire out: 620 m Speed: 30 kn\*10

Sorted: 1 Kg Total catch: 30.49 CATCH/HOUR: 261.33

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	257.14	85714	98.39		
Todarodes sagittatus	2.06	9	6.79		
Trachurus capensis	1.54	9	0.59	5291	
Merluccius capensis	0.60	9	0.23	5292	
Chrysaora sp.	0.00	1697			
Total	261.34		100.00		

PROJECT STATION:1574  
 DATE: 8/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2400  
 start stop duration Long E 1341  
 TIME :15:47:00 15:52:00 5 (min) Purpose code: 1  
 LOG : 7170.40 7170.80 0.40 Area code : 2  
 FDEPTH: 165 126 GearCond.code: 9  
 BDEPTH: 262 260 Validity code: 9  
 Towing dir: 86° Wire out: 570 m Speed: 31 kn\*10

Sorted: 1 Kg Total catch: 10.00 CATCH/HOUR: 120.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	120.00	85716	100.00		
Chrysaora sp.	0.00	5940			
Total	120.00		100.00		

PROJECT STATION:1575  
 DATE: 8/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2400  
 start stop duration Long E 1323  
 TIME :18:48:00 19:05:00 17 (min) Purpose code: 1  
 LOG : 7192.60 7193.60 1.00 Area code : 2  
 FDEPTH: 230 250 GearCond.code: 1  
 BDEPTH: 296 291 Validity code: 1  
 Towing dir: 90° Wire out: 600 m Speed: 31 kn\*10

Sorted: 7 Kg Total catch: 47.12 CATCH/HOUR: 167.08

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	141.18	64168	81.50		
Brama brama	11.26	7	6.74		
Merluccius capensis	4.45	18	2.66		
Trachurus capensis	4.41	14	2.64	5293	
Todarodes sagittatus	2.93	4	1.75		
Lepidopus caudatus	2.08	7	1.24		
Chrysaora sp.	0.00	81			
Total	166.31		95.53		

PROJECT STATION:1576  
 DATE: 8/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2400  
 start stop duration Long E 1323  
 TIME :20:45:00 21:05:00 20 (min) Purpose code: 1  
 LOG : 7203.00 7204.30 1.30 Area code : 2  
 FDEPTH: 190 200 GearCond.code: 1  
 BDEPTH: 295 294 Validity code: 1  
 Towing dir: 360° Wire out: 600 m Speed: 35 kn\*10

Sorted: 8 Kg Total catch: 41.27 CATCH/HOUR: 123.81

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	90.00	39125	71.64		
Trachurus capensis	11.43	36	5.23	5294	
REGALECIDAE	10.35	3	4.94		
Brama brama	5.61	2	2.81		
Todarodes sagittatus	3.72	18	2.91		
Lophius vomerinus	2.70	3	2.91		
Chrysaora sp.	0.00	18			
Total	123.81		100.00		



DATE: 9/ 6/96 PROJECT STATION:1577  
 GEAR TYPE: PT No:1 POSITION:Lat S 2329  
 start stop duration Long E 1424  
 TIME :11:55:00 12:05:00 10 (min) Purpose code: 1  
 LOG :7354.70 7355.20 0.50 Area code : 2  
 FDEPTH: 26 8 GearCond.code: 9  
 BDEPTH: 53 48 Validity code:  
 Towing dir: 155° Wire out: 140 m Speed: 31 kn\*10  
 Sorted: 4 Kg Total catch: 4.69 CATCH/HOUR: 28.14

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Thyrssites atun	22.14	6	78.68		
Sufflogobius bibarbatu	6.00	4998	21.32		
Chrysaora sp	0.00	9900			
Total	28.14		100.00		

DATE:10/ 6/96 PROJECT STATION:1582  
 GEAR TYPE: BT No:2 POSITION:Lat S 2240  
 start stop duration Long E 1318  
 TIME :22:18:00 22:38:00 20 (min) Purpose code: 1  
 LOG :7685.20 7686.50 1.30 Area code : 2  
 FDEPTH: 280 278 GearCond.code: 1  
 BDEPTH: 280 278 Validity code: 1  
 Towing dir: 90° Wire out: 900 m Speed: 30 kn\*10  
 Sorted: 141 Kg Total catch: 193.54 CATCH/HOUR: 580.62

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	372.30	543	64.12		5301
Coelorinchus sp	168.00	3060	28.93		
Lophius vomerinus	10.95	150	1.89		
Sufflogobius bibarbatu	7.50	1245	1.29		
Trachurus capensis	6.33	33	1.09		5300
Galeus polli	4.50	120	0.78		
Austroglossus microlepis	4.17	9	0.72		
Todarodes sagittatus	3.57	6	0.61		
S H R I M P S	1.80	720	0.31		
Helicolenus dactylopterus	1.05	285	0.18		
MYCTOPHIDAE	0.45	135	0.08		
Total	580.62		100.00		

DATE:10/ 6/96 PROJECT STATION:1578  
 GEAR TYPE: PT No:1 POSITION:Lat S 2300  
 start stop duration Long E 1359  
 TIME :05:39:00 05:57:00 18 (min) Purpose code: 1  
 LOG :7534.40 7535.20 0.80 Area code : 2  
 FDEPTH: 80 80 GearCond.code: 1  
 BDEPTH: 138 139 Validity code: 1  
 Towing dir: 270° Wire out: 200 m Speed: 31 kn\*10  
 Sorted: 2 Kg Total catch: 13.08 CATCH/HOUR: 43.60

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	24.67	2650	56.58		5295
Sufflogobius bibarbatu	10.90	9733	22.94		
Todarodes sagittatus	8.00	80	20.41		
Etrumeus whiteheadi	0.03	3	0.07		
Chrysaora sp	0.00	880			
Total	43.60		100.00		

DATE:11/ 6/96 PROJECT STATION:1583  
 GEAR TYPE: PT No:1 POSITION:Lat S 2240  
 start stop duration Long E 1256  
 TIME :01:44:00 02:10:00 26 (min) Purpose code: 1  
 LOG :7714.20 7715.60 1.40 Area code : 2  
 FDEPTH: 148 153 GearCond.code: 1  
 BDEPTH: 321 306 Validity code: 1  
 Towing dir: 90° Wire out: 500 m Speed: 30 kn\*10  
 Sorted: 16 Kg Total catch: 36.18 CATCH/HOUR: 83.40

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	46.15	32975	55.28		
Trachurus capensis	13.04	32	15.62		5302
Brama brama	5.95	12	7.15		
Centrolophus niger	5.82	2	6.97		
Hexanchus griseus	5.77	2	6.97		
Todarodes sagittatus	3.23	69	3.87		
PARALEPIDIDAE	1.38	138	1.65		
Beryx splendens	0.97	7	1.16		
Squalus megalops	0.81	2	0.97		
Merluccius paradoxus	0.37	2	0.44		
Total	83.49		100.00		

DATE:10/ 6/96 PROJECT STATION:1579  
 GEAR TYPE: PT No:1 POSITION:Lat S 2300  
 start stop duration Long E 1411  
 TIME :07:58:00 08:12:00 14 (min) Purpose code: 1  
 LOG :7550.60 7551.30 0.70 Area code : 2  
 FDEPTH: 40 50 GearCond.code: 1  
 BDEPTH: 114 116 Validity code: 1  
 Towing dir: 280° Wire out: 150 m Speed: 32 kn\*10  
 Sorted: 3 Kg Total catch: 4.87 CATCH/HOUR: 20.87

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	12.86	1546	61.62		5296
Sufflogobius bibarbatu	3.34	2083	16.00		
Etrumeus whiteheadi	2.06	283	9.87		5297
Trigla lyra	1.93	4	9.25		
Engraulis capensis	0.51	34	2.44		
Merluccius capensis, juveniles	0.17	9	0.81		
Aequorea aequorea	0.00	37586			
Chrysaora sp	0.00	2829			
Total	20.87		99.99		

DATE:11/ 6/96 PROJECT STATION:1584  
 GEAR TYPE: BT No:2 POSITION:Lat S 2220  
 start stop duration Long F 1254  
 TIME :06:13:00 06:33:00 20 (min) Purpose code: 1  
 LOG :7752.80 7753.90 1.10 Area code : 2  
 FDEPTH: 335 352 GearCond.code: 1  
 BDEPTH: 335 352 Validity code: 1  
 Towing dir: 270° Wire out:1150 m Speed: 33 kn\*10  
 Sorted: 184 Kg Total catch: 202.00 CATCH/HOUR: 606.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	540.00	1155	89.11		5303
Coelorinchus sp.	22.86	495	3.77		
Austroglossus microlepis	17.07	39	2.82		
Helicolenus dactylopterus	12.15	252	2.00		
Lophius vomerinus	9.06	6	1.50		
Todarodes sagittatus	2.31	3	0.38		
Chlorophthalmus atlanticus	0.99	54	0.16		
Trachurus, Juveniles	0.90	45	0.15		
C R A B S	0.36	9	0.06		
Trachurus capensis	0.30	3	0.05		
Total	606.00		100.00		

DATE:10/ 6/96 PROJECT STATION:1580  
 GEAR TYPE: PT No:1 POSITION:Lat S 2240  
 start stop duration Long E 1409  
 TIME :16:30:00 16:35:00 5 (min) Purpose code: 1  
 LOG :7632.40 7632.80 0.40 Area code : 2  
 FDEPTH: 23 32 GearCond.code: 9  
 BDEPTH: 103 104 Validity code:  
 Towing dir: 270° Wire out: 158 m Speed: 31 kn\*10  
 Sorted: 4 Kg Total catch: 19.25 CATCH/HOUR: 231.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	201.60	22908	87.27		5298
Sufflogobius bibarbatu	27.60	19716	11.95		
Engraulis capensis	1.80	180	0.78		
Aequorea aequorea	0.00	42096			
Chrysaora sp.	0.00	6336			
Total	231.00		100.00		

DATE:11/ 6/96 PROJECT STATION:1585  
 GEAR TYPE: PT No:1 POSITION:Lat S 2221  
 start stop duration Long E 1332  
 TIME :10:41:00 10:41:00 (min) Purpose code: 1  
 LOG :7793.70 7793.70 Area code : 2  
 FDEPTH: 0 0 GearCond.code: 9  
 BDEPTH: 148 148 Validity code: 9  
 Towing dir: 90° Wire out: 250 m Speed: 30 kn\*10  
 Sorted: 2 Kg Total catch: 2.49 CATCH/HOUR: 149.40

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus capensis	139.20	300	93.17		5304
MYCTOPHIDAE	4.80	5280	3.21		
Todarodes sagittatus	3.00	120	2.01		
Trachurus, Juveniles	1.20	480	0.80		5327
Sufflogobius bibarbatu	1.20	480	0.80		
Aequorea aequorea	0.00	98280			
Chrysaora sp	0.00	600			
Total	149.40		99.99		

DATE:10/ 6/96 PROJECT STATION:1581  
 GEAR TYPE: PT No:1 POSITION:Lat S 2240  
 start stop duration Long E 1347  
 TIME :18:57:00 19:04:00 7 (min) Purpose code: 1  
 LOG :7654.10 7654.50 0.40 Area code : 2  
 FDEPTH: 75 75 GearCond.code: 1  
 BDEPTH: 131 130 Validity code: 1  
 Towing dir: 270° Wire out: 200 m Speed: 30 kn\*10  
 Sorted: 1 Kg Total catch: 30.70 CATCH/HOUR: 263.14

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sufflogobius bibarbatu	257.14	214286	97.72		
Todarodes sagittatus	5.14	171	1.95		
Trachurus, Juveniles	0.51	60	0.19		5299
Merluccius capensis, juveniles	0.17	9	0.06		
Etrumeus whiteheadi	0.17	9	0.06		
Aequorea aequorea	0.00	30069			
Chrysaora sp.	0.00	7354			
Total	263.13		99.98		



PROJECT STATION: 1586  
 DATE: 11/ 6/96 GEAR TYPE: PT No:1 POSITION: Lat S 2222 Long E 1339  
 start stop duration  
 TIME :11:20:00 11:35:00 15 (min) Purpose code: 1  
 LOG :7795.30 7796.00 1.30 Area code : 2  
 FDEPTH: 80 92 GearCond.code: 1  
 BDEPTH: 143 140 Validity code: 1  
 Towing dir: 90° Wire out: 350 m Speed: 30 kn\*10

Sorted: 2 Kg Total catch: 5.99 CATCH/HOUR: 23.96

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sufflogobius bibarbatu	16.00	11432	66.78		
Trigla lyra	4.00	20	16.69		
Todarodes sagittatus	2.56	64	10.68		
Trachipterus jacksonensis	1.40	4	5.84		
Aequorea aequorea	0.00	93524			
Chrysaora sp.	0.00	1760			
<b>Total</b>	<b>23.96</b>		<b>99.99</b>		

PROJECT STATION: 1591  
 DATE: 12/ 6/96 GEAR TYPE: PT No:5 POSITION: Lat S 2140 Long E 1256  
 start stop duration  
 TIME :06:22:00 06:42:00 20 (min) Purpose code: 1  
 LOG :7962.90 7962.90 0.90 Area code : 2  
 FDEPTH: 240 250 GearCond.code: 1  
 BDEPTH: 292 295 Validity code: 1  
 Towing dir: 270° Wire out: 700 m Speed: 31 kn\*10

Sorted: 5 Kg Total catch: 5.82 CATCH/HOUR: 17.46

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Brama brama	10.68	6	61.17		
MYCTOPHIDAE	2.70	1440	15.46		
Zenopsis conchifer	2.67	3	15.29		
Cubiceps caeruleus	1.41	3	8.08		
<b>Total</b>	<b>17.46</b>		<b>100.00</b>		

PROJECT STATION: 1587  
 DATE: 11/ 6/96 GEAR TYPE: PT No:1 POSITION: Lat S 2221 Long E 1344  
 start stop duration  
 TIME :13:03:00 13:20:00 17 (min) Purpose code: 1  
 LOG :7808.10 7809.20 1.10 Area code : 2  
 FDEPTH: 50 48 GearCond.code: 1  
 BDEPTH: 126 127 Validity code: 1  
 Towing dir: 270° Wire out: 200 m Speed: 30 kn\*10

Sorted: 3 Kg Total catch: 154.02 CATCH/HOUR: 539.15

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sufflogobius bibarbatu	510.18	396925	94.63		
Todarodes sagittatus	28.94	724	5.37		
Trachurus, Juveniles	4.34	604	0.80	5305	
Etrumeus whiteheadi	0.14	7	0.03		
Chrysaora sp.	0.00	4659			
<b>Total</b>	<b>543.60</b>		<b>100.83</b>		

PROJECT STATION: 1592  
 DATE: 12/ 6/96 GEAR TYPE: BT No:1 POSITION: Lat S 2140 Long E 1313  
 start stop duration  
 TIME :09:18:00 09:38:00 20 (min) Purpose code: 1  
 LOG :7984.20 7985.30 1.10 Area code : 2  
 FDEPTH: 157 162 GearCond.code: 1  
 BDEPTH: 157 162 Validity code: 1  
 Towing dir: 270° Wire out: 600 m Speed: 31 kn\*10

Sorted: 49 Kg Total catch: 291.26 CATCH/HOUR: 873.78

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	627.00	9006	71.76	5312	
Trachurus capensis	243.00	2805	27.81	5311	
Sufflogobius bibarbatu	3.24	486	0.37		
Pterothrissus belloci	0.54	18	0.06		
Aequorea aequorea	0.00	15786			
Chrysaora sp	0.00	2376			
<b>Total</b>	<b>873.78</b>		<b>100.00</b>		

PROJECT STATION: 1588  
 DATE: 11/ 6/96 GEAR TYPE: PT No:1 POSITION: Lat S 2203 Long E 1348  
 start stop duration  
 TIME :17:32:00 17:46:00 14 (min) Purpose code: 1  
 LOG :7849.90 7850.60 0.70 Area code : 2  
 FDEPTH: 50 30 GearCond.code: 1  
 BDEPTH: 101 101 Validity code: 1  
 Towing dir: 323° Wire out: 160 m Speed: 31 kn\*10

Sorted: 1 Kg Total catch: 7.36 CATCH/HOUR: 31.54

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sufflogobius bibarbatu	30.00	19714	95.12		
Trachurus, Juveniles	0.77	94	2.44	5307	
Engraulis capensis	0.73	64	2.31	5306	
Merluccius capensis	0.04	4	0.13		
Aequorea aequorea	0.00	120274			
Chrysaora sp.	0.00	1131			
<b>Total</b>	<b>31.54</b>		<b>100.00</b>		

PROJECT STATION: 1593  
 DATE: 12/ 6/96 GEAR TYPE: PT No:5 POSITION: Lat S 2140 Long E 1329  
 start stop duration  
 TIME :11:45:00 12:08:00 23 (min) Purpose code: 1  
 LOG :8003.30 8004.90 1.60 Area code : 2  
 FDEPTH: 20 10 GearCond.code: 1  
 BDEPTH: 122 118 Validity code: 1  
 Towing dir: 90° Wire out: 100 m Speed: 40 kn\*10

Sorted: 9 Kg Total catch: 68.74 CATCH/HOUR: 179.32

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	159.31	13990	88.84	5313	
Etrumeus whiteheadi	20.01	1205	11.16	5314	
Aequorea aequorea	0.00	274539			
<b>Total</b>	<b>179.32</b>		<b>100.00</b>		

PROJECT STATION: 1589  
 DATE: 11/ 6/96 GEAR TYPE: PT No:1 POSITION: Lat S 2200 Long E 1323  
 start stop duration  
 TIME :20:50:00 20:59:00 9 (min) Purpose code: 1  
 LOG :7875.70 7876.20 0.50 Area code : 2  
 FDEPTH: 130 130 GearCond.code: 1  
 BDEPTH: 168 170 Validity code: 1  
 Towing dir: 270° Wire out: 250 m Speed: 31 kn\*10

Sorted: 14 Kg Total catch: 17.96 CATCH/HOUR: 119.73

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	81.67	2127	68.21	5308	
Sufflogobius bibarbatu	26.67	9133	22.28		
Thyrstites atun	11.07	33	9.25		
Todarodes sagittatus	0.33	7	0.28		
Aequorea aequorea	0.00	81853			
<b>Total</b>	<b>119.74</b>		<b>100.02</b>		

PROJECT STATION: 1594  
 DATE: 12/ 6/96 GEAR TYPE: PT No:1 POSITION: Lat S 2130 Long E 1328  
 start stop duration  
 TIME :14:16:00 14:30:00 14 (min) Purpose code: 1  
 LOG :8023.00 8023.80 0.80 Area code : 2  
 FDEPTH: 63 71 GearCond.code: 9  
 BDEPTH: 112 111 Validity code: 1  
 Towing dir: 153° Wire out: 260 m Speed: 35 kn\*10

Sorted: 2 Kg Total catch: 3.75 CATCH/HOUR: 16.07

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sufflogobius bibarbatu	11.66	10491	72.56		
Trachurus, Juveniles	4.29	527	26.70	5315	
Illex coindetii	0.13	13	0.81		
Chrysaora sp.	0.00	5657			
<b>Total</b>	<b>16.08</b>		<b>100.07</b>		

PROJECT STATION: 1590  
 DATE: 11/ 6/96 GEAR TYPE: BT No:9 POSITION: Lat S 2200 Long E 1311  
 start stop duration  
 TIME :22:56:00 23:04:00 8 (min) Purpose code: 1  
 LOG :7890.10 7890.50 0.40 Area code : 2  
 FDEPTH: 199 201 GearCond.code: 9  
 BDEPTH: 199 201 Validity code: 1  
 Towing dir: 270° Wire out: 700 m Speed: 30 kn\*10

Sorted: 44 Kg Total catch: 722.81 CATCH/HOUR: 5421.08

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	3513.75	28905	64.82	5310	
Trachurus capensis	1862.85	18758	34.36	5309	
Sufflogobius bibarbatu	16.65	2820	0.31		
RAJIDAE	12.45	8	0.23		
Pterothrissus belloci	10.28	383	0.19		
Todarodes sagittatus	5.10	128	0.09		
Aequorea aequorea	0.00	164438			
<b>Total</b>	<b>5421.08</b>		<b>100.00</b>		

PROJECT STATION: 1595  
 DATE: 12/ 6/96 GEAR TYPE: BT No:1 POSITION: Lat S 2120 Long E 1312  
 start stop duration  
 TIME :17:22:00 17:30:00 8 (min) Purpose code: 1  
 LOG :8049.50 8050.00 0.50 Area code : 2  
 FDEPTH: 133 132 GearCond.code: 1  
 BDEPTH: 133 132 Validity code: 1  
 Towing dir: 90° Wire out: 50 m Speed: 30 kn\*10

Sorted: 25 Kg Total catch: 1228.00 CATCH/HOUR: 9210.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus capensis	8010.00	99923	86.97	5316	
Merluccius capensis, juveniles	1155.00	9533	12.54	5317	
Sufflogobius bibarbatu	43.50	6165	0.47		
Aequorea aequorea	0.00	13155			
Chrysaora sp.	0.00	495			
<b>Total</b>	<b>9208.50</b>		<b>99.98</b>		



PROJECT STATION:1596  
 DATE:13/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2100  
 start stop duration Long E 1254  
 TIME :04:32:00 04:36:00 4 (min) Purpose code: 1  
 LOG :8158.50 8158.80 0.30 Area code : 2  
 FDEPTH: 10 24 GearCond.code: 9  
 BDEPTH: 257 260 Validity code: 1  
 Towing dir: 270° Wire out: 120 m Speed: 37 kn\*10

Sorted: 1 Kg Total catch: 25.27 CATCH/HOUR: 379.05

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	375.00	375000	98.93		
Cubiceps caerulus	2.55	15	0.67		
Trachurus, Juveniles	1.50	885	0.40	5318	
Chrysaora sp	0.00	5940			
Total	379.05		100.00		

PROJECT STATION:1601  
 DATE:13/ 6/96 GEAR TYPE: PT No:5 POSITION:Lat S 2114  
 start stop duration Long E 1322  
 TIME :17:53:00 17:59:00 6 (min) Purpose code: 1  
 LOG :8257.00 8257.40 0.40 Area code : 2  
 FDEPTH: 40 40 GearCond.code: 1  
 BDEPTH: 107 105 Validity code: 1  
 Towing dir: 90° Wire out: 150 m Speed: 31 kn\*10

Sorted: 2 Kg Total catch: 3.78 CATCH/HOUR: 37.80

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sufflogobius bibarbatus	22.20	3780	58.73		
Engraulis capensis	9.60	1070	25.40	5329	
Trachurus, Juveniles	5.60	560	14.81	5328	
Etrumeus whiteheadi	0.40	20	1.06		
Chrysaora sp.	0.00	660			
Aequorea aequorea	0.00	87700			
Total	37.80		100.00		

PROJECT STATION:1597  
 DATE:13/ 6/96 GEAR TYPE: PT No:5 POSITION:Lat S 2100  
 start stop duration Long E 1304  
 TIME :07:06:00 07:10:00 4 (min) Purpose code: 1  
 LOG :8171.70 8171.80 0.10 Area code : 2  
 FDEPTH: 85 85 GearCond.code: 1  
 BDEPTH: 129 128 Validity code: 1  
 Towing dir: 270° Wire out: 280 m Speed: 30 kn\*10

Sorted: Kg Total catch: 0.01 CATCH/HOUR: 0.15

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	0.15	45	100.00		
Chrysaora sp	0.00	990			
Aequorea aequorea	0.00	131550			
Total	0.15		100.00		

PROJECT STATION:1602  
 DATE:13/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2117  
 start stop duration Long E 1332  
 TIME :19:24:00 19:38:00 14 (min) Purpose code: 1  
 LOG :8268.70 8269.50 0.80 Area code : 2  
 FDEPTH: 37 38 GearCond.code: 1  
 BDEPTH: 77 77 Validity code: 1  
 Towing dir: 150° Wire out: 120 m Speed: 29 kn\*10

Sorted: 15 Kg Total catch: 240.00 CATCH/HOUR: 1028.57

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	1028.57	72939	100.00	5330	
Chrysaora sp.	0.00	171			
Total	1028.57		100.00		

PROJECT STATION:1598  
 DATE:13/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1302  
 start stop duration Long E 1302  
 TIME :09:13:00 09:20:00 7 (min) Purpose code: 1  
 LOG :8188.90 8189.30 0.40 Area code : 2  
 FDEPTH: 131 134 GearCond.code: 1  
 BDEPTH: 131 134 Validity code: 1  
 Towing dir: 270° Wire out: 500 m Speed: 30 kn\*10

Sorted: 21 Kg Total catch: 188.73 CATCH/HOUR: 1617.69

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	1277.14	20991	78.95	5319	
Merluccius capensis, juveniles	315.51	2160	19.50	5320	
Sufflogobius bibarbatus	21.60	2777	1.34		
Austroglossus microlepis	3.43	9	0.21		
Chrysaora sp	0.00	4526			
Aequorea aequorea	0.00	30069			
Total	1617.68		100.00		

PROJECT STATION:1603  
 DATE:15/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2055  
 start stop duration Long E 1324  
 TIME :08:30:00 08:50:00 20 (min) Purpose code: 1  
 LOG :8548.80 8550.20 1.40 Area code : 2  
 FDEPTH: 20 20 GearCond.code: 1  
 BDEPTH: 36 38 Validity code: 1  
 Towing dir: 320° Wire out: 100 m Speed: 40 kn\*10

Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Chrysaora sp.	0.00	78			
Aequorea aequorea	0.00	1053			
Total					

PROJECT STATION:1599  
 DATE:13/ 6/96 GEAR TYPE: BT No:9 POSITION:Lat S 1309  
 start stop duration Long E 1309  
 TIME :10:52:00 11:07:00 15 (min) Purpose code: 1  
 LOG :8199.20 8200.00 0.80 Area code : 2  
 FDEPTH: 124 124 GearCond.code: 1  
 BDEPTH: 124 124 Validity code: 1  
 Towing dir: 270° Wire out: 450 m Speed: 35 kn\*10

Sorted: 59 Kg Total catch: 1534.35 CATCH/HOUR: 6137.40

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus capensis	4378.40	67496	71.34	5321	
Sardinops ocellatus	930.80	10816	15.17	5322	
Merluccius capensis	728.00	9256	11.86	5323	
Sufflogobius bibarbatus	47.84	6968	0.78		
Illex coindetii	19.76	624	0.32		
Etrumeus whiteheadi	18.72	312	0.31	5325	
Pterothrissus belloci	12.48	312	0.20		
Scomber japonicus	1.40	4	0.02	5324	
Total	6137.40		100.00		

PROJECT STATION:1604  
 DATE:15/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2042  
 start stop duration Long E 1318  
 TIME :11:16:00 11:20:00 4 (min) Purpose code: 1  
 LOG :8572.40 8572.70 0.30 Area code : 3  
 FDEPTH: 12 18 GearCond.code: 9  
 BDEPTH: 53 51 Validity code: 1  
 Towing dir: 360° Wire out: 100 m Speed: 30 kn\*10

Sorted: 1 Kg Total catch: 1.35 CATCH/HOUR: 20.25

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	19.80	2775	97.78	5331	
Etrumeus whiteheadi	0.45	30	2.22	5332	
Aequorea aequorea	0.00	657750			
Total	20.25		100.00		

PROJECT STATION:1605  
 DATE:15/ 6/96 GEAR TYPE: BT No:9 POSITION:Lat S 2045  
 start stop duration Long E 1253  
 TIME :14:35:00 14:45:00 10 (min) Purpose code: 1  
 LOG :8604.80 8605.20 0.40 Area code : 3  
 FDEPTH: 177 174 GearCond.code: 1  
 BDEPTH: 177 174 Validity code: 1  
 Towing dir: 90° Wire out: 600 m Speed: 31 kn\*10

Sorted: 46 Kg Total catch: 46.78 CATCH/HOUR: 280.68

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	203.70	4260	72.57	5335	
Trachurus capensis	34.80	462	12.40	5334	
Sufflogobius bibarbatus	21.12	1884	7.52		
Lophius vomerinus	5.16	12	1.84		
Todarodes sagittatus	4.92	138	1.75		
Dentex macrophthalmus	4.20	12	1.50		
Synagrops microlepis	3.36	426	1.20		
Austroglossus microlepis	2.58	6	0.92		
Pterothrissus belloci	0.60	18	0.21		
Trachurus, Juveniles	0.12	42	0.04	5333	
BRAMIDAE	0.06	6	0.02		
Chlorophthalmus atlanticus	0.06	18	0.02		
Chrysaora sp	0.00	1188			
Total	280.68		99.66		

PROJECT STATION:1600  
 DATE:13/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2100  
 start stop duration Long E 1324  
 TIME :13:27:00 13:42:00 15 (min) Purpose code: 1  
 LOG :8219.50 8220.30 0.80 Area code : 2  
 FDEPTH: 24 21 GearCond.code: 1  
 BDEPTH: 66 73 Validity code: 1  
 Towing dir: 270° Wire out: 150 m Speed: 4 kn\*10

Sorted: 30 Kg Total catch: 632.10 CATCH/HOUR: 2528.40

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus Juveniles	2528.40	217896	100.00	5326	
Chrysaora sp	0.00	1056			
Total	2528.40		100.00		



PROJECT STATION:1606  
 DATE:15/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2044  
 start stop duration Long E 1246  
 TIME :16:25:00 16:45:00 20 (min) Purpose code: 1  
 LOG :8617.50 8618.60 1.10 Area code : 2  
 FDEPTH: 170 135 GearCond.code: 1  
 BDEPTH: 275 262 Validity code: 1  
 Towing dir: 90° Wire out: 650 m Speed: 35 kn\*10  
 Sorted: 1 Kg Total catch: 0.86 CATCH/HOUR: 2.58

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Cubiceps caeruleus	1.77	6	68.60		
MYCTOPHIDAE	0.60	339	23.26		
Todaropsis eblanae	0.21	3	8.14		
Chrysaora sp.	0.00	2970			
<b>Total</b>	<b>2.58</b>		<b>100.00</b>		

PROJECT STATION:1607  
 DATE:15/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 2044  
 start stop duration Long E 1231  
 TIME :18:37:00 18:57:00 20 (min) Purpose code: 1  
 LOG :8634.20 8635.30 1.10 Area code : 3  
 FDEPTH: 325 324 GearCond.code: 1  
 BDEPTH: 325 324 Validity code: 1  
 Towing dir: 270° Wire out:1100 m Speed: 31 kn\*10  
 Sorted: 161 Kg Total catch: 167.66 CATCH/HOUR: 502.98

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Merluccius capensis	416.85	741	82.88		5336
Lophius vomerinus	27.75	30	5.52		
Austroglossus microlepis	21.30	39	4.23		
Helicolenus dactylopterus	13.95	180	2.77		
Coelorinchus sp.	8.55	216	1.70		
Lophius vaillanti	7.41	3	1.47		
Chlorophthalmus atlanticus	4.77	189	0.95		
Todarodes sagittatus	1.41	3	0.28		
Ebinania costaeacanarie	0.54	9	0.11		
Trigla lyra	0.45	3	0.09		
Chrysaora sp.	0.00	792			
<b>Total</b>	<b>502.98</b>		<b>100.00</b>		

PROJECT STATION:1608  
 DATE:16/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2030  
 start stop duration Long E 1243  
 TIME :02:50:00 02:50:00 (min) Purpose code: 1  
 LOG :8716.00 8716.00 Area code : 3  
 FDEPTH: 0 0 GearCond.code: 9  
 BDEPTH: 200 200 Validity code: 9  
 Towing dir: 360° Wire out: 550 m Speed: 4 kn\*10  
 Sorted: 1 Kg Total catch: 0.79 CATCH/HOUR: 47.40

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Synagrops microlepis	21.60	7020	45.57		
MYCTOPHIDAE	7.80	3660	16.46		
Trachipterus jacksonensis	7.20	60	15.19		
Centrolophus niger	7.20	60	15.19		
Trachurus, Juveniles	3.60	1380	7.59		5337
<b>Total</b>	<b>47.40</b>		<b>100.00</b>		

PROJECT STATION:1609  
 DATE:16/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2029  
 start stop duration Long E 1250  
 TIME :04:38:00 04:56:00 18 (min) Purpose code: 1  
 LOG :8728.90 8729.90 1.00 Area code : 3  
 FDEPTH: 110 115 GearCond.code: 1  
 BDEPTH: 134 140 Validity code: 1  
 Towing dir: 350° Wire out: 380 m Speed: 31 kn\*10  
 Sorted: 3 Kg Total catch: 3.43 CATCH/HOUR: 11.43

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trigla lyra	4.40	10	38.50		
Etrumeus whiteheadi	3.13	130	27.38		5339
Merluccius capensis, juveniles	2.63	50	23.01		5340
Trachurus, Juveniles	1.00	43	8.75		5338
Sardinops ocellatus	0.23	3	2.01		
Synagrops microlepis	0.03	7	0.26		
Chrysaora sp.	0.00	660			
<b>Total</b>	<b>11.42</b>		<b>99.91</b>		

PROJECT STATION:1610  
 DATE:16/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2029  
 start stop duration Long E 1255  
 TIME :06:20:00 06:38:00 18 (min) Purpose code: 1  
 LOG :8740.00 8740.70 0.70 Area code : 3  
 FDEPTH: 37 30 GearCond.code: 1  
 BDEPTH: 132 132 Validity code: 1  
 Towing dir: 270° Wire out: 120 m Speed: 35 kn\*10  
 Sorted: 13 Kg Total catch: 25.34 CATCH/HOUR: 84.47

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Etrumeus whiteheadi	84.00	3403	99.44		5341
Trachurus, Juveniles	0.47	33	0.56		5342
Aequorea aequorea	0.00	5847			
Chrysaora sp.	0.00	1320			
<b>Total</b>	<b>84.47</b>		<b>100.00</b>		

PROJECT STATION:1611  
 DATE:16/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 2030  
 start stop duration Long E 1256  
 TIME :07:42:00 07:52:00 10 (min) Purpose code: 1  
 LOG :8746.20 8746.60 0.40 Area code : 3  
 FDEPTH: 126 128 GearCond.code: 1  
 BDEPTH: 126 128 Validity code: 1  
 Towing dir: 260° Wire out: 450 m Speed: 32 kn\*10  
 Sorted: 42 Kg Total catch: 2475.00 CATCH/HOUR: 14850.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	14100.00	428814	94.95		5343
Merluccius capensis, juveniles	600.00	4416	4.04		5344
Sufflogobius bibarbatatus	150.00	11250	1.01		
Chrysaora sp.	0.00	396			
<b>Total</b>	<b>14850.00</b>		<b>100.00</b>		

PROJECT STATION:1612  
 DATE:16/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2031  
 start stop duration Long E 1313  
 TIME :10:15:00 10:31:00 16 (min) Purpose code: 1  
 LOG :8767.90 8768.90 1.00 Area code : 3  
 FDEPTH: 25 30 GearCond.code: 1  
 BDEPTH: 55 54 Validity code: 1  
 Towing dir: 160° Wire out: 100 m Speed: 29 kn\*10  
 Sorted: 15 Kg Total catch: 185.76 CATCH/HOUR: 696.60

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	690.75	77625	99.16		5345
Engraulis capensis	4.50	360	0.65		
Sardinops ocellatus	0.90	90	0.13		
Etrumeus whiteheadi	0.45	45	0.06		
<b>Total</b>	<b>696.60</b>		<b>100.00</b>		

PROJECT STATION:1613  
 DATE:16/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2016  
 start stop duration Long E 1310  
 TIME :14:26:00 14:35:00 9 (min) Purpose code: 1  
 LOG :8807.90 8808.30 0.40 Area code : 3  
 FDEPTH: 26 32 GearCond.code: 9  
 BDEPTH: 53 54 Validity code: 1  
 Towing dir: 360° Wire out: 100 m Speed: 31 kn\*10  
 Sorted: 33 Kg Total catch: 3312.00 CATCH/HOUR: 22080.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	21800.00	2294667	98.73		5347
Etrumeus whiteheadi	246.67	18667	1.12		5346
Engraulis capensis	33.33	2667	0.15		
<b>Total</b>	<b>22080.00</b>		<b>100.00</b>		

PROJECT STATION:1614  
 DATE:16/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 2015  
 start stop duration Long E 1252  
 TIME :17:37:00 17:39:00 2 (min) Purpose code: 1  
 LOG :8836.10 8836.20 0.10 Area code : 3  
 FDEPTH: 120 120 GearCond.code: 1  
 BDEPTH: 120 120 Validity code: 1  
 Towing dir: 90° Wire out: 450 m Speed: 31 kn\*10  
 Sorted: 34 Kg Total catch: 1200.00 CATCH/HOUR: 36000.00

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	34560.00	1170780	96.00		5348
Merluccius capensis, juveniles	1080.00	14940	3.00		5349
Pterothrissus belloci	360.00	7800	1.00		
Aequorea aequorea	0.00	52620			
Chrysaora sp.	0.00	1980			
<b>Total</b>	<b>36000.00</b>		<b>100.00</b>		

PROJECT STATION:1615  
 DATE:16/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 2015  
 start stop duration Long E 1235  
 TIME :19:57:00 20:04:00 7 (min) Purpose code: 1  
 LOG :8855.40 8855.80 0.40 Area code : 3  
 FDEPTH: 156 158 GearCond.code: 1  
 BDEPTH: 156 158 Validity code: 1  
 Towing dir: 100° Wire out: 405 m Speed: 30 kn\*10  
 Sorted: 19 Kg Total catch: 25.29 CATCH/HOUR: 216.77

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus capensis	112.29	1654	51.80		5350
Merluccius capensis, juveniles	62.14	1286	28.67		5352
Trachurus, Juveniles	27.00	1346	12.46		5351
Sufflogobius bibarbatatus	10.54	926	4.86		
Perulibatrachus rossignoli	2.40	9	1.11		
Pterothrissus belloci	2.06	43	0.95		
Lepidopus caudatus	0.34	9	0.16		
Chrysaora sp.	0.00	5657			
<b>Total</b>	<b>216.77</b>		<b>100.01</b>		



PROJECT STATION:1616  
 DATE:17/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 2000  
 start stop duration Long E 1249  
 TIME :09:00:00 09:20:00 20 (min) Purpose code: 1  
 LOG :8975.40 8976.50 1.10 Area code : 3  
 FDEPTH: 107 103 GearCond.code: 1  
 BDEPTH: 107 103 Validity code: 1  
 Towing dir: 90° Wire out: 350 m Speed: 30 kn\*10  
 Sorted: 7 Kg Total catch: 34.95 CATCH/HOUR: 104.85

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	102.75	5616	98.00		5353
Merluccius capensis, juveniles	1.95	45	1.86		
Sufflogobius bibarbatatus	0.15	90	0.14		
Aequorea aequorea	0.00	5262			
Chrysaora sp.	0.00	396			
Total	104.85		100.00		

PROJECT STATION:1621  
 DATE:18/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1930  
 start stop duration Long E 1233  
 TIME :09:04:00 09:09:00 5 (min) Purpose code: 1  
 LOG :9198.50 9198.90 0.40 Area code : 3  
 FDEPTH: 30 30 GearCond.code: 1  
 BDEPTH: 106 109 Validity code: 1  
 Towing dir: 270° Wire out: 150 m Speed: 30 kn\*10  
 Sorted: 24 Kg Total catch: 216.54 CATCH/HOUR: 2598.48

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Etrumeus whiteheadi	1474.20	147420	56.73		5364
Trachurus, Juveniles	1004.40	116748	38.65		5365
Sardinops ocellatus	113.40	11556	4.36		5363
Engraulis capensis	6.48	864	0.25		
Aequorea aequorea	0.00	42096			
Chrysaora sp.	0.00	6336			
Total	2598.48		99.99		

PROJECT STATION:1617  
 DATE:17/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 2001  
 start stop duration Long E 1257  
 TIME :11:00:00 11:13:00 13 (min) Purpose code: 1  
 LOG :8986.70 8987.40 0.70 Area code : 3  
 FDEPTH: 35 40 GearCond.code: 9  
 BDEPTH: 59 60 Validity code: 1  
 Towing dir: 160° Wire out: 120 m Speed: 33 kn\*10  
 Sorted: 9 Kg Total catch: 72.56 CATCH/HOUR: 334.89

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	216.00	23220	64.50		5356
Sardinops ocellatus	113.40	11257	33.86		5355
Trigla lyra	3.00	14	0.90		
Engraulis capensis	2.49	249	0.74		5354
Chrysaora sp.	0.00	6092			
Total	334.89		100.00		

PROJECT STATION:1622  
 DATE:18/ 6/96 GEAR TYPE: PT No:2 POSITION:Lat S 1935  
 start stop duration Long E 1246  
 TIME :11:50:00 12:00:00 10 (min) Purpose code: 1  
 LOG :9221.90 9222.50 0.60 Area code : 3  
 FDEPTH: 28 25 GearCond.code: 1  
 BDEPTH: 47 47 Validity code: 1  
 Towing dir: 320° Wire out: 100 m Speed: 35 kn\*10  
 Sorted: 14 Kg Total catch: 115.20 CATCH/HOUR: 691.20

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Engraulis capensis	504.00	58992	72.92		5367
Sardinops ocellatus	185.28	25104	26.81		5366
Etrumeus whiteheadi	1.92	96	0.28		5368
Chrysaora sp.	0.00	180			
Total	691.20		100.01		

PROJECT STATION:1618  
 DATE:17/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1947  
 start stop duration Long E 1252  
 TIME :14:26:00 14:34:00 8 (min) Purpose code: 1  
 LOG :9016.90 9017.50 0.60 Area code : 3  
 FDEPTH: 24 30 GearCond.code: 1  
 BDEPTH: 44 45 Validity code: 1  
 Towing dir: 160° Wire out: 100 m Speed: 31 kn\*10  
 Sorted: 16 Kg Total catch: 93.72 CATCH/HOUR: 702.90

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Etrumeus whiteheadi	641.25	66960	91.23		5360
Trachurus, Juveniles	55.80	4140	7.94		5359
Sardinops ocellatus	4.05	450	0.58		5358
Engraulis capensis	1.80	225	0.26		5357
Chrysaora sp.	0.00	375			
Total	702.90		100.01		

PROJECT STATION:1623  
 DATE:18/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1915  
 start stop duration Long E 1202  
 TIME :18:24:00 18:48:00 24 (min) Purpose code: 1  
 LOG :9288.00 9289.30 1.30 Area code : 3  
 FDEPTH: 100 90 GearCond.code: 1  
 BDEPTH: 252 148 Validity code: 9  
 Towing dir: 90° Wire out: 250 m Speed: 30 kn\*10  
 Sorted: 2 Kg Total catch: 1.85 CATCH/HOUR: 4.63

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus capensis	3.03	30	65.44		5369
Sufflogobius bibarbatatus	1.05	645	22.68		
Todaropsis eblanae	0.33	8	7.13		
Merluccius capensis, juveniles	0.23	5	4.97		
Chrysaora sp.	0.00	18			
Aequorea aequorea	0.00	878			
Total	4.64		100.22		

PROJECT STATION:1619  
 DATE:17/ 6/96 GEAR TYPE: PT No:2 POSITION:Lat S 1945  
 start stop duration Long E 1236  
 TIME :17:42:00 18:02:00 20 (min) Purpose code: 1  
 LOG :9046.50 9047.60 1.10 Area code : 3  
 FDEPTH: 0 0 GearCond.code: 1  
 BDEPTH: 116 115 Validity code: 1  
 Towing dir: 90° Wire out: 120 m Speed: 30 kn\*10  
 Sorted: 1 Kg Total catch: 0.74 CATCH/HOUR: 2.22

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	2.22	162	100.00		5361
Aequorea aequorea	0.00	5262			
Chrysaora sp.	0.00	396			
Total	2.22		100.00		

PROJECT STATION:1624  
 DATE:18/ 6/96 GEAR TYPE: PT No:5 POSITION:Lat S 1915  
 start stop duration Long E 1155  
 TIME :20:51:00 21:20:00 29 (min) Purpose code: 1  
 LOG :9303.00 9304.7 1.70 Area code : 3  
 FDEPTH: 150 145 GearCond.code: 1  
 BDEPTH: 288 278 Validity code: 1  
 Towing dir: 90° Wire out: 453 m Speed: 30 kn\*10  
 Sorted: 3 Kg Total catch: 2.66 CATCH/HOUR: 5.50

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Synagrops microlepis	2.69	281	48.91		
MYCTOPHIDAE	2.48	2483	45.09		
Trachurus capensis	0.25	2	4.55		
Krill	0.08	621	1.45		
Chrysaora sp.	0.00	21			
Total	5.50		100.00		

PROJECT STATION:1620  
 DATE:18/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1930  
 start stop duration Long E 1230  
 TIME :07:40:00 08:00:00 20 (min) Purpose code: 1  
 LOG :9190.30 9191.40 1.10 Area code : 3  
 FDEPTH: 119 119 GearCond.code: 1  
 BDEPTH: 120 120 Validity code: 1  
 Towing dir: 270° Wire out: 400 m Speed: 31 kn\*10  
 Sorted: 1 Kg Total catch: 0.33 CATCH/HOUR: 0.99

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus, Juveniles	0.99	21	100.00		5362
Chrysaora sp.	0.00	1188			
Total	0.99		100.00		

PROJECT STATION:1625  
 DATE:19/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1900  
 start stop duration Long E 1126  
 TIME :04:58:00 05:12:00 14 (min) Purpose code: 1  
 LOG :9371.40 9372.20 0.80 Area code : 3  
 FDEPTH: 200 200 GearCond.code: 1  
 BDEPTH: 424 447 Validity code: 1  
 Towing dir: 260° Wire out: 600 m Speed: 31 kn\*10  
 Sorted: 11 Kg Total catch: 11.28 CATCH/HOUR: 48.34

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	20.10	13401	41.56		
VITRELEDONELLIDAE	12.26	17	25.36		
TRICHIURIDAE	7.07	9	14.63		
Centrolophus niger	6.13	4	12.68		
Tetragonurus atlanticus	0.81	4	1.68		
ASTRONESTHIDAE	0.69	13	1.33		
Cubiceps caeruleus	0.60	4	1.24		
PARALEPIDIDAE	0.47	51	0.67		
Krill	0.21	1286	0.43		
Chrysaora sp.	0.00	10			
Total	48.34		100.00		



PROJECT STATION:1626  
 DATE:19/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1900  
 start stop duration Long E 1140  
 TIME :07:46:00 08:09:00 23 (min) Purpose code: 1  
 LOG :9391.90 9393.10 1.20 Area code : 3  
 FDEPTH: 298 295 GearCond.code: 1  
 BDEPTH: 298 295 Validity code: 1  
 Towing dir: 270° Wire out:1000 m Speed: 30 kn\*10  
 Sorted: 999 Kg Total catch 1106 57 CATCH/HOUR: 2886 70

PROJECT STATION:1631  
 DATE:19/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1844  
 start stop duration Long E 1146  
 TIME :23:40:00 24:00:00 20 (min) Purpose code: 1  
 LOG :9517.30 9518.30 1.00 Area code : 3  
 FDEPTH: 231 235 GearCond.code: 1  
 BDEPTH: 231 235 Validity code: 1  
 Towing dir: 270° Wire out: 770 m Speed: 30 kn\*10  
 Sorted 32 Kg Total catch: 1608.03 CATCH/HOUR: 4824 09

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macropthalmus	1377.39	2992	47.72	
Merluccius capensis	1293.91	2463	44.82	5372
Trachurus capensis	133.43	665	4.62	5371
Todarodes sagittatus	17.84	47	0.62	
Pterothrissus belloci	13.85	180	0.59	
Chlorophthalmus atlanticus	17.86	694	0.48	
Lophius vomerinus	8.63	10	0.30	
Lophius vaillanti	5.66	3	0.20	
Synagrops microlepis	4.85	329	0.17	
Coelorinchus sp.	4.38	125	0.15	
RAJIDAE	3.86	3	0.13	
Helicolenus dactylopterus	3.83	203	0.13	
Squalus megalops	1.98	5	0.07	
Total	2886.67		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	2983.50	42993	61.85	5378
Merluccius capensis	887.40	3519	18.40	5379
Dentex macropthalmus	864.45	8568	17.92	
Pterothrissus belloci	88.74	1377	1.84	
Total	4824.09		100.01	

PROJECT STATION:1632  
 DATE:20/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1830  
 start stop duration Long E 1132  
 TIME :04:42:00 05:02:00 20 (min) Purpose code: 1  
 LOG :9568.00 9569.20 1.20 Area code : 3  
 FDEPTH: 229 221 GearCond.code: 1  
 BDEPTH: 229 221 Validity code: 1  
 Towing dir: 95° Wire out: 840 m Speed: 30 kn\*10  
 Sorted 47 Kg Total catch: 374.42 CATCH/HOUR: 1123 26

PROJECT STATION:1627  
 DATE:19/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1859  
 start stop duration Long E 1155  
 TIME :10:58:00 11:18:00 20 (min) Purpose code: 1  
 LOG :9413.50 9414.50 1.00 Area code : 3  
 FDEPTH: 243 235 GearCond.code: 1  
 BDEPTH: 243 235 Validity code: 1  
 Towing dir: 110° Wire out: 850 m Speed: 30 kn\*10  
 Sorted: 96 Kg Total catch: 1530 81 CATCH/HOUR: 4592 43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus. Juveniles	582.00	10926	51.81	5380
Merluccius capensis	200.40	1536	17.84	5381
Helicolenus dactylopterus	150.00	3000	13.35	
Trigla lyra	68.40	312	6.09	
Dentex macropthalmus	44.25	408	3.94	
Chlorophthalmus atlanticus	39.84	2553	3.55	
Pterothrissus belloci	24.45	360	2.18	
C R U S T A C E A N S	12.72	1152	1.13	
PANDALIDAE	0.72	168	0.06	
Austroglossus microlepis	0.48	24	0.04	
Chrysaora sp.	0.00	198		
Total	1123.26		99.99	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macropthalmus	2893.80	16536	63.01	
Trachurus capensis	1493.70	18408	32.53	5373
Merluccius sp.	114.45	444	2.49	5374
Pterothrissus belloci	90.48	1248	1.97	
Total	4592.43		100.00	

PROJECT STATION:1633  
 DATE:20/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1830  
 start stop duration Long E 1147  
 TIME :07:17:00 07:22:00 5 (min) Purpose code: 1  
 LOG :9589.80 9589.30 0.30 Area code : 3  
 FDEPTH: 140 139 GearCond.code: 1  
 BDEPTH: 140 139 Validity code: 1  
 Towing dir: 270° Wire out: 500 m Speed: 30 kn\*10  
 Sorted. 11 Kg Total catch: 4500 00 CATCH/HOUR: 54000 00

PROJECT STATION:1628  
 DATE:19/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1900  
 start stop duration Long E 1223  
 TIME :15:42:00 15:46:00 4 (min) Purpose code: 1  
 LOG :9446.00 9446.20 0.20 Area code : 3  
 FDEPTH: 80 80 GearCond.code: 9  
 BDEPTH: 80 80 Validity code: 1  
 Towing dir: 260° Wire out: 350 m Speed: 30 kn\*10  
 Sorted: 29 Kg Total catch: 992 80 CATCH/HOUR: 14892 00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus. Juveniles	54000.00	1074984	100.00	5382
Total	54000.00		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	14892.00	323340	100.00	5375
Chrysaora sp.	0.00	14850		
Total	14892.00		100.00	

PROJECT STATION:1634  
 DATE:20/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1815  
 start stop duration Long E 1142  
 TIME :13:00:00 13:16:00 16 (min) Purpose code: 1  
 LOG :9649.80 9650.70 1.10 Area code : 3  
 FDEPTH: 130 135 GearCond.code: 1  
 BDEPTH: 130 135 Validity code: 1  
 Towing dir: 270° Wire out: 430 m Speed: 30 kn\*10  
 Sorted. 32 Kg Total catch: 1291 47 CATCH/HOUR: 4843 01

PROJECT STATION:1629  
 DATE:19/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1850  
 start stop duration Long E 1219  
 TIME :18:36:00 18:41:00 5 (min) Purpose code: 1  
 LOG :9472.10 9472.40 0.30 Area code : 3  
 FDEPTH: 15 15 GearCond.code: 1  
 BDEPTH: 48 49 Validity code: 1  
 Towing dir: 160° Wire out: 100 m Speed: 30 kn\*10  
 Sorted: 25 Kg Total catch: 579 60 CATCH/HOUR: 6955 20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	3736.13	82718	77.14	5383
Merluccius capensis	516.60	2921	10.67	5384
Dentex macropthalmus	424.35	10301	8.76	
Pterothrissus belloci	127.61	4151	2.63	
Trigla lyra	16.91	154	0.35	
Synagrops microlepis	16.91	3536	0.35	
Raja miraletus	2.96	4	0.06	
Sufflogobius bibarbatus	1.54	461	0.03	
Total	4843.01		99.99	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus. Juveniles	6955.20	917892	100.00	5376
Chrysaora sp.	0.00	1188		
Total	6955.20		100.00	

PROJECT STATION:1635  
 DATE:20/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1815  
 start stop duration Long E 1139  
 TIME :14:03:00 14:13:00 10 (min) Purpose code: 1  
 LOG :9655.30 9655.90 0.60 Area code : 3  
 FDEPTH: 30 32 GearCond.code: 9  
 BDEPTH: 138 144 Validity code: 1  
 Towing dir: 90° Wire out: 120 m Speed: 30 kn\*10  
 Sorted 13 Kg Total catch: 169 28 CATCH/HOUR: 1015 68

PROJECT STATION:1630  
 DATE:19/ 6/96 GEAR TYPE: PT No:5 POSITION:Lat S 1845  
 start stop duration Long E 1149  
 TIME :22:47:00 22:57:00 10 (min) Purpose code: 1  
 LOG :9514.10 9514.70 0.60 Area code : 3  
 FDEPTH: 130 115 GearCond.code: 1  
 BDEPTH: 214 217 Validity code: 1  
 Towing dir: 270° Wire out: 300 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 0.16 CATCH/HOUR: 0.96

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus. Juveniles	893.02	50058	88.12	5385
Etrumeus whiteheadi	120.66	6564	11.88	5386
Chrysaora sp.	0.00	954		
Aequorea aequorea	0.00	2368		
Total	1015.68		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sufflogobius bibarbatus	0.36	216	37.50	
Synagrops microlepis	0.18	36	18.75	
Aequorea aequorea	0.00	2634		
Chrysaora sp.	0.00	102		
Total	0.96		100.00	



PROJECT STATION:1636  
 DATE:20/ 6/96 GEAR TYPE: PT No:5 POSITION:Lat S 1815  
 start stop duration Long E 1132  
 TIME :15:40:00 16:10:00 30 (min) Purpose code: 1  
 LOG :9667.30 9668.80 1.50 Area code : 3  
 FDEPTH: 102 18 GearCond.code: 1  
 BDEPTH: 261 233 Validity code: 1  
 Towing dir: 100° Wire out: 350 m Speed: 30 kn\*10

Sorted: 26 Kg Total catch: 349.51 CATCH/HOUR: 699.02

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus, Juveniles	681.60 18972	97.51		5387
MYCTOPHIDAE	15.16 8432	2.17		
Etrumeus whiteheadi	2.12 80	0.30		
Todarodes sagittatus	0.10 2	0.01		
Synagrops microlepis	0.04 6	0.01		
Chrysaora sp.	0.00 792			
Alopias vulpinus	0.00 2			
Total	699.02	100.00		

PROJECT STATION:1637  
 DATE:21/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1759  
 start stop duration Long E 1139  
 TIME :05:46:00 06:06:00 20 (min) Purpose code: 1  
 LOG :9799.80 9800.90 1.10 Area code : 3  
 FDEPTH: 127 123 GearCond.code: 1  
 BDEPTH: 127 123 Validity code: 1  
 Towing dir: 90° Wire out: 480 m Speed: 30 kn\*10

Sorted: 53 Kg Total catch: 1200.00 CATCH/HOUR: 3600.00

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus, Juveniles	2512.98 57828	69.81		5388
Dentex macrophthalmus	609.09 9903	16.92		
Merluccius capensis, juveniles	311.88 1839	8.66		5389
Trigla lyra	155.25 108	4.31		
Umbrina canariensis	10.08 132	0.28		
Chrysaora sp.	0.00 396			
Total	3599.28	99.98		

PROJECT STATION:1638  
 DATE:21/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1756  
 start stop duration Long E 1144  
 TIME :09:10:00 09:17:00 7 (min) Purpose code: 1  
 LOG :9825.70 9826.10 0.40 Area code : 3  
 FDEPTH: 40 40 GearCond.code: 1  
 BDEPTH: 73 70 Validity code: 1  
 Towing dir: 156° Wire out: 170 m Speed: 30 kn\*10

Sorted: 34 Kg Total catch: 435.50 CATCH/HOUR: 3732.86

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus, Juveniles	1782.86 328946	47.76		5392
Engraulis capensis	1242.43 84300	33.28		5391
Etrumeus whiteheadi	691.97 63060	18.54		5390
Sardinops ocellatus	10.03 780	0.27		5393
Todaropsis eblanae	5.57 223	0.15		
Total	3732.86	100.00		

PROJECT STATION:1639  
 DATE:21/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1742  
 start stop duration Long E 1141  
 TIME :11:47:00 11:57:00 10 (min) Purpose code: 1  
 LOG :9849.20 9849.80 0.60 Area code : 3  
 FDEPTH: 50 50 GearCond.code: 1  
 BDEPTH: 89 87 Validity code: 1  
 Towing dir: 16° Wire out: 170 m Speed: 30 kn\*10

Sorted: 36 Kg Total catch: 289.36 CATCH/HOUR: 1736.16

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Etrumeus whiteheadi	1677.60 75552	96.63		5397
Trachurus, Juveniles	30.72 5760	1.77		5396
Sardinops ocellatus	25.92 432	1.49		5394
Engraulis capensis	1.92 96	0.11		5395
Total	1736.16	100.00		

PROJECT STATION:1640  
 DATE:21/ 6/96 GEAR TYPE: PT No:5 POSITION:Lat S 1744  
 start stop duration Long E 1128  
 TIME :13:55:00 14:20:00 25 (min) Purpose code: 1  
 LOG :9866.50 9867.80 1.30 Area code : 3  
 FDEPTH: 100 106 GearCond.code: 1  
 BDEPTH: 199 200 Validity code: 1  
 Towing dir: 270° Wire out: 350 m Speed: 30 kn\*10

Sorted: 44 Kg Total catch: 43.90 CATCH/HOUR: 105.36

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus capensis	69.72 1694	66.17		5398
Etrumeus whiteheadi	29.88 571	28.36		5399
Thyrssites atun	4.34 12	4.12		
Todarodes sagittatus	0.74 12	0.70		
Centrolophus niger	0.60 5	0.57		
Lepidopus caudatus	0.07 7	0.07		
Chrysaora sp.	0.00 31			
Aequorea aequorea	0.00 11786			
Total	105.35	99.99		

PROJECT STATION:1641  
 DATE:21/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1730  
 start stop duration Long E 1132  
 TIME :17:43:00 17:56:00 13 (min) Purpose code: 1  
 LOG :9901.80 9902.50 0.70 Area code : 3  
 FDEPTH: 155 150 GearCond.code: 1  
 BDEPTH: 155 150 Validity code: 1  
 Towing dir: 97° Wire out: 550 m Speed: 31 kn\*10

Sorted: 53 Kg Total catch: 264.38 CATCH/HOUR: 1220.22

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus, Juveniles	651.92 17802	53.43		5400
Dentex macrophthalmus	305.77 4578	25.06		
Merluccius capensis, juveniles	161.77 785	13.26		5401
Pterothrissus bellioi	55.62 1062	4.56		
Trigla lyra	24.46 254	2.00		
Synagrops microlepis	15.00 3000	1.23		
Umbrina canariensis	2.31 23	0.19		
Sepia sp.	2.08 23	0.17		
Chlorophthalmus atlanticus	1.15 231	0.09		
Chrysaora sp.	0.00 305			
Total	1220.08	99.99		

PROJECT STATION:1642  
 DATE:21/ 6/96 GEAR TYPE: PT No:1 POSITION:Lat S 1735  
 start stop duration Long E 1141  
 TIME :19:40:00 19:54:00 14 (min) Purpose code: 1  
 LOG :917.30 918.10 0.80 Area code : 3  
 FDEPTH: 25 25 GearCond.code: 1  
 BDEPTH: 63 78 Validity code: 1  
 Towing dir: 270° Wire out: 100 m Speed: 30 kn\*10

Sorted: 29 Kg Total catch: 138.92 CATCH/HOUR: 595.37

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Engraulis capensis	571.07 56276	95.42		5404
Trachurus, Juveniles	7.71 1821	1.29		5402
Etrumeus whiteheadi	7.71 407	1.29		
Sepia sp.	3.47 4	0.58		
Todaropsis eblanae	3.00 21	0.50		
Trachurus capensis	1.54 17	0.26		5403
Merluccius capensis, juveniles	0.43 43	0.07		
Sardinops ocellatus	0.43 21	0.07		
Total	595.36	99.98		

PROJECT STATION:1643  
 DATE:21/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1715  
 start stop duration Long E 1134  
 TIME :23:33:00 23:39:00 6 (min) Purpose code: 1  
 LOG :9951.00 9951.50 0.50 Area code : 3  
 FDEPTH: 119 121 GearCond.code: 9  
 BDEPTH: 119 121 Validity code: 1  
 Towing dir: 270° Wire out: 450 m Speed: 30 kn\*10

Sorted: 32 Kg Total catch: 2245.73 CATCH/HOUR: 22457.30

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus capensis	19880.00 456530	88.52		5405
Dentex macrophthalmus	1739.50 25560	7.75		
Merluccius capensis	333.70 1420	1.49		5406
Chelidonichthys capensis	262.70 710	1.17		
Galeichthys feliceps	177.50 710	0.79		
Umbrina canariensis	63.90 710	0.28		
Total	22457.30	100.00		

PROJECT STATION:1644  
 DATE:22/ 6/96 GEAR TYPE: BT No:1 POSITION:Lat S 1834  
 start stop duration Long E 1202  
 TIME :10:56:00 11:01:00 5 (min) Purpose code: 1  
 LOG : 72.90 73.20 0.30 Area code : 3  
 FDEPTH: 41 41 GearCond.code: 1  
 BDEPTH: 41 41 Validity code: 1  
 Towing dir: 340° Wire out: 200 m Speed: 30 kn\*10

Sorted: 35 Kg Total catch: 1415.89 CATCH/HOUR: 16990.68

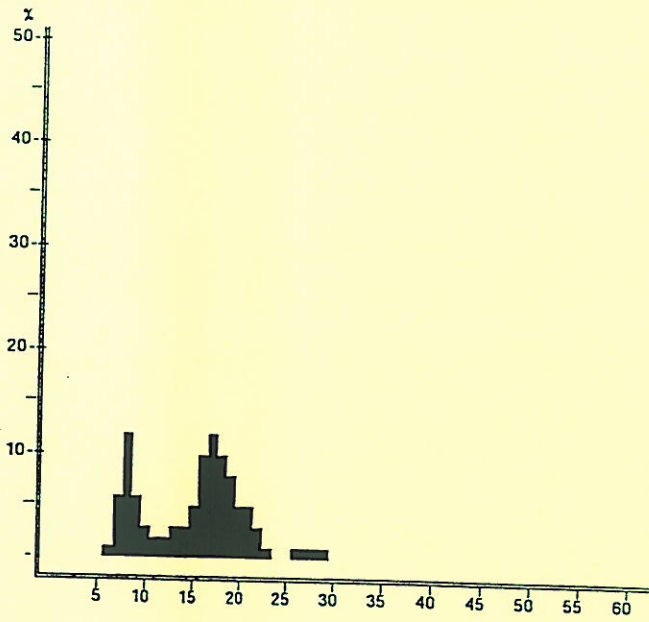
SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus, Juveniles	16879.32 1654956	99.34		5407
Etrumeus whiteheadi	67.80 3396	0.40		5408
Galeichthys feliceps	43.56 480	0.26		
Total	16990.68	100.00		

PROJECT STATION:1645  
 DATE:22/ 6/96 GEAR TYPE: BT No:7 POSITION:Lat S 1839  
 start stop duration Long E 1206  
 TIME :12:13:00 12:16:00 3 (min) Purpose code: 1  
 LOG : 83.40 83.60 0.20 Area code : 3  
 FDEPTH: 43 44 GearCond.code: 1  
 BDEPTH: 43 44 Validity code: 1  
 Towing dir: 320° Wire out: 200 m Speed: 30 kn\*10

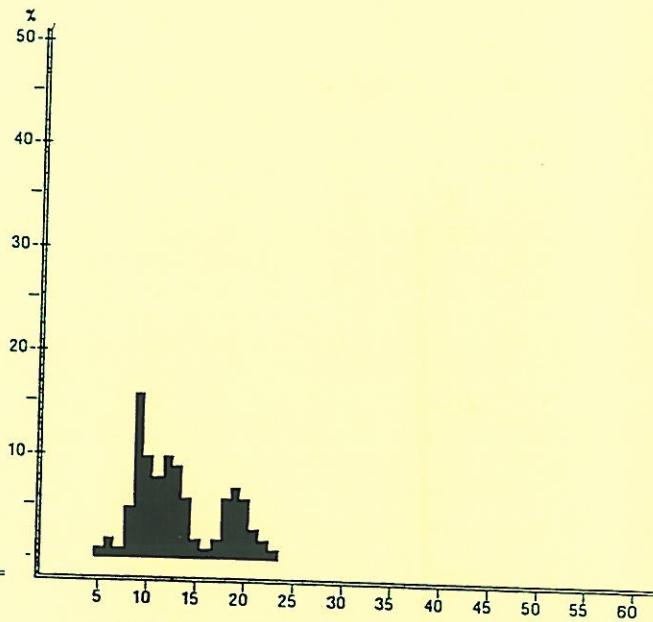
Sorted: 30 Kg Total catch: 1507.56 CATCH/HOUR: 30151.20

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trachurus, Juveniles	29835.00 2606100	98.95		5409
Etrumeus whiteheadi	316.20 21420	1.05		5410
Total	30151.20	100.00		

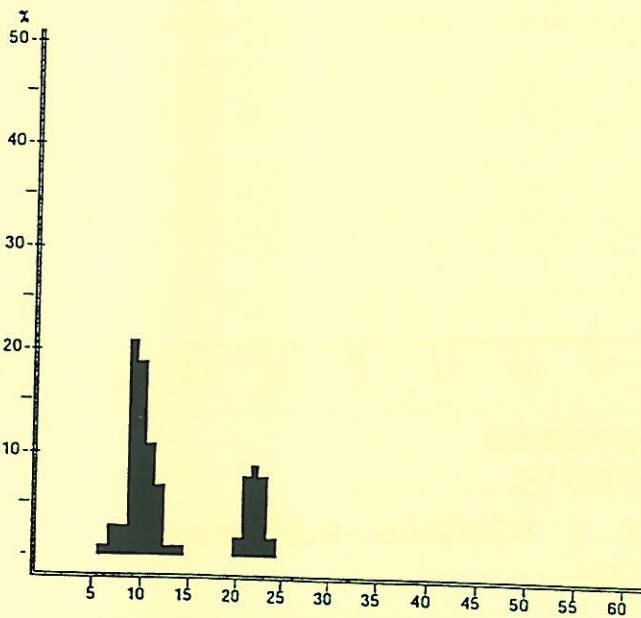
## Annex VI Size distribution per area



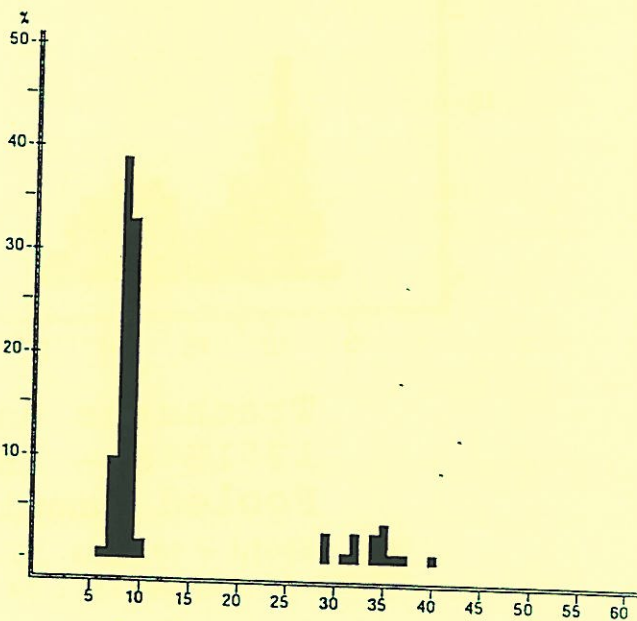
**Trachurus capensis**  
 17°15'S - 19°00'S  
 Pooled sample ( simple adding ).  
 MEAN LENGTH = 15.88cm N= 2668  
 NUMBER OF SUBSAMPLES : 20



**Trachurus capensis**  
 19°01'S - 21°00'S  
 Pooled sample ( simple adding ).  
 MEAN LENGTH = 13.57cm N= 2087  
 NUMBER OF SUBSAMPLES : 23

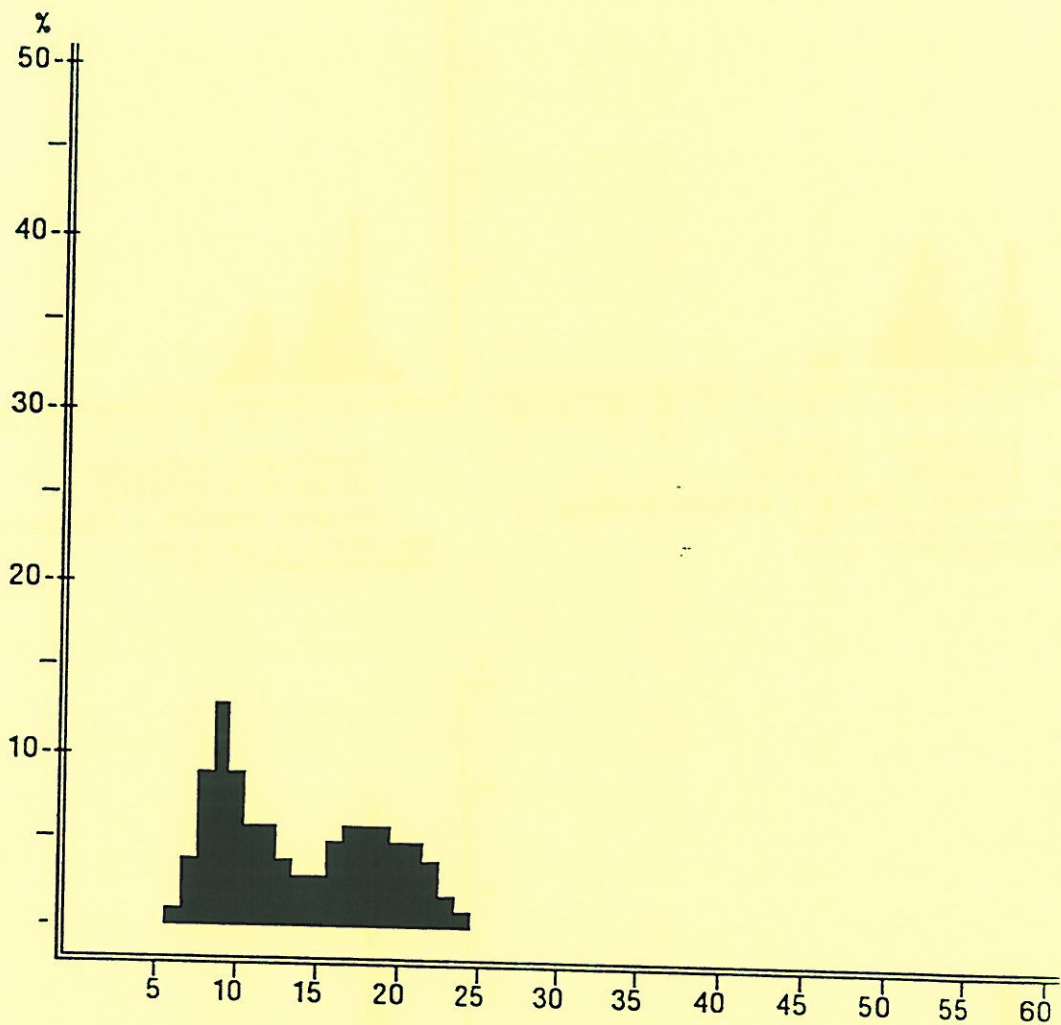


**Trachurus capensis**  
 21°01'S - 23°00'S  
 Pooled sample ( simple adding ).  
 MEAN LENGTH = 14.58cm N= 1274  
 NUMBER OF SUBSAMPLES : 16



**Trachurus capensis**  
 23°01'S - 25°00'S  
 Pooled sample ( simple adding ).  
 MEAN LENGTH = 12.71cm N= 116  
 NUMBER OF SUBSAMPLES : 4





*Trachurus capensis*

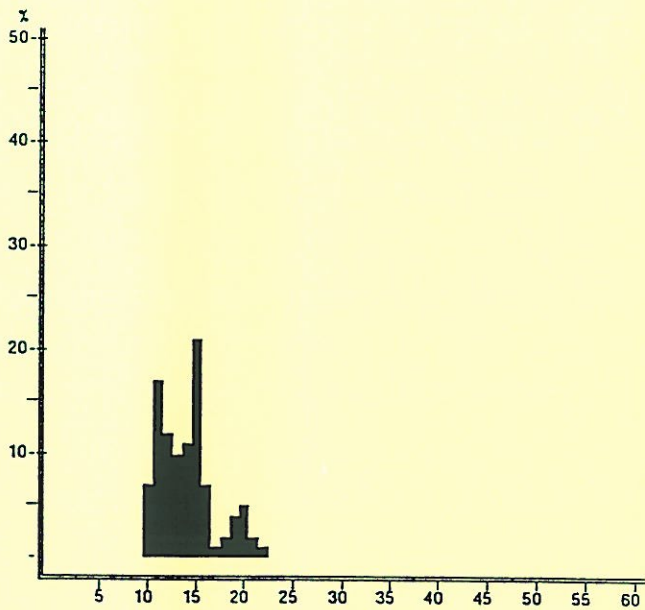
17°15'S - 25°00'S

Pooled sample ( simple adding ).

MEAN LENGTH = 14.72cm N= 6201

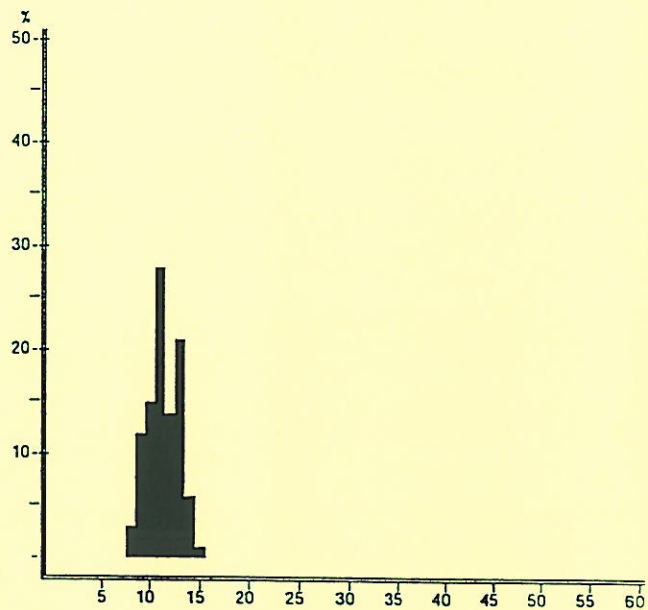
NUMBER OF SUBSAMPLES : 64





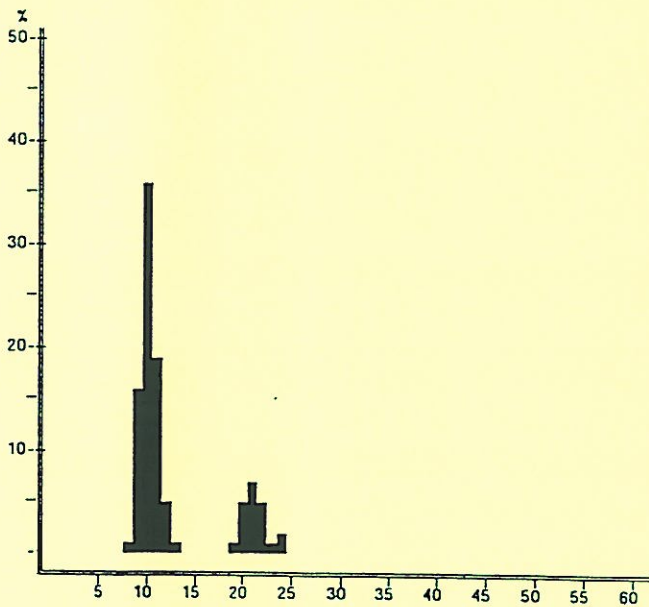
*Etrumeus whiteheadi*  
 17°15'S - 25°00'S  
 Pooled sample ( simple adding ).

MEAN LENGTH = 14.50cm N= 954  
 NUMBER OF SUBSAMPLES : 16



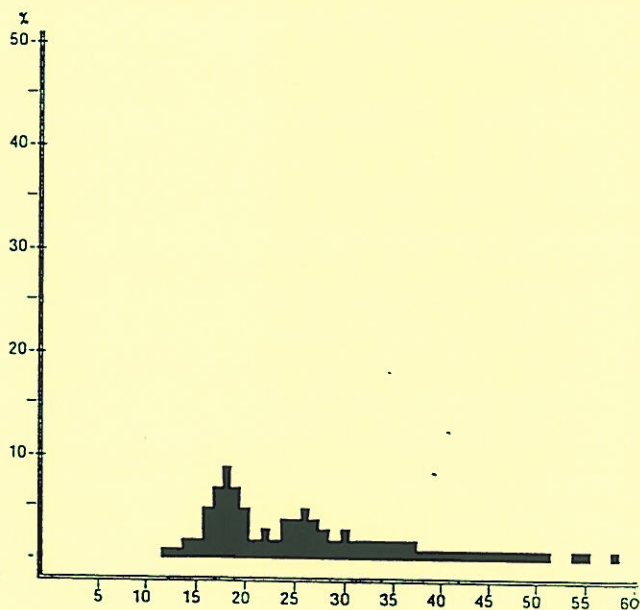
*Engraulis capensis*  
 17°15'S - 25°00'S  
 Pooled sample ( simple adding ).

MEAN LENGTH = 11.79cm N= 339  
 NUMBER OF SUBSAMPLES : 8



*Sardinops ocellatus*  
 17°15'S - 25°00'S  
 Pooled sample ( simple adding ).

MEAN LENGTH = 13.11cm N= 474  
 NUMBER OF SUBSAMPLES : 7



*Merluccius capensis*  
 17°15'S - 25°00'S  
 Pooled sample ( simple adding ).

MEAN LENGTH = 27.22cm N= 1116  
 NUMBER OF SUBSAMPLES : 21



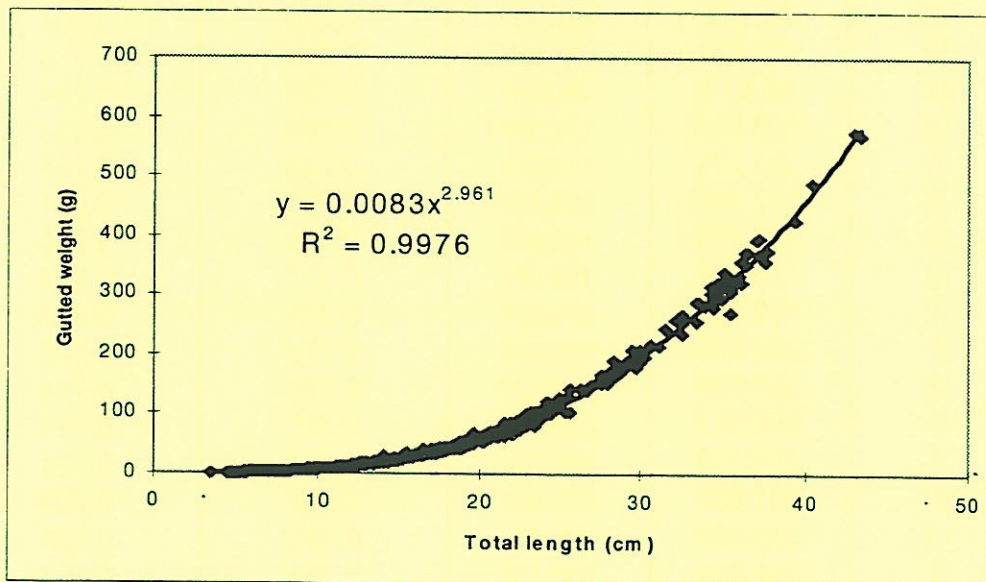
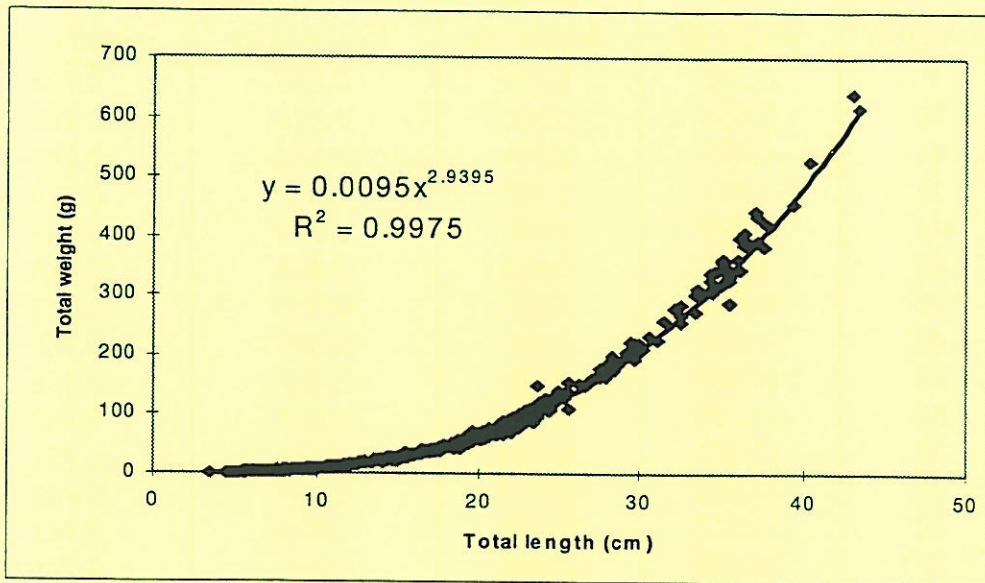
## Annex VII Length-weight relationships

Area: 17°00' S - 25°00' S

Length (cm)	No. of fish sampled	Total weight (g)	Gutted weight (g)	Condition factor total weight	Condition factor gutted weight
3	2	0.240	0.215	0.889	0.795
4	10	0.559	0.503	0.874	0.786
5	14	1.077	0.974	0.862	0.780
6	31	1.841	1.672	0.852	0.774
7	48	2.897	2.639	0.844	0.769
8	40	4.289	3.919	0.838	0.765
9	55	6.063	5.554	0.832	0.762
10	49	8.265	7.587	0.826	0.759
11	53	10.937	10.061	0.822	0.756
12	50	14.125	13.018	0.817	0.753
13	35	17.871	16.499	0.813	0.751
14	45	22.221	20.548	0.810	0.749
15	40	27.217	25.205	0.806	0.747
16	37	32.903	30.512	0.803	0.745
17	36	39.321	36.512	0.800	0.743
18	41	46.515	43.245	0.798	0.742
19	45	54.528	50.754	0.795	0.740
20	45	63.402	59.078	0.793	0.738
21	44	73.179	68.260	0.790	0.737
22	53	83.903	78.341	0.788	0.736
23	42	95.614	89.362	0.786	0.734
24	18	108.356	101.364	0.784	0.733
25	7	122.171	114.387	0.782	0.732
26	3	137.100	128.474	0.780	0.731
27	8	153.185	143.663	0.778	0.730
28	12	170.469	159.997	0.777	0.729
29	7	188.992	177.516	0.775	0.728
30	5	208.796	196.261	0.773	0.727
31	2	229.922	216.272	0.772	0.726
32	4	252.413	237.589	0.770	0.725
33	3	276.309	260.254	0.769	0.724
34	8	301.652	284.307	0.767	0.723
35	13	328.482	309.787	0.766	0.723
36	6	356.841	336.736	0.765	0.722
37	5	386.770	365.194	0.764	0.721
38	0	418.309	395.200	0.762	0.720
39	1	451.500	426.796	0.761	0.719
40	1	486.384	460.021	0.760	0.719
41	0	523.000	494.916	0.759	0.718
42	0	561.390	531.520	0.758	0.717
43	2	601.595	569.873	0.757	0.717
44	0	643.654	610.016	0.756	0.716
45	0	687.609	651.989	0.755	0.715

$W(i) = q * L(i)^b$ ;  $q = 0.0095, b = 2.9395$





## Annex VIII Reproductive Status

Area: 17°15' S - 21°00' S

Length class (cm)	No. of fish				No. of fish per maturity stage							Mean gonad weight	
	juveniles	males	females	total	1	2	3	4	5	6	7		
3.0 - 12.9	149	0	0	149	149								0.00
13.0 - 13.9	16	0	2	18	17	1							0.10
14.0 - 14.9	6	7	19	32	9	23							0.10
15.0 - 15.9	2	17	15	34	2	32							0.10
16.0 - 16.9	1	13	18	32	1	28	2					1	0.20
17.0 - 17.9	0	16	19	35	1	31	2					1	0.20
18.0 - 18.9	0	22	19	41		33	7					1	0.20
19.0 - 19.9	0	14	28	42		23	10	1				8	0.40
20.0 - 20.9	0	20	15	35		17	10					8	0.40
21.0 - 21.9	0	17	15	32		4	7				1	20	0.50
22.0 - 22.9	0	16	17	33		4	13	2			5	9	0.70
23.0 - 23.9	0	11	13	24		2	10	1			4	7	1.00
24.0 - 24.9	0	6	4	10			5				1	4	0.80
25.0 - 25.9	0	2	3	5			1	1	1			2	2.20
26.0 - 26.9	0	1	0	1								1	1.00
27.0 - 27.9	0	4	4	8			4				1	3	1.80
28.0 - 28.9	0	5	5	10			5					5	2.00
29.0 - 29.9	0	2	2	4			1				2	1	2.30
30.0 - 30.9	0	1	3	4			2					2	2.40
31.0 - 31.9				0									
32.0 - 32.9	0	0	2	2			1				1		3.90
33.0 - 33.9	0	0	1	1			1						4.90
34.0 - 34.9	0	1	2	3			1					2	4.20
35.0 - 35.9	0	0	3	3			2					1	4.20
36.0 - 36.9				0									
37.0 - 37.9	0	0	1	1							1		3.70
38.0 - 38.9													
39.0 - 39.9													
40.0 - 40.9													
41.0 - 41.9													
42.0 - 42.9													
43.0 - 43.9													
44.0 - 44.9													
45.0 - 45.9													
<b>Total</b>	174	175	210	559	179	198	84	5	1	16	76		



Area: 21°01' S - 25°00' S

Length class (cm)	No. of fish				No. of fish per maturity stage							Mean gonad weight	
	juveniles	males	females	total	1	2	3	4	5	6	7		
3.0 - 12.9	203	0	0	203	203								0.00
13.0 - 13.9	16	0	1	17	16	1							0.10
14.0 - 14.9	9	2	2	13	9	4							0.10
15.0 - 15.9	3	1	2	6	3	3							0.10
16.0 - 16.9	1	0	4	5	1	4							0.15
17.0 - 17.9	0	1	0	1		1							0.10
18.0 - 18.9													
19.0 - 19.9	0	2	1	3		2						1	0.33
20.0 - 20.9	0	7	3	10		2	2				1	5	0.40
21.0 - 21.9	0	5	6	11		1	1				4	5	0.55
22.0 - 22.9	0	7	13	20		3	2				3	12	0.80
23.0 - 23.9	0	12	6	18		1	7				1	9	0.90
24.0 - 24.9	0	3	5	8		1	2				2	3	1.40
25.0 - 25.9	0	0	2	2							1	1	1.70
26.0 - 26.9	0	2	0	2			2						2.10
27.0 - 27.9													
28.0 - 28.9	0	1	1	2			1				1		2.70
29.0 - 29.9	0	2	1	3			1					2	1.67
30.0 - 30.9	0	1	0	1			1						3.10
31.0 - 31.9	0	1	1	2			1				1		2.55
32.0 - 32.9	0	1	1	2								2	2.05
33.0 - 33.9	0	1	1	2			1	1					7.30
34.0 - 34.9	0	2	3	5			5						5.92
35.0 - 35.9	0	2	8	10			4	1			3	2	5.76
36.0 - 36.9	0	2	4	6			4				1	1	11.10
37.0 - 37.9	0	1	3	4			1	1			1	1	8.50
38.0 - 38.9				0									
39.0 - 39.9	0	1	0	1			1						9.80
40.0 - 40.9	0	0	1	1							1		8.30
41.0 - 41.9				0									
42.0 - 42.9				0									
43.0 - 43.9	0	1	1	2			2						25.30
44.0 - 44.9				0									
45.0 - 45.9				0									
Total	232	58	70	360	232	23	38	3	0	20	44		



Area: 17°15' S - 25°00' S

Length class (cm)	No. of fish				No. of fish per maturity stage							Mean gonad weight
	juveniles	males	females	total	1	2	3	4	5	6	7	
3.0 - 12.9	352	0	0	352	352	0	0	0	0	0	0	0.00
13.0 - 13.9	32	0	3	35	33	2	0	0	0	0	0	0.10
14.0 - 14.9	15	9	21	45	18	27	0	0	0	0	0	0.10
15.0 - 15.9	5	18	17	40	5	35	0	0	0	0	0	0.10
16.0 - 16.9	2	13	22	37	2	32	2	0	0	0	1	0.18
17.0 - 17.9	0	17	19	36	1	32	2	0	0	0	1	0.15
18.0 - 18.9	0	22	19	41	0	33	7	0	0	0	1	0.10
19.0 - 19.9	0	16	29	45	0	25	10	1	0	0	9	0.37
20.0 - 20.9	0	27	18	45	0	19	12	0	0	1	13	0.40
21.0 - 21.9	0	22	21	43	0	5	8	0	0	5	25	0.53
22.0 - 22.9	0	23	30	53	0	7	15	2	0	8	21	0.75
23.0 - 23.9	0	23	19	42	0	3	17	1	0	5	16	0.95
24.0 - 24.9	0	9	9	18	0	1	7	0	0	3	7	1.10
25.0 - 25.9	0	2	5	7	0	0	1	1	1	1	3	1.95
26.0 - 26.9	0	3	0	3	0	0	2	0	0	0	1	1.55
27.0 - 27.9	0	4	4	8	0	0	4	0	0	1	3	0.90
28.0 - 28.9	0	6	6	12	0	0	6	0	0	1	5	2.35
29.0 - 29.9	0	4	3	7	0	0	2	0	0	2	3	1.99
30.0 - 30.9	0	2	3	5	0	0	3	0	0	0	2	2.75
31.0 - 31.9	0	1	1	2	0	0	1	0	0	1	0	1.28
32.0 - 32.9	0	1	3	4	0	0	1	0	0	1	2	2.98
33.0 - 33.9	0	1	2	3	0	0	2	1	0	0	0	6.10
34.0 - 34.9	0	3	5	8	0	0	6	0	0	0	2	5.06
35.0 - 35.9	0	2	11	13	0	0	6	1	0	3	3	4.98
36.0 - 36.9	0	2	4	6	0	0	4	0	0	1	1	5.55
37.0 - 37.9	0	1	4	5	0	0	1	1	0	2	1	6.10
38.0 - 38.9	0	0	0	0	0	0	0	0	0	0	0	0.00
39.0 - 39.9	0	1	0	1	0	0	1	0	0	0	0	4.90
40.0 - 40.9	0	0	1	1	0	0	0	0	0	1	0	4.15
41.0 - 41.9	0	0	0	0	0	0	0	0	0	0	0	0.00
42.0 - 42.9	0	0	0	0	0	0	0	0	0	0	0	0.00
43.0 - 43.9	0	1	1	2	0	0	2	0	0	0	0	12.65
44.0 - 44.9	0	0	0	0	0	0	0	0	0	0	0	0.00
45.0 - 45.9	0	0	0	0	0	0	0	0	0	0	0	0.00
<b>Total</b>	<b>406</b>	<b>233</b>	<b>280</b>	<b>919</b>	<b>411</b>	<b>221</b>	<b>122</b>	<b>8</b>	<b>1</b>	<b>36</b>	<b>120</b>	

**Summary of maturity stages for the entire area (17°15' S - 25°00' S)**

No. of fish sampled	% of fish		% per maturity stage							Length at 50% maturity
	males	females	1	2	3	4	5	6	7	
919	45	55	10	39	22	1	0	6	21	19 - 20 cm





## Annex IX Maturity stages

Horse mackerel reproductive stages according to Hecht (1976) and modified in 1995 and 1996.

<b>0</b>	<p><b>UNKNOWN</b> Damaged fish; decayed.</p>
<b>1</b>	<p><b>JUVENILE</b> Not able to distinguish between male or female. Approximately: 0.1 - 14 cm fish.</p>
<b>2</b>	<p><b>IMMATURE</b> Gonads are very small, less than half the body cavity length, and flattened or tubular i.e. thin and thread-like. The colour of the gonads is translucent. Sexes are distinguishable. Approximately: 14 - 19 cm fish. <u>Ovaries:</u> Light orange gelatinous mass. Cannot see eggs with the naked eye. <u>Testes:</u> Translucent-white; thin, elongate balloon-like.</p>
<b>3</b>	<p><b>MATURING</b> Gonads longer than half of the body cavity length and becoming cylindrical. <u>Ovaries:</u> Individual eggs clearly visible. Colour bright orange. Blood vessels marked. Spindle shaped. <u>Testes:</u> White to creamy. Testes more swollen. Spindle shaped.</p>
<b>4</b>	<p><b>RIPE</b> Gonads very large, virtually filling body cavity, even causing distension of abdomen. <u>Ovaries:</u> Individual eggs almost 0.5 mm or larger and lightly elongated. Ovary sac breaks releasing eggs. Colour dark orange. <u>Testes:</u> Colour creamy. Release milt when punctured.</p>
<b>5</b>	<p><b>SPAWNING\RUNNING</b> Eggs or milt released through vent during handling i.e. running. <u>Ovaries:</u> Dark orange and greatly swollen. Could be partly spent. <u>Testis:</u> External appearance changes from smooth structure to white and knob-like. Swollen to partly spent.</p>
<b>6</b>	<p><b>SPENT</b> <u>Ovaries:</u> Gonads flattened, but still elongated. Very blood-shot (dark red). Few eggs remaining appear grey/brown. When ovary dull brown in colour and brown/white eggs remaining: refer to infertile gonad. <u>Testis:</u> The testis are deflated and grey in colour.</p>
<b>7</b>	<p><b>RECOVERING\INACTIVE</b> Gonads are slightly larger than stage 2, approximately half of body cavity length, but still generally flat. Colour more pronounced. <u>Ovaries:</u> Pale dull-reddish tint. <u>Testes:</u> Grey-white colour and very flat (lobe like) with sharp edges.</p>



