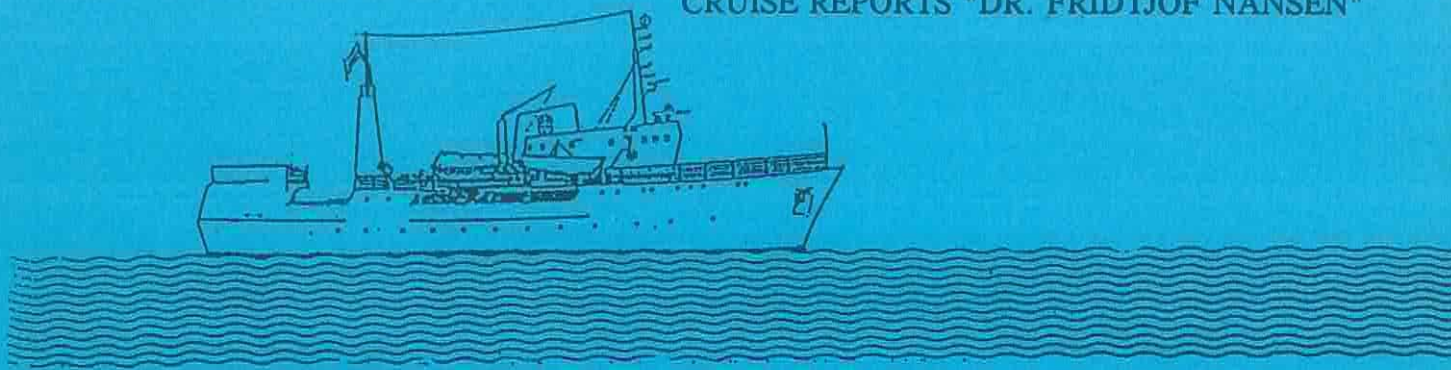


NORAD-FAO/UNDP GLO 82/001

CRUISE REPORTS "DR. FRIDTJOF NANSEN"



## **SURVEYS OF THE FISH RESOURCES OF ANGOLA**

**Report on a survey of pelagic resources on the shelf  
from Tombua to Cunene 26 to 29 November 1991.**

Institute of Marine Research, Bergen

The "DR. FRIDTJOF NANSEN" research programme is sponsored by the Norwegian Agency for Development Assistance, NORAD, the Food and Agriculture Organization of the United Nations, FAO and the United Nations Development Programme, UNDP. The programme in Angola which has comprised eleven previous surveys in the period 1985-1991 is being conducted and planned under agreements between NORAD, Angolan authorities, Centro de Investigacao Pesqueira, CIP, Luanda and the Institute of Marine Research, Bergen. This report describes the work and findings of a brief coverage of southern Angolan waters made as an extension of a survey of pelagic resources in Namibia.

## **1. INTRODUCTION**

### **Objectives**

When planning a survey of the pelagic stocks of Namibia to be conducted jointly by the Namibian research vessel "BENGUELA" and the Norwegian vessel "DR. FRIDTJOF NANSEN" in November-December 1991, it was found desirable to extend the coverage north of the Cunene River and include the Angolan shelf up to 16°S. The advice of the Director of CIP, Luanda, Dr. Luis Anapaz was sought and his approval was received by telefax on November 25.

The objective of the survey was to study and describe the distribution, composition and abundance of the pelagic commercial stocks in the area, sardine, anchovy, round herring (pelagic fish type 1) and horse mackerel (pelagic fish type 2).

### **Participants**

The scientific staff from the Institute of Marine Research, Bergen were: Johannes Hamre, Terje Haugland, Jeppe Kolding, Helge Ullebust and Tore Mørk.

### **Narrative**

The vessel left Walvis Bay on 23 November. The inshore sardine survey started at about Rocky Point and was conducted jointly with BENGUELA up to Cunene on 25 November. 26 November was spent in an inshore coverage up to Baia dos Tigres and in a sphere calibration of both vessels in the Baia. The survey of the shelf for horse mackerel from 16°S. to Cunene was started on 26 November and completed on 29 November with an interval for intercalibration with BENGUELA. On 29-30 November a repeat coverage was made of the inshore sardine area from 17°35'S northwards to 16°40'S returning southwards to Cape Frio.

## **2. HYDROGRAPHY**

Figure 1 shows the distribution of temperature at 4 m of depth as observed by the ships recorder. November represents a season when the front between the Benguela- and the Angola current systems should be located fairly northward in its seasonal shifts, but surface temperatures of 18-20°C over the Baia dos Tigres shelf is considerably higher than that found in November 1985 and the tongue of warm Angolan Current water is wider and further inshore than in November 1989. These changes could, however, be local and related to short term climatic conditions.

### 3. COMPOSITION, DISTRIBUTION AND ABUNDANCE OF PELAGIC FISH

The course tracks and fishing stations are shown in Figure 2. The acoustic integrations system provided observations of fish densities, usually averaged over 5 nm, but in areas of high fish concentrations over 1 nm. The unit of acoustic reflection used was  $m^2/nm^2$  reflecting surface with readings divided by 10. The integrator values from fish targets was allocated to groups of species or species on the basis of trawl sampling and characteristic behaviour identified in the echo recordings.

#### Sardine, anchovy and round herring (pelagic type 1 fish)

For the findings south of Cape Frio reference is made to the second part of the report: "Surveys of the Fish Resources of Namibia, October to 16 December 1991". To the north of Cape Frio a continuous more or less dispersed distribution of sardine, anchovy and round herring was found inshore past Cunene up to  $16^{\circ}40'S$ , see Figure 3. Small, but dense schools of sardine were located in various parts of this distribution area. Another distribution area of sardine was found north of Baia dos Tigres, in inshore waters between  $16^{\circ}30'S$  and  $16^{\circ}00'S$ .

Table 1 shows the biomass estimates by species and areas. The corresponding estimates for Namibia were: sardine 600 000, anchovy 136 000 and round herring 106 000 tonnes. Size sampling showed that the main part of the sardine in Namibia consisted of young sardine of between 15 and 20 cm of length. The sardine in Angola was on the other hand unusually large sized with modal length of about 25 cm, see Figure 5.

Table 1. Biomass estimates of pelagic type 1 fish by area. Tonnes.			
	Sardine	Anchovy	Round herring
Tombua- Baia dos Tigres	87 000		
Baia dos Tigres- Cunene	35 000	70 000	12 000
Total	122 000	70 000	12 000

Sardine was located in the two previous DR. FRIDTJOF NANSEN surveys in Angola in 1991: in the beginning of June with an estimated 26 000 tons restricted in distribution to the Baia dos Tigres, and in the first part of September with a total of 131 000 tonnes found along the coast from Cunene up to about  $16^{\circ}15'S$ . In both surveys sampling showed large sized sardine with modal lengths around 25 cm, very similar to that found in November. One should also note the similarity of the biomass estimates of the September-and November surveys.

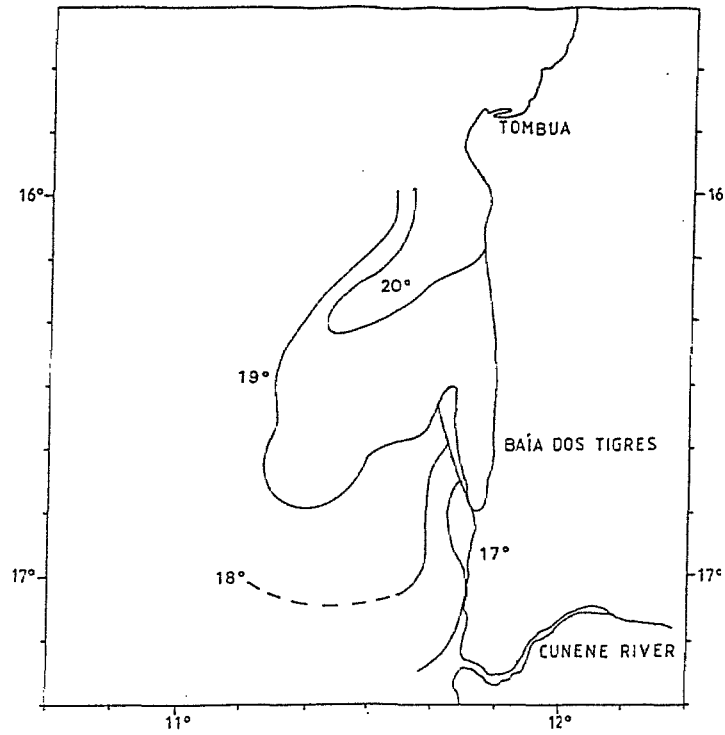


Figure 1. Distribution of temperature at 4 m of depth as observed by the ships recorder.

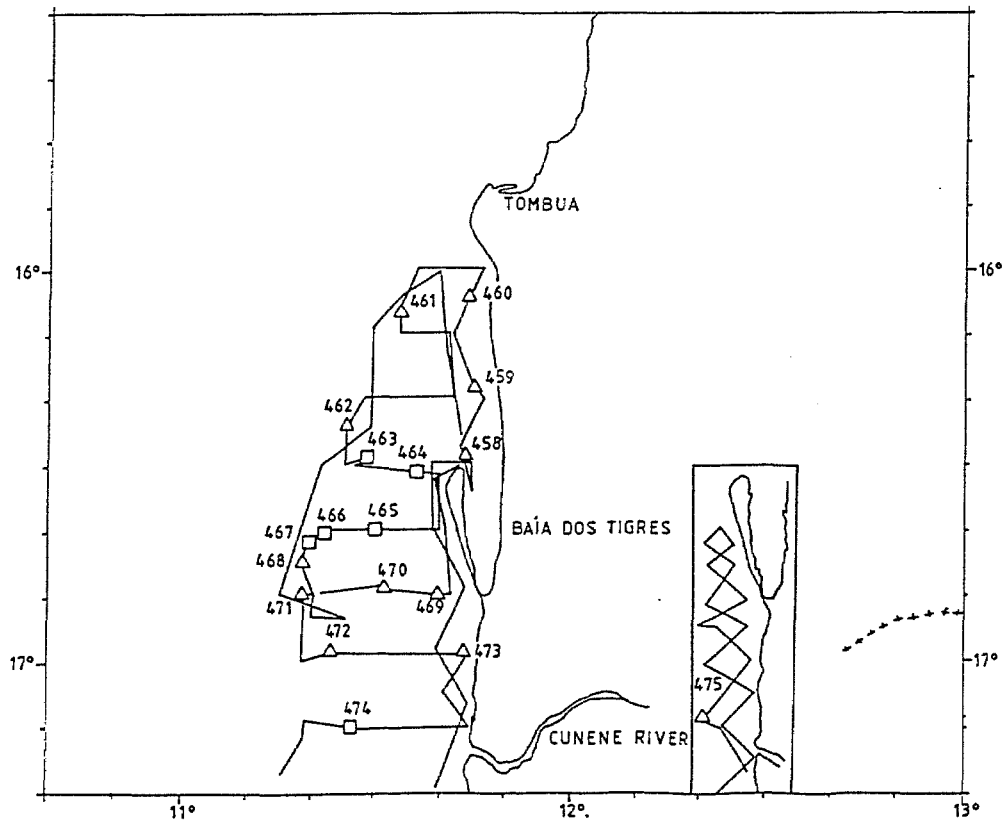


Figure 2. Course tracks and fishing stations.

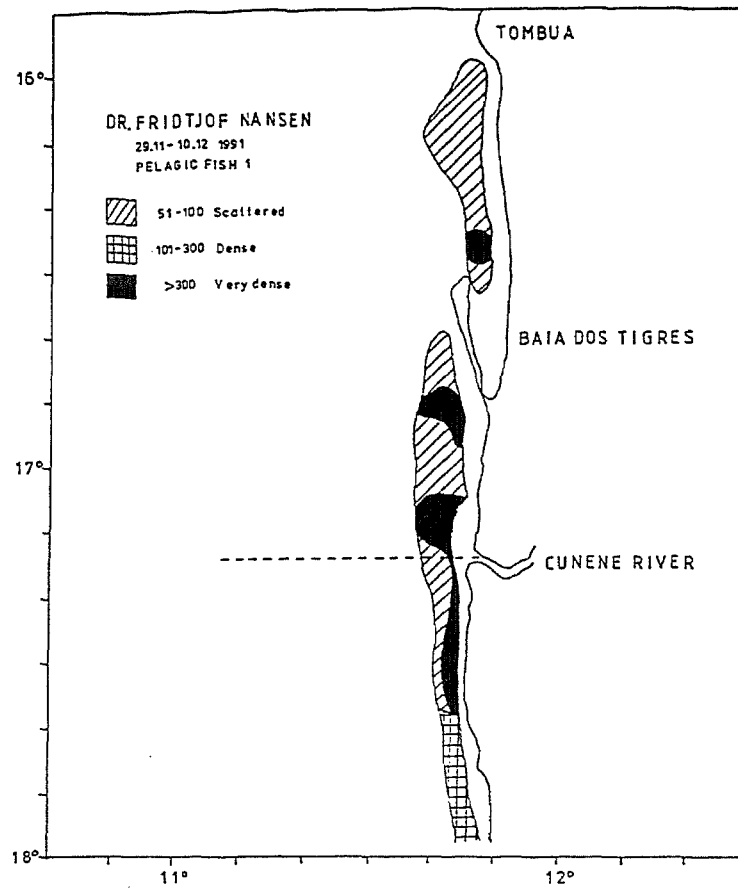


Figure 3. Distribution of pelagic fish type 1, sardine, anchovy and round herring from the echo integration data.

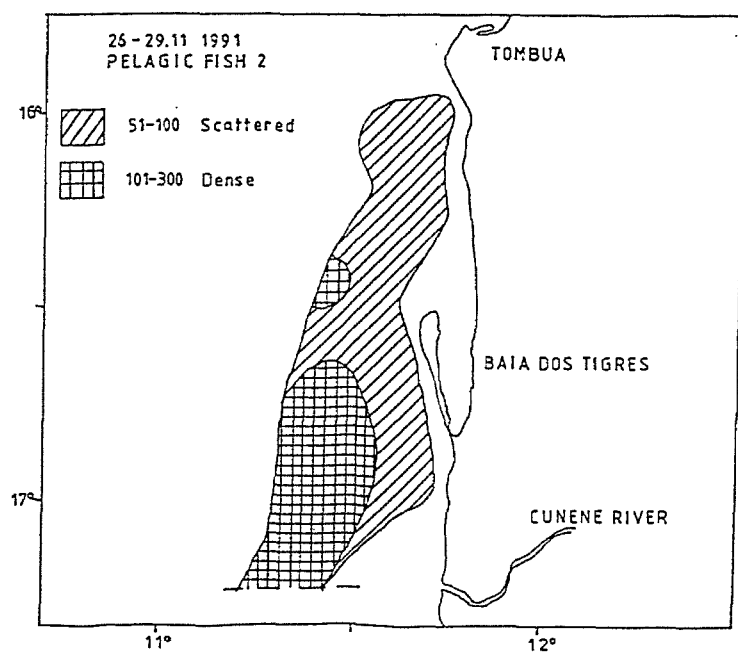


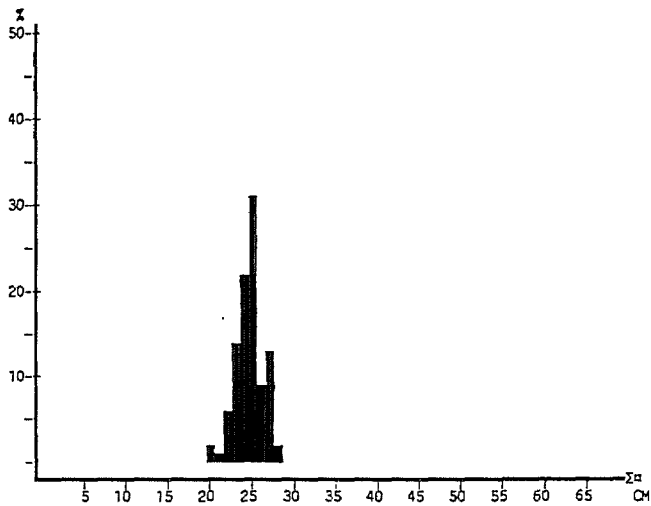
Figure 4. Distribution of horse mackerels from the echo integration data.

Sampling of anchovy from hauls somewhat north of the Cunene River showed the presence of only one group with a modal size of about 14 cm, see Figure 5.

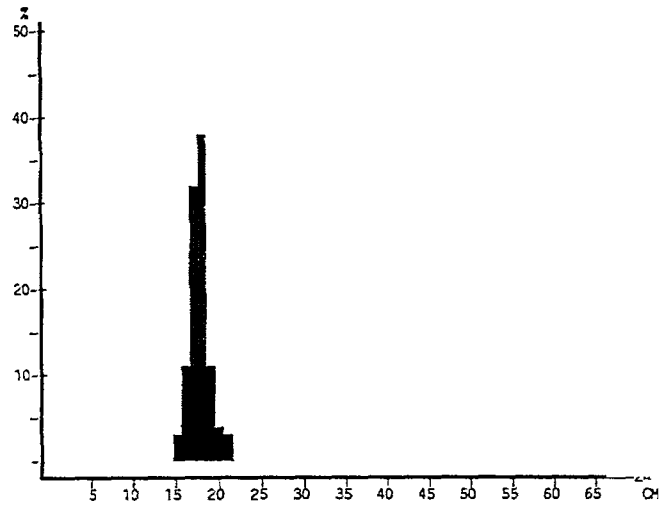
### **Horse mackerels**

The distribution of horse mackerel over the Baia dos Tigres shelf from observations of the echo integration system is shown in Figure 4. The Cunene species dominated the catches north of 16°30'S, while catches to the south consisted of Cape horse mackerel. As previously the horse mackerel is mainly located on the shelf outside the inshore zone and extending to the shelf edge. At times the Cape hake distribution extends 5-10 nm outside the edge and this may contribute to uncertainties in the estimates. The area of high density of Cape horse mackerel on the southern part of the Baia dos Tigres shelf continued southwards in Namibia approximately to Cape Frio.

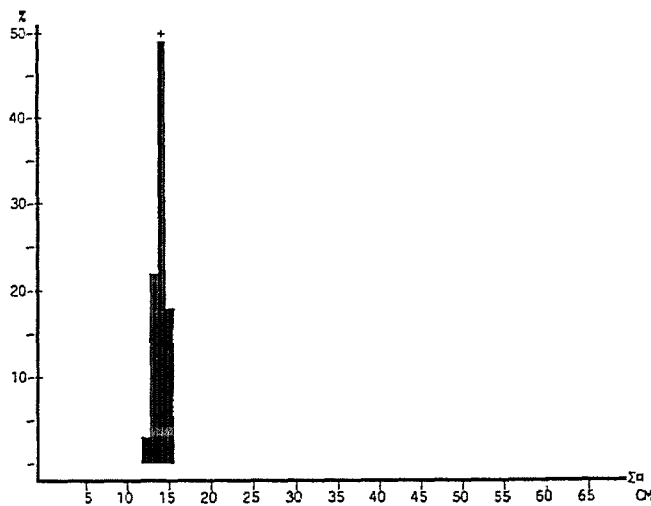
A biomass estimate of Cape horse mackerel in Angola shows about 400 000 tonnes compared with 1.3 mill tonnes between Ambrose Bay and the Cunene river in Namibia. Size sampling showed a small recruit group at about 15 cm and adult fish between 20 and 30 cm of length, see Figure 5. The June 1991 Angola survey showed about 300 000 tonnes of Cape horse mackerel in this area, while the estimate from the September coverage was only about 100 000 tonnes. This may indicate a variability of the estimates, perhaps due to a varying component outside the shelf edge or actual variations in the presence of Cape horse mackerel during the winter season. The size compositions from the June and September surveys had a strong component of fish at about 20 cm of length perhaps corresponding to the main group of 20-25 cm fish found in November.



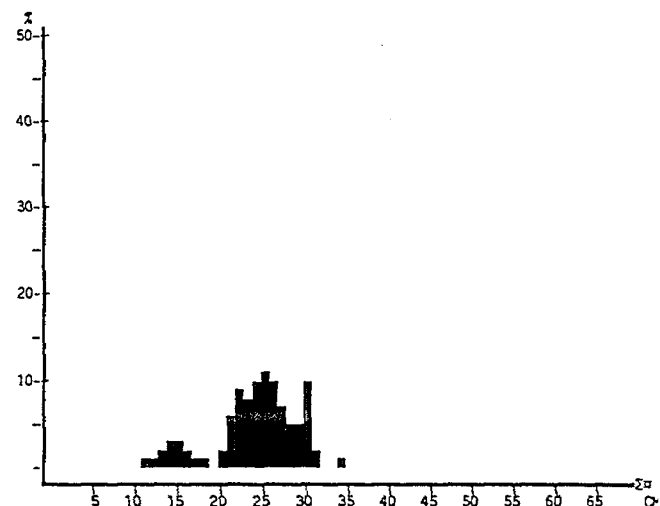
*Sardinops ocellata*  
 Cunene - Tombua, Dec. 1991  
 Pooled sample ( equal weight ).  
 MEAN LENGTH = 24.56cm N= 319  
 NUMBER OF SUBSAMPLES : 5



*Etrumeus whiteheadi*  
 Cunene - Tombua, Dec. 1991  
 Pooled sample ( equal weight ).  
 MEAN LENGTH = 17.64cm N= 32  
 NUMBER OF SUBSAMPLES : 2



*Engraulis capensis*  
 Cunene - Tombua, Dec. 1991  
 Pooled sample ( equal weight ).  
 MEAN LENGTH = 13.89cm N= 376  
 NUMBER OF SUBSAMPLES : 3



*Trachurus capensis*  
 Cunene - Tombua, Dec. 1991  
 Pooled sample ( equal weight ).  
 MEAN LENGTH = 23.94cm N= 1053  
 NUMBER OF SUBSAMPLES : 13

Figure 5. Size compositions of main species.



## **ANNEX 1 INSTRUMENTS AND FISHING GEAR**

### **ACOUSTIC INSTRUMENTS**

A SIMRAD scientific echo sounder, EK 500/38kHz, was used during the survey for estimation of fish density.

Based on a calibration experiment using a standard copper sphere in Baia dos Tigres on 26th November 1991, the following settings were used:

Absorption Coeff.	10 dB/km
Pulse length	Medium
Bandwidth	Wide
Max. Power	2000 W
Angle sensitivity	21.9
2-way Beam Angle	-21.0 dB
Sv Transd. Gain	28.0 dB
Ts Transd. Gain	28.0 dB
3 dB Beamwidth	6.9°
Along-ship Offset	0°
Athwart-ship	0°

### **HYDROGRAPHY**

Temperature, salinity and oxygen were sampled at standard depths with Nansen bottles. Oxygen was measured with the Winkler method and salinity determined with an inductive salinometer.

### **FISHING GEAR**

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. This gear was also used for some of the mid-water trawls.

Pelagic trawl: Swedish type mid-water trawl with a vertical opening of 20-25m.

Cod ends of trawls with fine meshed inner lining.



# ANNEX 2 RECORD OF FISHING STATIONS

PROJECT STATION: 458  
 DATE:26/11/91 GEAR TYPE: PT No: POSITION:Lat S 1628 Long E 1143  
 TIME :19:50:00 20:03:00 13 (min) Purpose code: 1  
 LOG :2788.10 2789.00 0.90 Area code : 3  
 FDEPTH: 5 10' GearCond.code:  
 BDEPTH: 48 43 Validity code:  
 Towing dir: 162 Wire out: 100 m Speed:410 kn\*10

Sorted: 70 Kg Total catch: 457.90 CATCH/HOUR: 2113.38

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Sardinops ocellata	1866.00 10777	88.29	466
Trachurus capensis	183.00 1048	8.66	467
Myliobatis aquila	25.38 9	1.20	
Callorhynchus capensis	21.00 28	0.99	
Sarda sarda	12.00 28	0.57	
Loligo vulgaris	6.00 60	0.28	
<b>Total</b>	<b>2113.38</b>	<b>99.99</b>	

PROJECT STATION: 462  
 DATE:27/11/91 GEAR TYPE: PT No: POSITION:Lat S 1624 Long E 1126  
 TIME :06:40:00 06:53:00 13 (min) Purpose code: 1  
 LOG :2883.60 2884.10 0.50 Area code : 3  
 FDEPTH: 130 180 GearCond.code:  
 BDEPTH: 333 499 Validity code:  
 Towing dir: 17 Wire out: 450 m Speed:310 kn\*10

Sorted: 8 Kg Total catch: 8.02 CATCH/HOUR: 37.02

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Trachurus capensis	36.46 272	98.49	473
Zenopsis conchifer	0.55 5	1.49	
<b>Total</b>	<b>37.01</b>	<b>99.98</b>	

PROJECT STATION: 463  
 DATE:27/11/91 GEAR TYPE: BT No:1 POSITION:Lat S 1629 Long E 1128  
 TIME :08:25:00 08:45:00 20 (min) Purpose code: 1  
 LOG :2896.60 2897.60 1.00 Area code : 3  
 FDEPTH: 99 99 GearCond.code:  
 BDEPTH: 99 99 Validity code:  
 Towing dir: 340 Wire out: 400 m Speed:310 kn\*10

Sorted: 64 Kg Total catch: 194.09 CATCH/HOUR: 582.27

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Dentex macrophthalmus	215.10 810	36.94	474
Trachurus trecae	144.00 1698	24.73	475
Pterothrissus belloci	141.30 864	24.27	
Atractoscion aequidens	16.29 42	2.80	
Lepidopus caudatus	16.29 42	2.80	
Zeus faber	13.05 42	2.24	
Trachurus capensis	12.96 63	2.23	476
Merluccius capensis	9.45 42	1.62	
Raja clavata	7.08 3	1.22	
Squalus megalops	4.68 21	0.80	
Loligo vulgaris	1.80 42	0.31	
BOTHIDAE	0.27 18	0.05	
<b>Total</b>	<b>582.27</b>	<b>100.01</b>	

PROJECT STATION: 459  
 DATE:26/11/91 GEAR TYPE: PT No: POSITION:Lat S 1618 Long E 1145  
 TIME :21:26:00 21:44:00 18 (min) Purpose code: 1  
 LOG :2801.40 2802.20 0.80 Area code : 3  
 FDEPTH: 0 0 GearCond.code:  
 BDEPTH: 37 39 Validity code:  
 Towing dir: 340 Wire out: 150 m Speed:300 kn\*10

Sorted: 68 Kg Total catch: 429.85 CATCH/HOUR: 1432.83

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Sardinops ocellata	1150.33 6173	80.28	468
Trachurus capensis	252.00 5253	17.59	469
Sepia officinalis hierredda	13.80 37	0.96	
Sphyrna zygaena	10.00 3	0.70	
Sardinella aurita	5.13 23	0.36	
Sarda sarda	1.03 3	0.07	
Balistes caprisicus	0.53 3	0.04	
<b>Total</b>	<b>1432.82</b>	<b>100.00</b>	

PROJECT STATION: 464  
 DATE:27/11/91 GEAR TYPE: BT No:1 POSITION:Lat S 1631 Long E 1136  
 TIME :10:17:00 10:37:00 20 (min) Purpose code: 1  
 LOG :2910.60 2911.50 0.90 Area code : 3  
 FDEPTH: 82 84 GearCond.code:  
 BDEPTH: 82 84 Validity code:  
 Towing dir: 180 Wire out: 350 m Speed:280 kn\*10

Sorted: 63 Kg Total catch: 1459.56 CATCH/HOUR: 4378.68

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Dentex macrophthalmus	2046.00 8277	46.73	479
Trachurus trecae	1473.00 55936	33.64	477
Trachurus capensis	789.00 3243	18.02	478
Pterothrissus belloci	46.50 279	1.06	
Atractoscion aequidens	24.18 93	0.55	
<b>Total</b>	<b>4378.68</b>	<b>100.00</b>	

PROJECT STATION: 461  
 DATE:27/11/91 GEAR TYPE: PT No: POSITION:Lat S 1607 Long E 1134  
 TIME :01:52:00 02:07:00 15 (min) Purpose code: 1  
 LOG :2839.50 2840.40 0.90 Area code : 3  
 FDEPTH: 10 10 GearCond.code:  
 BDEPTH: 525 536 Validity code:  
 Towing dir: 10 Wire out: 100 m Speed:350 kn\*10

Sorted: 30 Kg Total catch: 1082.00 CATCH/HOUR: 4328.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Trachurus trecae	4228.00 34448	97.69	472
Iurus oxyrinchus	100.00 4	2.31	
<b>Total</b>	<b>4328.00</b>	<b>100.00</b>	

PROJECT STATION: 465  
 DATE:27/11/91 GEAR TYPE: BT No:1 POSITION:Lat S 1640 Long E 1130  
 TIME :12:58:00 13:18:00 20 (min) Purpose code: 1  
 LOG :2933.10 2934.10 1.13 Area code : 3  
 FDEPTH: 103 106 GearCond.code:  
 BDEPTH: 103 106 Validity code:  
 Towing dir: 230 Wire out: 500 m Speed:335 kn\*10

Sorted: 50 Kg Total catch: 1980.00 CATCH/HOUR: 5940.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP.NO.
	weight numbers		
Trachurus capensis	3540.00 16968	59.60	480
Dentex macrophthalmus	1284.00 12600	21.62	
Trachurus trecae	924.00 12720	15.56	481
Zeus faber	156.00 240	2.63	
Merluccius capensis	24.00 120	0.40	
Todaropsis eblanae	12.00 120	0.20	
<b>Total</b>	<b>5940.00</b>	<b>100.01</b>	

PROJECT STATION: 466  
 DATE: 27/11/91 GEAR TYPE: BT No:1 POSITION: Lat S 1641 Long E 1122  
 start stop duration  
 TIME :14:35:00 14:50:00 15 (min) Purpose code: 1  
 LOG :2943.80 2944.70 0.84 Area code : 3  
 FDEPTH: 121 127 GearCond.code:  
 BDEPTH: 121 127 Validity code:  
 Towing dir: 360 Wire out: 550 m Speed:325 kn\*10  
 Sorted: 33 Kg Total catch: 197.40 CATCH/HOUR: 789.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Trachurus capensis	537.60	3696	68.09	482
Zenopsis conchifer	88.80	240	11.25	
Dentex macrophthalmus	62.40	408	7.90	
Zeus faber	50.40	72	6.38	
Merluccius capensis	24.00	24	3.04	
Trachurus trecae	14.40	144	1.82	
Todaropsis eblanae	7.20	144	0.91	
Illex coindetii	2.40	24	0.30	
Pterothrissus belloci	2.40	48	0.30	
Total	789.60		99.99	

PROJECT STATION: 467  
 DATE: 27/11/91 GEAR TYPE: BT No: POSITION: Lat S 1642 Long E 1119  
 start stop duration  
 TIME :16:10:00 16:33:00 23 (min) Purpose code: 1  
 LOG :2852.40 2853.60 1.04 Area code : 3  
 FDEPTH: 380 320 GearCond.code: 3  
 BDEPTH: 380 320 Validity code:  
 Towing dir: 146 Wire out: 1000 m Speed:277 kn\*10  
 Sorted: 26 Kg Total catch: 263.10 CATCH/HOUR: 686.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Merluccius capensis	678.26	2426	98.82	483
Helicolenus dactylopterus	4.17	104	0.61	
Synagrops microlepis	2.61	52	0.38	
Aristeus varidens	1.30	52	0.19	
Total	686.34		100.00	

PROJECT STATION: 468  
 DATE: 27/11/91 GEAR TYPE: PT No:1 POSITION: Lat S 1645 Long E 1118  
 start stop duration  
 TIME :17:56:00 18:06:00 10 (min) Purpose code: 1  
 LOG :2957.80 2958.50 0.70 Area code : 3  
 FDEPTH: 150 150 GearCond.code:  
 BDEPTH: 399 406 Validity code:  
 Towing dir: 190 Wire out: 500 m Speed:380 kn\*10  
 Sorted: 8 Kg Total catch: 7.61 CATCH/HOUR: 45.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
MYCTOPHRIDAE	32.70	38940	71.62	
Helicolenus dactylopterus	6.60	48	14.45	
Merluccius capensis	6.36	24	13.93	
Total	45.66		100.00	

PROJECT STATION: 469  
 DATE: 28/11/91 GEAR TYPE: PT No: POSITION: Lat S 1650 Long E 1140  
 start stop duration  
 TIME :22:05:00 22:15:00 10 (min) Purpose code: 1  
 LOG :3115.60 3116.30 0.70 Area code : 3  
 FDEPTH: 10 10 GearCond.code:  
 BDEPTH: 34 37 Validity code:  
 Towing dir: 360 Wire out: 100 m Speed:320 kn\*10  
 Sorted: 30 Kg Total catch: 55.08 CATCH/HOUR: 330.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis capensis	162.00	9042	49.02	484
Trachurus capensis	67.80	2220	20.52	485
Mustelus mustelus	34.80	12	10.53	
Sardinops ocellata	23.40	192	7.08	486
Trachurus trecae	17.28	1020	5.23	487
Galeichthys feliceps	12.00	72	3.63	
Zeus faber	10.80	12	3.27	
Loligo vulgaris	2.40	24	0.73	
Total	330.48		100.01	

PROJECT STATION: 470  
 DATE: 28/11/91 GEAR TYPE: PT No: POSITION: Lat S 1648 Long E 1132  
 start stop duration  
 TIME :23:15:00 23:35:00 20 (min) Purpose code: 1  
 LOG :3123.60 3125.40 1.80 Area code : 3  
 FDEPTH: 40 0 GearCond.code:  
 BDEPTH: 96 100 Validity code:  
 Towing dir: 270 Wire out: 200 m Speed:300 kn\*10  
 Sorted: 2 Kg Total catch: 1.80 CATCH/HOUR: 5.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Sepia sp.	4.50	45	83.33	
Trachurus capensis	0.90	21	16.67	
Total	5.40		100.00	

PROJECT STATION: 471  
 DATE: 29/11/91 GEAR TYPE: PT No: POSITION: Lat S 1650 Long E 1119  
 start stop duration  
 TIME :01:12:00 01:27:00 15 (min) Purpose code: 1  
 LOG :3136.30 3137.20 0.90 Area code : 3  
 FDEPTH: 15 15 GearCond.code:  
 BDEPTH: 157 300 Validity code:  
 Towing dir: 360 Wire out: 100 m Speed:360 kn\*10  
 Sorted: 30 Kg Total catch: 74.00 CATCH/HOUR: 296.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Trachurus capensis	294.00	2124	99.32	488
MYCTOPHRIDAE	1.00	208	0.34	
Trichiurus lepturus	1.00	8	0.34	
Total	296.00		100.00	

PROJECT STATION: 472  
 DATE: 29/11/91 GEAR TYPE: PT No:1 POSITION: Lat S 1658 Long E 1123  
 start stop duration  
 TIME :04:25:00 04:40:00 15 (min) Purpose code: 1  
 LOG :3158.70 3159.50 0.80 Area code : 3  
 FDEPTH: 30 40 GearCond.code:  
 BDEPTH: 130 130 Validity code:  
 Towing dir: 360 Wire out: 200 m Speed:440 kn\*10  
 Sorted: 4 Kg Total catch: 3.60 CATCH/HOUR: 14.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Trachurus capensis	12.80	120	88.89	489
Zenopsis conchifer	1.60	4	11.11	
Total	14.40		100.00	

PROJECT STATION: 473  
 DATE: 29/11/91 GEAR TYPE: PT No: POSITION: Lat S 1659 Long E 1143  
 start stop duration  
 TIME :07:15:00 07:22:00 7 (min) Purpose code: 1  
 LOG :3182.70 3183.00 0.30 Area code : 3  
 FDEPTH: 10 10 GearCond.code:  
 BDEPTH: 20 21 Validity code:  
 Towing dir: 275 Wire out: 100 m Speed:400 kn\*10  
 Sorted: 36 Kg Total catch: 2336.10 CATCH/HOUR: 20023.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis capensis	19722.86	1032789	98.50	490
Etrumeus whiteheadi	300.86	7800	1.50	491
Total	20023.72		100.00	

PROJECT STATION: 474  
 DATE: 29/11/91 GEAR TYPE: BT No:1 POSITION: Lat S 1711 Long E 1127  
 start stop duration  
 TIME :10:25:00 10:45:00 20 (min) Purpose code: 1  
 LOG :3213.10 3213.80 0.70 Area code : 3  
 FDEPTH: 141 146 GearCond.code:  
 BDEPTH: 141 146 Validity code:  
 Towing dir: 200 Wire out: 500 m Speed:280 kn\*10  
 Sorted: 29 Kg Total catch: 3754.40 CATCH/HOUR: 11263.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Trachurus capensis	10413.00	164352	92.45	492
Dentex macrophthalmus	440.70	5070	3.91	
Merluccius capensis	390.00	780	3.46	
Todaropsis eblanae	19.50	390	0.17	
Total	11263.20		99.99	

PROJECT STATION: 475  
 DATE: 29/11/91 GEAR TYPE: PT No: POSITION: Lat S 1709 Long E 1137  
 start stop duration  
 TIME :23:41:00 23:56:00 15 (min) Purpose code: 1  
 LOG :3321.30 3322.40 1.10 Area code : 3  
 FDEPTH: 20 20 GearCond.code:  
 BDEPTH: 75 68 Validity code:  
 Towing dir: 55 Wire out: 100 m Speed:410 kn\*10  
 Sorted: 36 Kg Total catch: 207.80 CATCH/HOUR: 831.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP.NO.
	weight	numbers		
Engraulis capensis	560.00	25136	67.37	500
Sardinops ocellata	140.00	1300	16.84	499
Thyrsites arum	76.00	28	9.14	
Argyrosomus hololepidotus	39.20	12	4.72	
Etrumeus whiteheadi	12.00	360	1.44	501
Sepia sp.	2.00	20	0.24	
Trichiurus lepturus	2.00	20	0.24	
Total	831.20		99.99	

