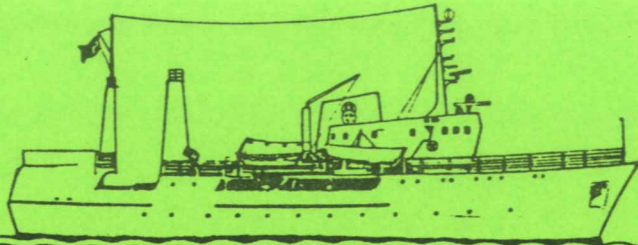


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Reports on Surveys with the
R/V Dr. Fridtjof Nansen

NORAD/UNDP/FAO

PROGRAMME GLO/82/001

CRUISE REPORT
"DR. FRIDTJOF NANSEN"

FISHERIES RESOURCES SURVEY
PAKISTAN
2 - 12 JUNE 1984

EGIL ONA

JUNE 1984

Institute of Marine Research, Bergen

INTRODUCTION

Under the UNDP/FAO Global Programme (GLO/82/001) the fishery research vessel "Dr. Fridtjof Nansen" has carried out several surveys in the North Arabian Sea during 1983-84.

The third cruise in Pakistan waters under this project was carried out in June 1984. The vessel entered the western Pakistan border on 2 June at 2200 hours on its way to Karachi, and terminated the cruise at the same border on 12 June 0900 hours. The local scientists from the Marine Fisheries Department, Karachi, entered the vessel in Karachi on 3 June, and left the vessel in Gwadar on June 11.

Scientific Staff

From the Institute of Marine Research, Bergen:

E. Ona (Cruise leader), K. Pittman, K. Strømsnes, A. Roald,
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From the Marine Fisheries Department, Karachi.

Mohammed Haron Ul Rashid Mian
Syed Aitazullah Shah Syed
Shahad Ashras Gujar
Mohammed Wasim Khan Patman

Objectives

To carry out an acoustic survey of Pakistan waters; mapping the distribution and measuring the abundance of pelagic, demersal and mesopelagic fish.

NARRATIVE

The investigations started off the Indus delta on 4 June and was finished at the Iranian border on 12 June. The area between the 15-20 m depth-contour line out to 5-10 nautical miles off the slope of the continental shelf was covered with transects about 10-15 nautical miles apart (Figure 1).

The distance sailed with the number of stations worked were as follows:

Sailing distance:	1970 nautical miles
Hydrographical Stations:	21
Pelagic trawl hauls	11
Bottom trawl hauls	30

Weather conditions were good, but with the south-west monsoon producing a heavy swell during most of the survey. Instruments and gears functioned satisfactorily.

RESULTS

Hydrography

Figures 2-5 show the distribution of temperature, salinity, density and oxygen content in the four hydrographical sections (Figure 1). In the upper 100 meters the previous indications of anti-cyclonic movement of the offshore waters is not found here. A decreasing depth of the isolines towards deeper waters in the Soamiani Bay section rather indicate a reversed circulation pattern. In all sections, the water masses on the continental shelf have a high oxygen content with the 3 ml/l-isoline below 100 meters depth, except in the last section at the Iranian border. Here, an oxygen content of 6 ml/l was recorded on the shelf, while the 3 ml/l isoline was significantly shallower than in the other sections. This, together with the tendency of coastal rising of temperature and salinity isolines indicates that a local upwelling has occurred in this area. The high oxygen content of the water masses on the shelf

was probably caused by a high phytoplankton production, as brownish water masses were seen all along the shelf from Gwadar to the Iranian border. The phytoplankton, preliminary identified as dinoflagellates, were distributed in large patches or belts about 1-2 nautical miles wide, and a pronounced reduction of fish density were seen inside the belts. As the two hydrographical stations on the shelf on this section were taken at sunset, the oxygen content may be lower during the night. The high variance in oxygen content caused by phytoplankton production/respiration, or toxic elements excreted by the algae, is suggested to cause the lowered fish density within the patches.

The freshwater runoff outside Indus river in Section I (Figure 2) and in Sonmiani Bay (Figure 3) could barely be detected. The salinity is high at the shallow stations in both sections.

Pelagic fish

Figure 6 shows the distribution of pelagic fish. Note that the density scalings are not directly comparable with earlier cruises due to changed performance of new echo sounders and integrator. (Ref. Annex III). The fish was distributed over most of the shelf area, and no recordings of pelagic fish were made further offshore. In general the recordings were very scattered, and no area with real pelagic schooling activity was found. Denser concentrations were recorded in the Sonmiani Bay, where a pelagic trawl station (Figure 1) gave an almost clean catch of ponyfish (Leiognathus sp.). In the inner end of the Indus Swatch the denser pelagic recordings probably contained a mixture of Indian oil sardine (Sardinella longiceps), goldstripe sardinella (S. gibbosa), anchovy (Thryssa dussumieri), Rainbow sardine (Dussumieria acuta), Scad (Decapterus russelli), ponyfish (Leiognathus sp., Gazza minuta) and Spanish mackerel (Scomberomorus koreanus), which all were present in the bottom trawl catches in the area.

In the denser concentrations off Sind and outside Karachi, the indian ilisha (Ilisha melastoma), ponyfish (Leiognathus sp.), Rainbow sardine (Dussumieria acuta), anchovy (Thryssa sp., T.

dussumieria, T. vitrirostris), barracudas (Sphyraena putnamiae), gold-stripe sardinella (S. gibbosa), and indo-pacific spanish mackerel (Scomberomurus guttatus) were present both in pelagic and bottom trawl catches.

Along the Makran coast the pelagic fish distribution was very scattered. The anchovies Thryssa mystax, T. vitrirostris, T. dussumieri, rainbow sardine (Dussumieria acuta), blacktip sardinella (S. elanura), ponyfish (Gazza minuta) and spanish mackerels (Scomberomorus commersoni, S. guttatus) were frequently recorded in the catches.

At the Makran coast small schools or individual tunas were observed jumping in front of the vessel. As no sonar contacts were made, it was concluded that no fishable schools were present. A few sonar contacts of fast swimming fish were also made just outside the Indus Swatch, but no catches were made as the fish strongly avoided the vessel and kept a distance of about 100 meters on approaches.

Demersal fish

The distribution of demersal fish is shown in Figure 7. The recordings all along the Sind coast were generally scattered while limited areas with higher densities were found in the Sonmiani Bay and along the eastern part of the Makran coast.

At the Sind coast, the concentrations of bottom fish were dominated by hairtails (Trichiurus lepturus), threadfin bream (Nemipterus japonicus), catfish (Arius sp.), grunters (Pomadasys maculatus), lizardfish (Saurida tumbil), Indian driftfish (Ariomma indica), croakers (Argyrosomus sp.), snappers (Lutjanus malabaricus) and groupers (Epinephelus diacanthus). Catch rates were generally low, 100-500 kg per hour trawling, with a maximum at St. no. 113, outside Karachi, of 1.6 tonnes pr. hour.

In the Sonmiani bay the bottom trawl catches was dominated by the threadfin bream (Nemipterus japonicus), hairtails (Trichiu-

rus lepturus), croaker (Otolithes ruber), and catfish (Ancharius brevibarbis). Catch rates of 0.5-1.1 tonnes per hour trawling were usual in this area.

Along the eastern part of the Makran coast the catch rates increased, and hauls up to 7.5 tonnes per hour trawling were experienced. The hairtails (Trichurus lepturus), catfish (Ancharius brevibarbis) seabreams (Acanthopagurus sp.) and croakers (Pennahia sp.) dominated the catch. Except for one trawl station, giving 4 tonnes per hour trawling, fish density on the western Makran coast was low. The larger catch in this area contained about 30% grunters (Pomadasys commersoni) with trevallies (Lactarius lactarius), croaker (Otolithes ruber) and catfish (Ancharius brevibarbis) as secondary components.

Mesopelagic fish

Recordings of mesopelagic fish (Figure 8) were made at and off the edge of the continental shelf in the entire area, as well as inside the Indus Swatch. The recordings were mainly scattered with low catch rates. The fish showed a daily migration pattern with two distinct scattering layers both at day and nighttime. The vertical migrations were fast, the downward migration from surface to 150 - 200 meters often completed within 20 minutes. The lanternfish Benthoosema pterotum was predominant in the mesopelagic scattering layers, but driftfish (Cubiceps cubiceps) also represented about 10% of the catch at the last pelagic trawl station at the Iranian border.

A peculiar behaviour pattern of mesopelagic fish, identified as Benthoosema pterotum was seen in a limited shelf-edge area off Sind. (Figures 8 and 10).

Large schools at shallow depths, from 0-150 meters, extending from the DAY I-layer, was recorded at highlight day-conditions (hours 0800-1200). The phenomenon seemed to be more a delayed downwards migration than a regular pattern, and schools joining the D-I scattering layer were observed at about 1200 hours. The fish from two pelagic trawl stations of aimed trawling on

sonar contacts was larger and significantly lighter in colour than the common Benthoosema pterotum. Samples from the catches were taken for further analysis at the Institute of Marine Research.

Plankton

In most of the shelf areas planktonic scatterers contributed the major part of the total echo abundance (integrated echo energy) (Figure 9). Jellyfish, small shrimps, fish larvae and krill were identified as main contributors. Planktonic scattering layers were observed in all depths both during day and night at high densities, which to a great extent made it impossible to obtain reliable integrated values of scattered fish. Any systematic differences in scattering strength on the two systems have to be further analysed later, as the 120 kHz system must be recalibrated due to imperfect weather conditions on the last test.

Surface observations

No systematic record of whales and dolphins were made at this cruise. Four whales were reported to be seen from the bridge on the eastern Makran coast. At long distance they were identified as three bryde whales and one humpback-whale. Flocks of dolphins were frequently observed off the Sind shelf.

Scattered observations of individual or small schools of tuna were observed jumping in front of the vessel along the Makran coast, but no real sonar contacts were made on these.

A phytoplankton bloom was seen as brown belts, 1-2 nautical miles wide, at the western Makran coast, from Gwadar to the Iranian border. The brown water was caused by a high density of dinoflagellates.

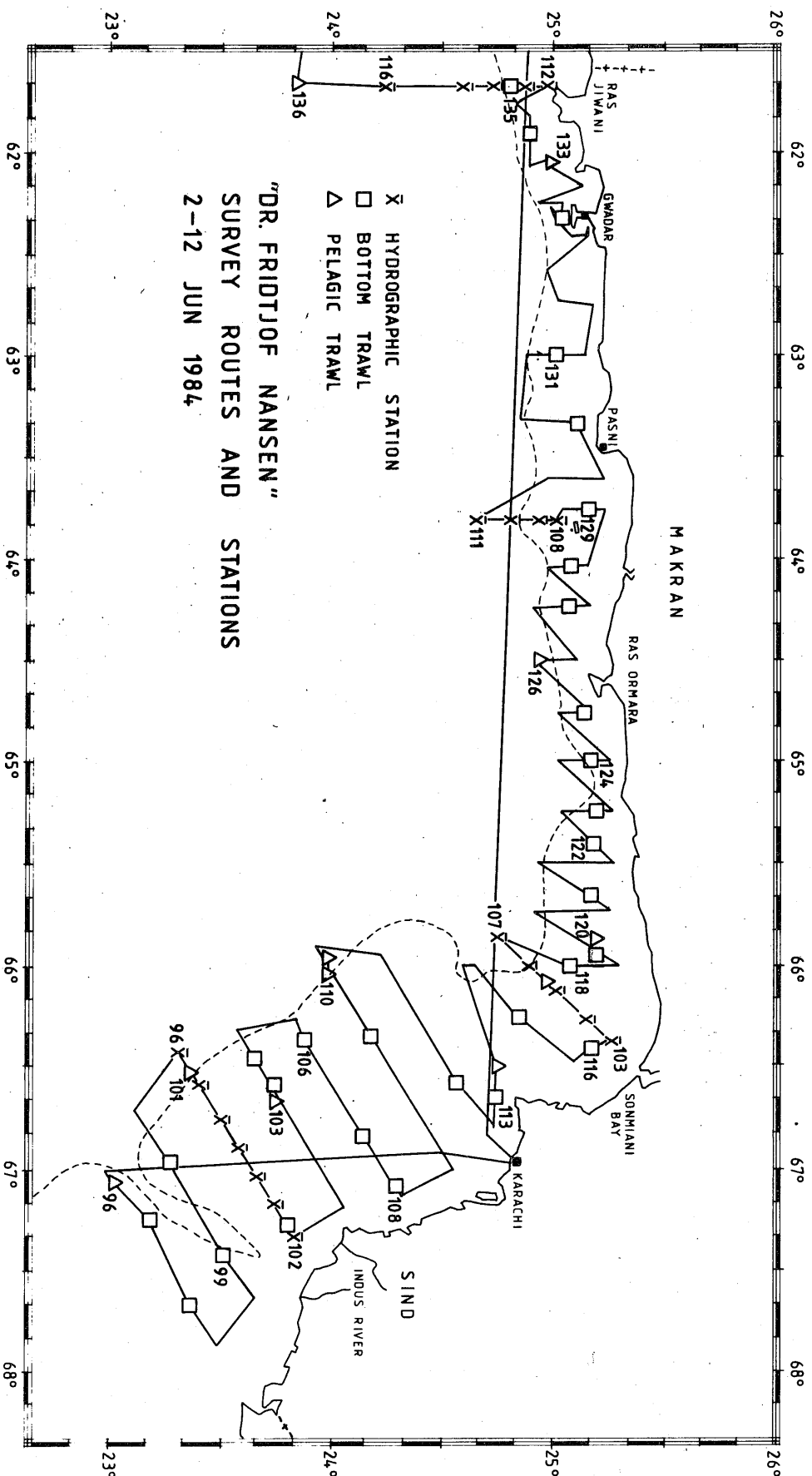


Fig. 1. Survey routes and stations. "Dr. Fridtjof Nansen"s fisheries resources survey, Pakistan 2 - 12 June 1984.

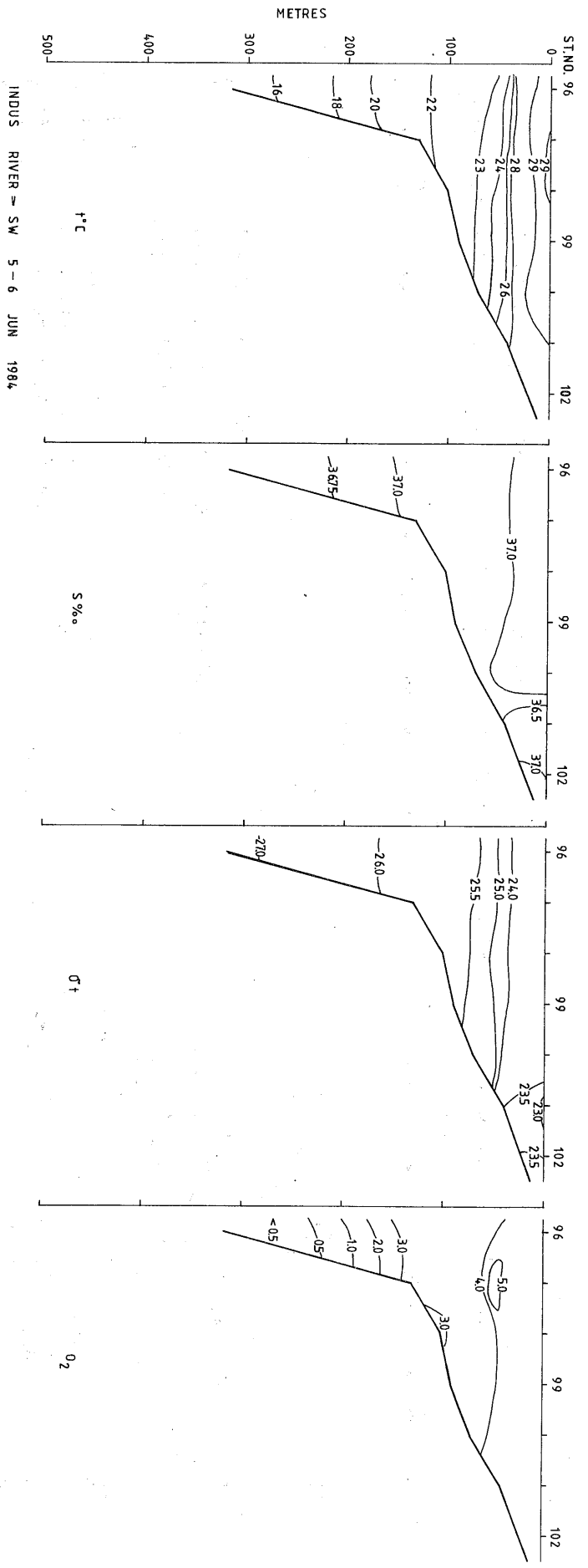


Fig. 2. Section I : Indus River - SW. 5 - 6 June 1984.
 Temperature, salinity, density and oxygen content.

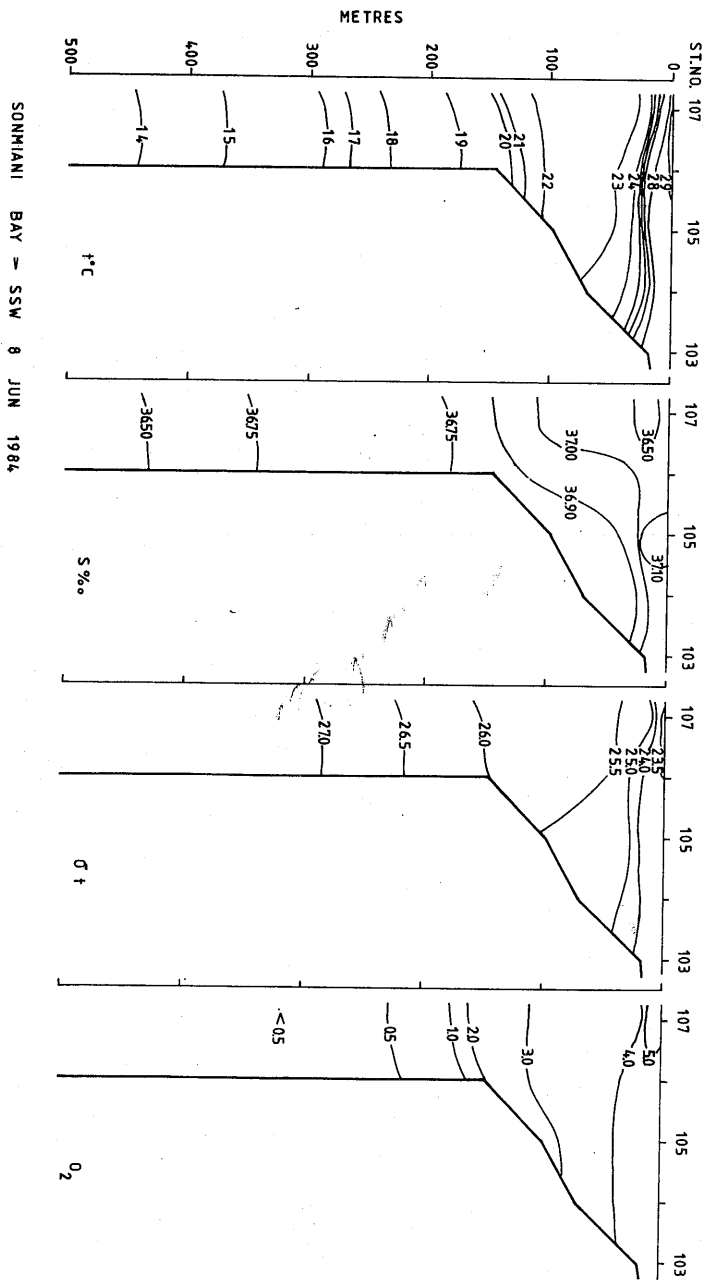


Fig. 3. Section II : Sonmiani Bay - SW. 8 June 1984.
 Temperature, salinity, density and oxygen content.

Fig. 5. Section IV : Ras Jiwani - South, 11 - 12 June 1984. Temperature, salinity, density, and oxygen content.

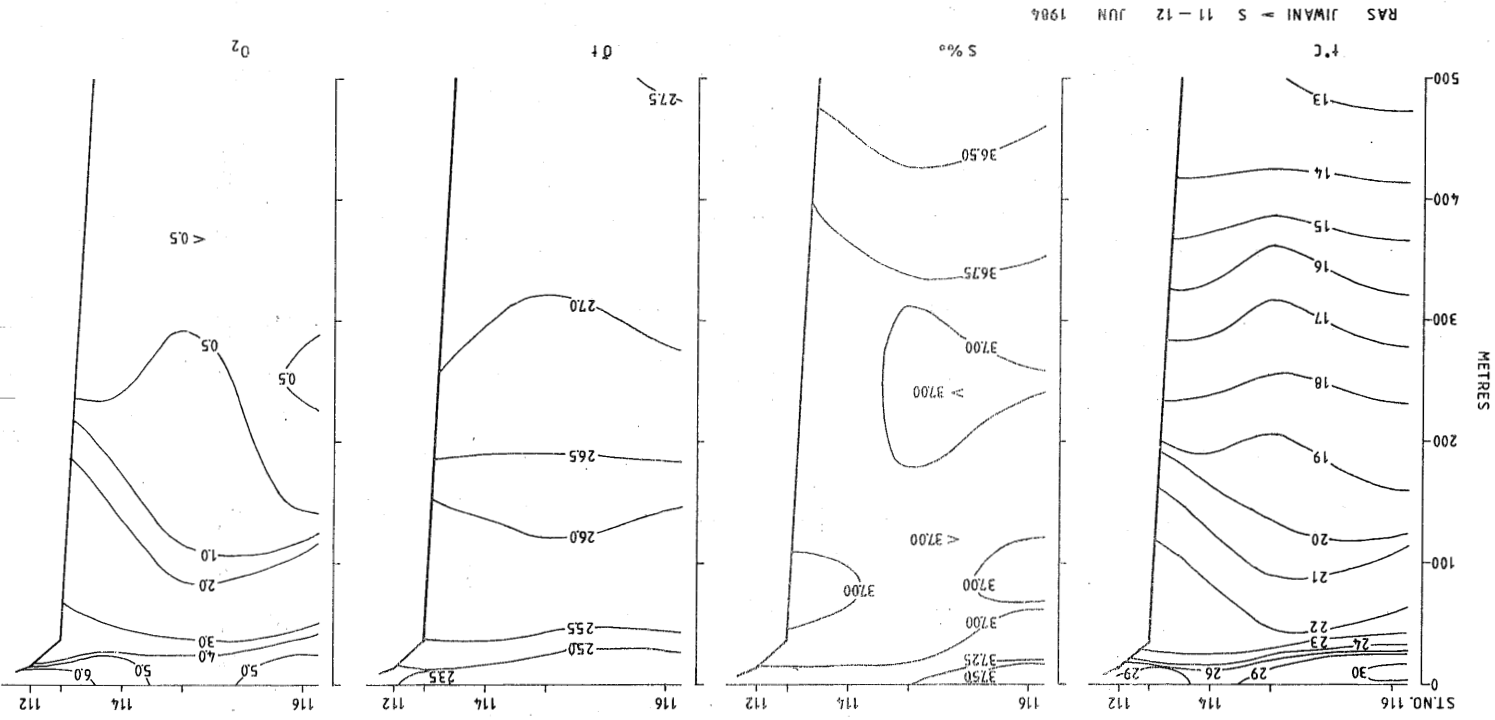
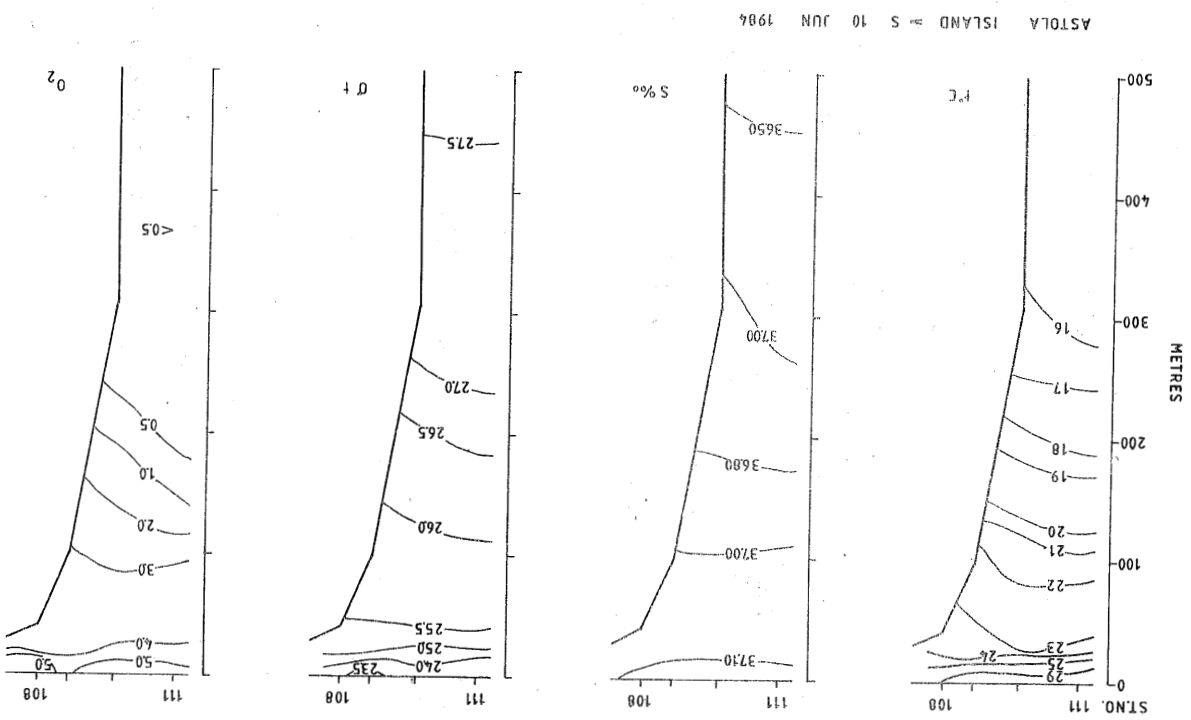


Fig. 4. Section III : Astola Isl. - South, 10 June 1984. Temperature, salinity, density, and oxygen content.



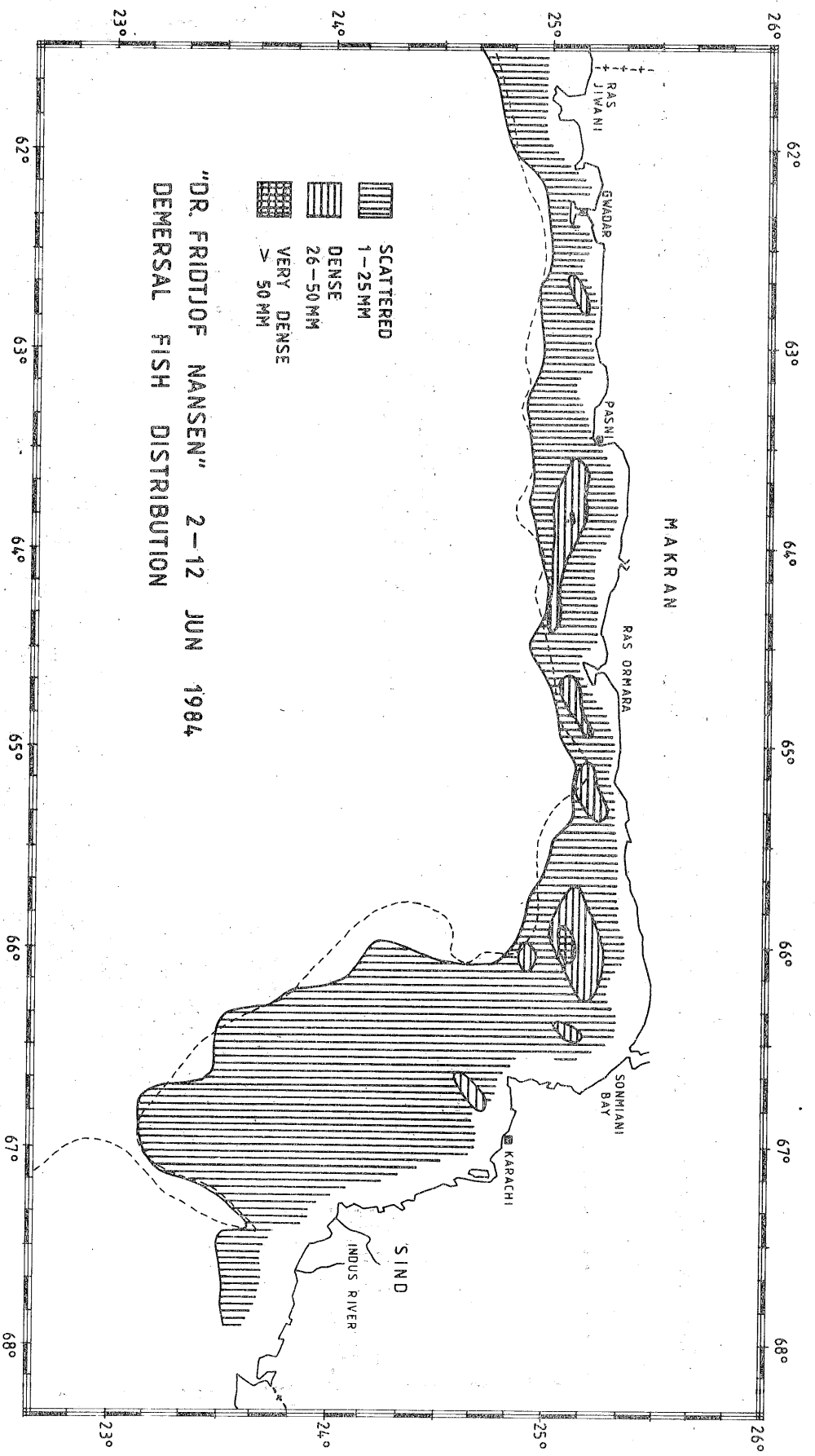


Fig. 7. Demersal fish distribution. "Dr. Fridtjof Nansen"s fisheries resources survey, Pakistan, 2 - 12 June 1984.

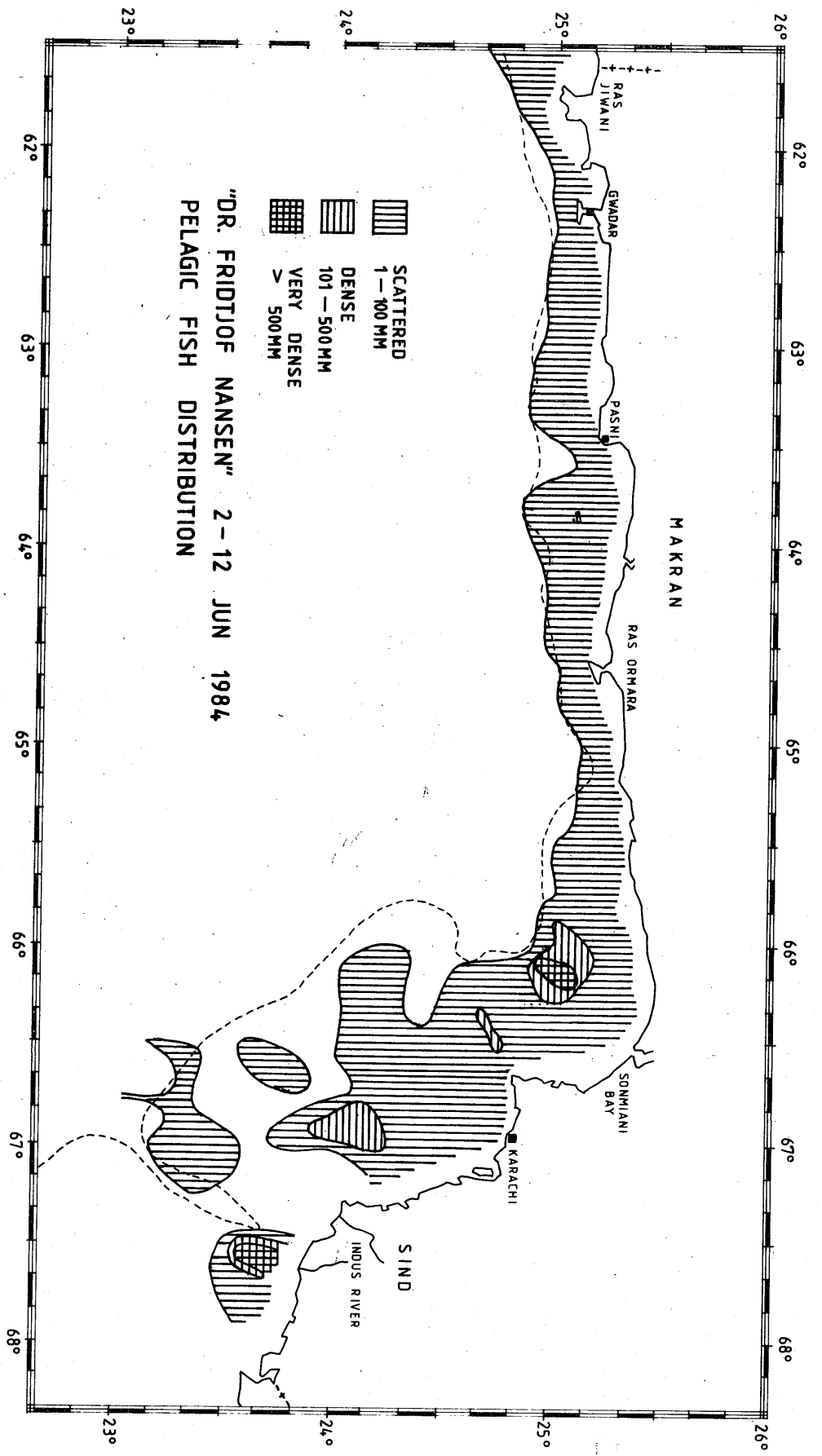


Fig. 6. Pelagic fish distribution. "Dr. Fridtjof Nansen" s fisheries resources survey, Pakistan, 2 - 12 June 1984.

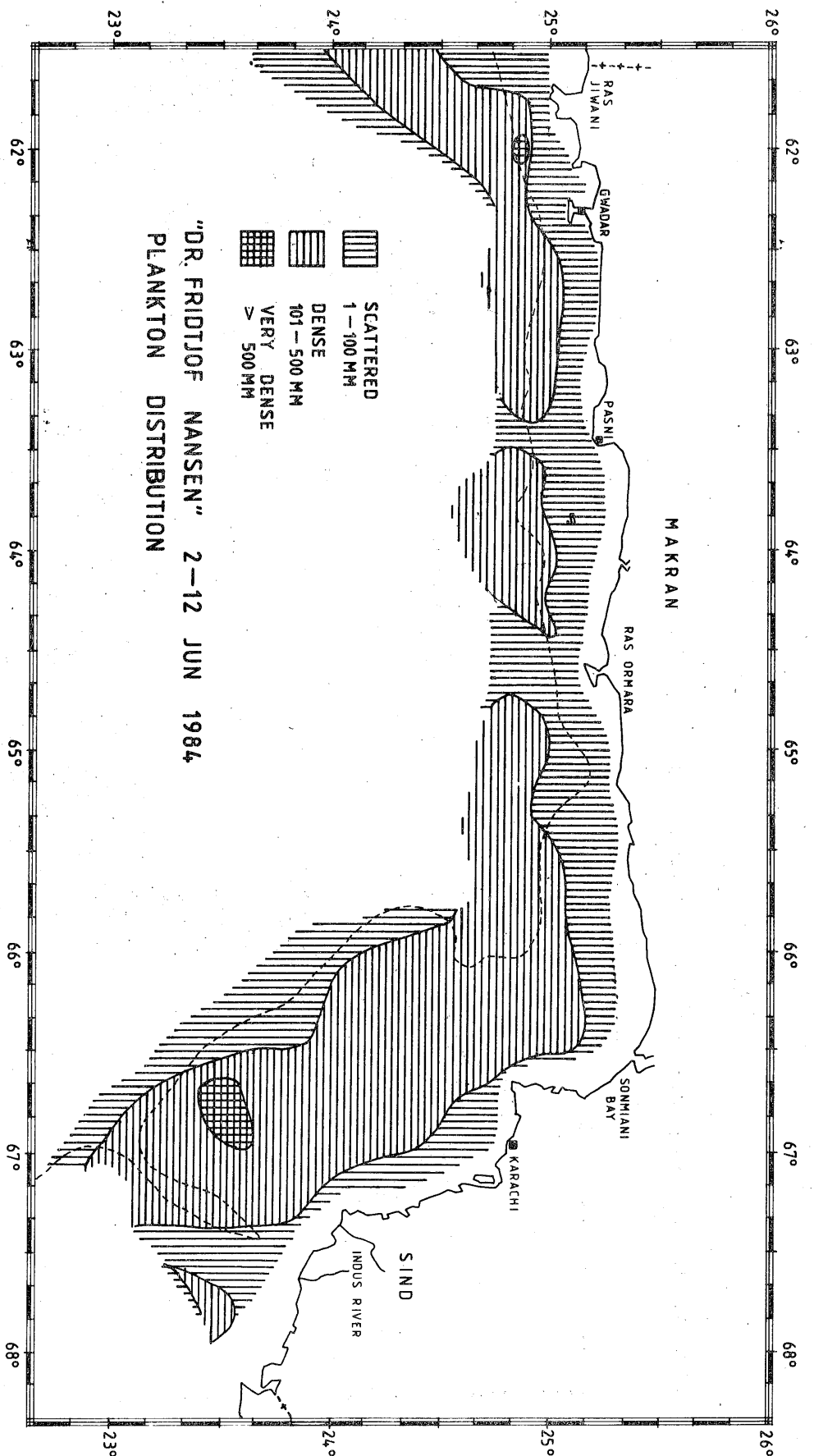


Fig. 9. Plankton distribution. "Dr. Fridtjof Nansen"s fisheries resources survey, Pakistan, 2 - 12 June 1984.

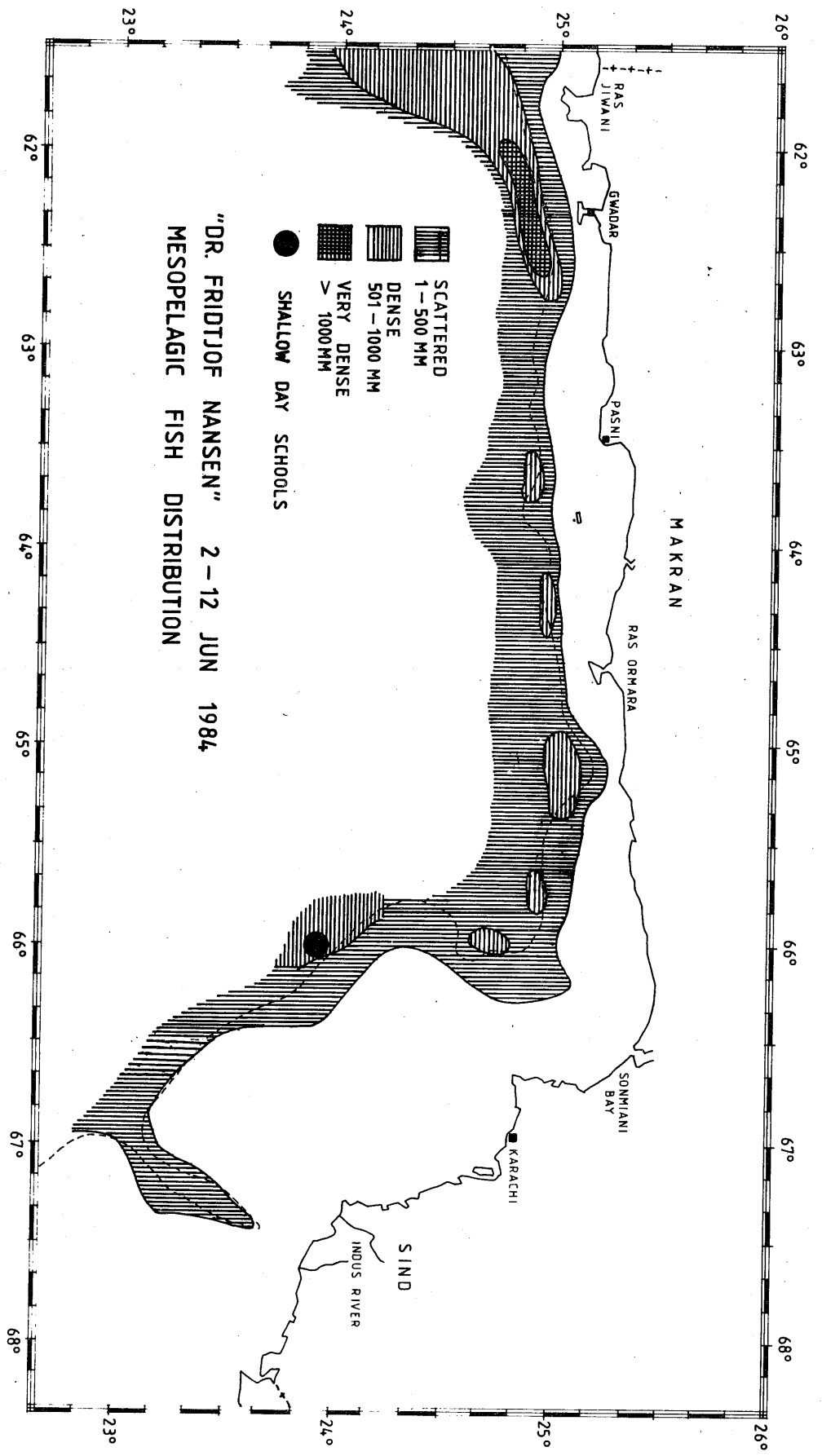


Fig. 8. Mesopelagic fish distribution. "Dr. Fridtjof Nansen"s fisheries resources survey, Pakistan, 2 - 12 June 1984.

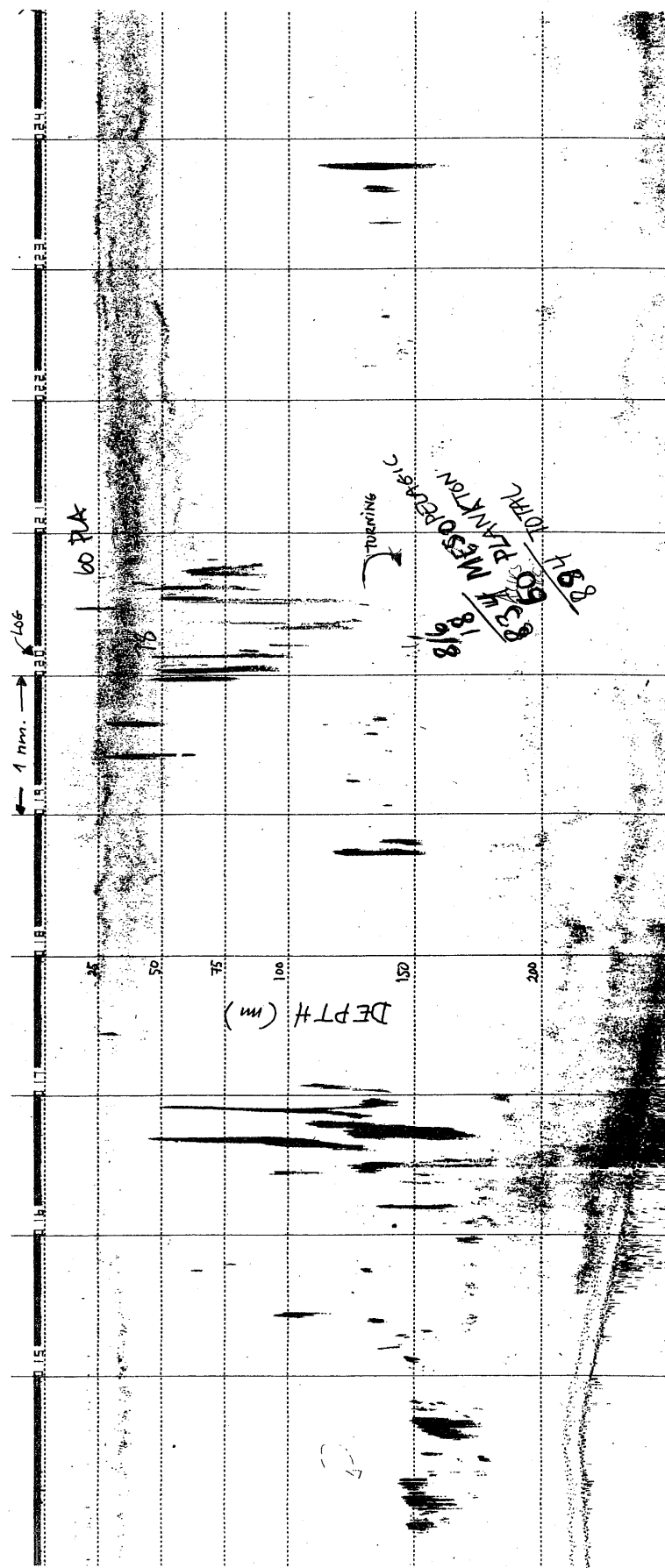
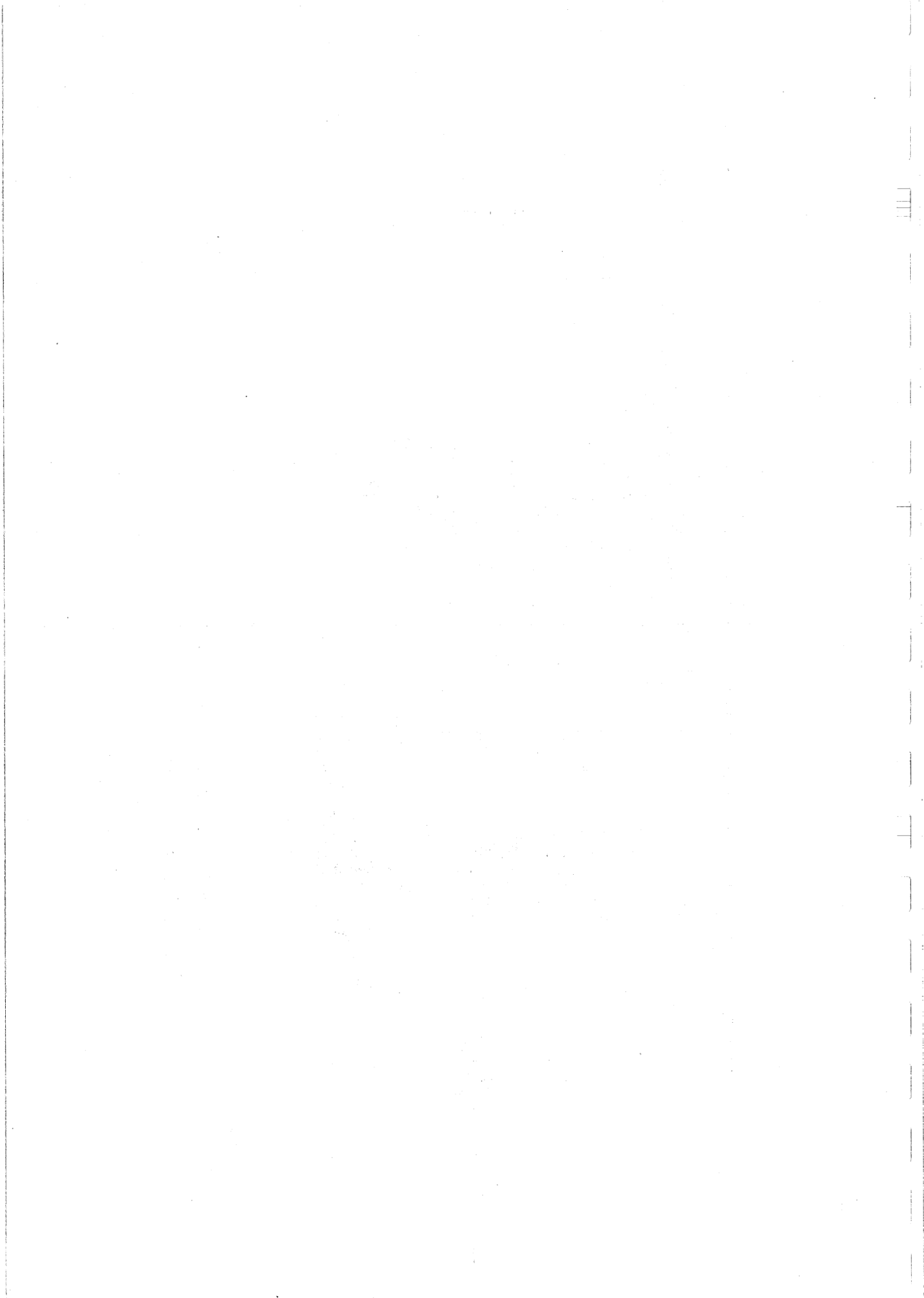


Fig. 10. Echogram recordings of shallow day schools of lantern fish, Benthosema pterotum.



ANNEX I : Details of fishing stations
with catch data and species.

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:245
 PROJECT STATION NO.:097
 PROJECT:AS
 DATE: 04/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2311
 start stop duration Long E 06715
 TIME : 2330 2332 002(min) Purpose code:1
 LOG : 7514 7514 0,0 TOWING DIR:240
 FDEPTH: 081 081 WIRE OUT :0350m SPEED: ,0
 BDEPTH: 0081 0081
 TOTAL CATCH: 00000,0KG. CATCH/HOUR: 00000,0KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR	% OF TOT.C.	SAMP.NO
NO CATCH	weight numbers		
	,00 0	,0	
	,00	,0	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:244
 PROJECT STATION NO.:096
 PROJECT:AS
 DATE: 04/06 1984 GEAR TYPE:PT No:2 POSITION:Lat N 2302
 start stop duration Long E 06704
 TIME : 2110 2140 030(min) Purpose code:1
 LOG : 7493 7495 1,7 TOWING DIR:240
 FDEPTH: 045 045 WIRE OUT :0125m SPEED:3,4
 BDEPTH: 0127 0127
 TOTAL CATCH: 00011,2KG. CATCH/HOUR: 00022,4KG. SORTED:011,2KG.

SPECIES	CATCH PER HOUR	% OF TOT.C.	SAMP.NO
	weight numbers		
MYCTOPHIDAE	15,00 5000	66,9	6
Sardinella longiceps	2,60 48	11,6	5
Trichiurus lepturus	1,80 8	8,0	
Leiognathus sp	1,60 118	7,1	
Tentoriceps cristatus	,80 4	3,5	
Loligo sp	,40 16	1,7	
Sardinella gibbosa	,10 2	,4	
Chaetodon sp.	,02 6	,0	
MISCELLANEOUS	,02 8	,0	
	22,34	99,2	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:246
 PROJECT STATION NO.:098
 PROJECT:AS
 DATE: 05/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2322
 start stop duration Long E 06740
 TIME : 0315 0345 030(min) Purpose code:1
 LOG : 7541 7543 1,5 TOWING DIR:235
 FDEPTH: 023 022 WIRE OUT :0150m SPEED:3,0
 BDEPTH: 0023 0022
 TOTAL CATCH: 00234,2KG. CATCH/HOUR: 00468,4KG. SORTED:084,4KG.

SPECIES	CATCH PER HOUR	% OF TOT.C.	SAMP.NO
	weight numbers		
SHRIMPS	88,00 0	18,7	
Trichiurus lepturus	72,00 352	15,3	
Polynemus sextarius	48,00 2624	10,2	
Arius sp	43,20 48	9,2	
SCIAENIDAE	30,40 4976	6,4	
SHARK	22,40 32	4,7	
Johnieops macrorhynchus	16,00 528	3,4	
MISCELLANEOUS	8,00 96	1,7	
Thryssa dussumieri	6,40 96	1,3	
Pomadasys maculatus	4,80 352	1,0	
APOGONIDAE	3,20 112	,6	
Lutjanus sp	26,00 8	5,5	
R A Y S	100,00 52	21,3	
	468,40	99,3	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:247
 PROJECT STATION NO.:099
 PROJECT:AS
 DATE: 05/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2331
 start stop duration Long E 06225
 TIME : 0815 0845 030(min) Purpose code:1
 LOG : 7590 7592 1,5 TOWING DIR:062
 FDEPTH: 060 051 WIRE OUT :0300m SPEED:3,0
 BDEPTH: 0060 0051

TOTAL CATCH: 00276,5KG. CATCH/HOUR: 00553,0KG. SORTED:034,6KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Carangoides malabaricus	96,00	1088	17,3	7
Saurida tumbil	80,00	272	14,4	
Nemipterus japonicus	72,00	1056	13,0	8
Spyraena putnamiae	56,00	48	10,1	
Carangoides chrysophrys	48,00	16	8,6	
Scomberomorus koreanus	36,80	32	6,6	
Lagocephalus lunaris	32,00	192	5,7	
Alepes vari	24,00	64	4,3	
Pomadasy maculatus	22,40	384	4,0	
Ulua mentalis	16,00	48	2,8	
Trichiurus lepturus	16,00	32	2,8	
Sepia sp	16,00	32	2,8	
Pseudorhombus arsius	8,00	32	1,4	
L O B S T E R S	8,00	32	1,4	
Gerres filamentosus	6,40	32	1,1	
Gazza minuta	3,20	96	,5	
Polynemus microstoma	3,20	16	,5	
Lactarius lactarius	3,20	16	,5	
Upeneus sulphureus	3,20	48	,5	
Sardinella longiceps	,96	16	,1	
Argyrops spinifer	,80	16	,1	
Decapterus russelli	,48	16	,0	
Cynoglossus bilineatus	,32	16	,0	
Therapon theraps	,08	32	,0	
	553,04		98,5	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:248
 PROJECT STATION NO.:100
 PROJECT:AS
 DATE: 05/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2317
 start stop duration Long E 06657
 TIME : 1235 1305 030(min) Purpose code:1
 LOG : 7628 7630 1,5 TOWING DIR:055
 FDEPTH: 112 105 WIRE OUT :0500m SPEED:3,0
 BDEPTH: 0112 0105

TOTAL CATCH: 00124,8KG. CATCH/HOUR: 00249,6KG. SORTED:031,2KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	100,00	160	40,0	
Nemipterus japonicus	68,00	704	27,2	9
Ariomma indica	20,00	184	8,0	
Dussumieria acuta	16,00	264	6,4	10
Sphyraena obtusata	11,20	80	4,4	
Loligo sp	8,00	0	3,2	
Decapterus russelli	5,60	104	2,2	
Argyrops spinifer	5,60	16	2,2	
Acropoma japonicum	3,20	400	1,2	
Pennahia macrocephalus	2,40	8	,9	
L O B S T E R S	2,40	8	,9	
Priacanthus hamrur	2,40	8	,9	
Leiognathus sp	1,60	208	,6	
Arius thalassinus	1,60	8	,6	
Gerres filamentosus	,80	8	,3	
Cynoglossus bilineatus	,80	40	,3	
	249,60		99,3	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:249
 PROJECT STATION NO.:101
 PROJECT:AS
 DATE: 05/06 1984 GEAR TYPE:PT No:2 POSITION:Lat N 2323
 start stop duration Long E 06632
 TIME : 1800 1830 030(min) Purpose code:1
 LOG : 7676 7677 1,4 TOWING DIR:240
 FDEPTH: 030 040 WIRE OUT :0075m SPEED:2,8
 BDEPTH: 0183 0183

TOTAL CATCH: 00020,0KG. CATCH/HOUR: 00040,0KG. SORTED:020,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
MYCTOPHIDAE	40,00	0	100,0	11
	40,00		100,0	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:250
 PROJECT STATION NO.:102
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2350
 start stop duration Long E 06719
 TIME : 0140 0210 030(min) Purpose code:1
 LOG : 7733 7735 1,6 TOWING DIR:240
 FDEPTH: 020 020 WIRE OUT :0125m SPEED:3,2
 BDEPTH: 0020 0020

TOTAL CATCH: 00091,6KG. CATCH/HOUR: 00183,2KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Argyrosonus sp.	69,80	6	38,1	
Krill	32,00	0	17,4	
Pomadasy bayanus	21,20	4	11,5	
Formio niger	12,80	4	6,9	
Arius tenuispinis	12,00	20	6,5	
Torpedo marmorata	8,00	4	4,3	
Otolithes ruber	5,60	20	3,0	
Johnieops sp.	5,60	124	3,0	
Harpodon sp.	5,20	64	2,8	
DASYATIDAE	4,80	4	2,6	
Pennahia sp.	1,60	4	,8	
Trichiurus lepturus	1,60	24	,8	
Cynoglossus bilineatus	1,20	88	,6	
Lactarius lactarius	,80	4	,4	
SHRIMPS	,80	48	,4	
Polynemus sextarius	,20	20	,1	
	183,20		99,2	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:251
 PROJECT STATION NO.:103
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:PT No:2 POSITION:Lat N 2346
 start stop duration Long E 06639
 TIME : 0715 0745 030(min) Purpose code:1
 LOG : 7789 7790 1,2 TOWING DIR:062
 FDEPTH: 060 054 WIRE OUT :0150m SPEED:2,4
 BDEPTH: 0093 0091

TOTAL CATCH: 00000,0KG. CATCH/HOUR: 00000,0KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
N O C A T C H	,00	0	,0	
	,00		,0	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:252
 PROJECT STATION NO.:104
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2347
 start stop duration Long E 06679
 TIME : 0830 0900 030(min) Purpose code:1
 LOG : 7795 7796 1,4 TOWING DIR:055
 FDEPTH: 093 093 WIRE OUT :0500m SPEED:2,8
 BDEPTH: 0093 0093

TOTAL CATCH: 00073,6KG. CATCH/HOUR: 00147,2KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	60,00	0	40,7	
Nemipterus japonicus	30,00	180	20,3	
Ariomma indica	18,60	120	12,6	
CARCHARHINIDAE	12,00	6	8,1	
Saurida tumbil	8,40	6	5,7	
Ulua mentalis	4,80	12	3,2	
Priacanthus hamrur	3,60	6	2,4	
DASYATIDAE	3,00	2	2,0	
Argyrops spinifer	1,20	6	,8	
Selar crumenophthalmus	1,20	6	,8	
Decapterus russelli	1,20	12	,8	
Loligo sp	,84	84	,5	
Fistularia petimba	,60	12	,4	
Upeneus sp	,60	6	,4	
Leiognathus sp	,54	30	,3	
Cynoglossus bilineatus	,48	12	,3	
APOGONIDAE	,12	6	,0	
	147,18		99,3	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:253
 PROJECT STATION NO.:105
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2340
 start stop duration Long E 06628
 TIME : 1030 1055 025(min) Purpose code:1
 LOG : 7812 7813 1,1 TOWING DIR:050
 FDEPTH: 115 110 WIRE OUT :0550m SPEED:2,6
 BDEPTH: 0115 0110

TOTAL CATCH: 00102,3KG. CATCH/HOUR: 00245,5KG. SORTED:034,1KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Nemipterus japonicus	86,40	864	35,1	
Lutjanus malabaricus	46,80	7	19,0	
Epinephelus diacanthus	20,16	28	8,2	
Argyrops spinifer	18,72	21	7,6	
Trichiurus lepturus	14,40	21	5,8	
Leiognathus sp	12,24	1476	4,9	
APOGONIDAE	10,80	5400	4,3	
Gymnura natalensis	10,08	7	4,1	
Selar crumenophthalmus	9,36	43	3,8	
Ariomma indica	5,76	36	2,3	
Loligo sp	5,76	0	2,3	
Pomadasys maculatus	3,60	7	1,4	
Acropoma japonicum	,36	14	,1	
Fistularia petimba	,36	7	,1	
Decapterus russelli	,36	7	,1	
Saurida undosquamis	,36	7	,1	
	245,52		99,2	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:254
 PROJECT STATION NO.:106
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2352
 start stop duration Long E 06623
 TIME : 1513 1521 008(min) Purpose code:1
 LOG : 7850 7850 0,4 TOWING DIR:238
 FDEPTH: 105 106 WIRE OUT :0500m SPEED:3,0
 BDEPTH: 0105 0106

TOTAL CATCH: 00095,4KG. CATCH/HOUR: 00715,5KG. SORTED:029,3KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Nemipterus japonicus	536,25	4042	74,9	12
Selar crumenophthalmus	48,75	270	6,8	
Leiognathus sp	33,75	337	4,7	
Trichiurus lepturus	31,50	487	4,4	
Decapterus russelli	26,25	22	3,6	
Saurida tumbil	21,75	487	3,0	
Loligo sp	9,75	735	1,3	
Dussumieria acuta	2,25	22	,3	
Fistularia petimba	2,25	45	,3	
Saurida undosquamis	1,20	22	,1	
	713,70		99,4	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:255
 PROJECT STATION NO.:107
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2409
 start stop duration Long E 06651
 TIME : 1845 1915 030(min) Purpose code:1
 LOG : 7887 7888 1,2 TOWING DIR:232
 FDEPTH: 067 064 WIRE OUT :0350m SPEED:2,6
 BDEPTH: 0067 0064
 TOTAL CATCH: 00141,3KG. CATCH/HOUR: 00282,6KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Pomadasys hasta	140,00	66	49,5	13
Leiognathus sp	62,20	0	22,0	
Ilisha melastoma	14,40	74	5,0	14
Nemipterus japonicus	12,20	162	4,3	
Loligo sp	8,00	0	2,8	
Arius thalassinus	6,80	4	2,4	
Lactarius lactarius	6,80	80	2,4	
METAPENAEIDAE	6,60	266	2,3	
Muraenesox bagio	6,00	4	2,1	
Saurida tumbil	4,80	6	1,6	
Gymnura natalensis	3,20	2	1,1	
Sphyræna obtusata	2,40	40	,8	
L O B S T E R S	2,00	2	,7	
Lagocephalus lunaris	1,60	4	,5	
Platycephalus sp.	1,40	10	,4	
Ariomma indica	1,30	12	,4	
Selar crumenophthalmus	1,20	4	,4	
Acropoma japonicum	1,20	56	,4	
Dussumieria acuta	,20	2	,0	
Decapterus russelli	,20	2	,0	
Carangoides malabaricus	,10	6	,0	
APOGONIDAE	,04	26	,0	
	282,64		99,1	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:256
 PROJECT STATION NO.:108
 PROJECT:AS
 DATE: 06/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2418
 start stop duration Long E 06704
 TIME : 2120 2150 030(min) Purpose code:1
 LOG : 7909 7911 1,5 TOWING DIR:238
 FDEPTH: 022 026 WIRE OUT :0100m SPEED:3,0
 BDEPTH: 0022 0026
 TOTAL CATCH: 00310,2KG. CATCH/HOUR: 00620,4KG. SORTED:054,8KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	140,00	0	22,5	
Harpodon sp.	57,40	588	9,2	
Gymnura sp.	56,00	28	9,0	
Muraenesox bagio	56,00	56	9,0	
Ancharius brevibarbis	49,00	28	7,8	
Otolithes ruber	30,10	210	4,8	
Johnius sp.	28,00	476	4,5	
Argyrosomus sp.	26,00	2	4,1	
Pampus chilensis	21,00	28	3,3	
Cynoglossus bilineatus	21,00	1876	3,3	
Drepane longimana	15,40	28	2,4	
Dendrophysa sp.	14,00	56	2,2	
CARCHARHINIDAE	14,00	14	2,2	
C R A B S	14,00	70	2,2	
METAPENAEIDAE	14,00	70	2,2	
Pomadasys hasta	12,60	14	2,0	
Sphaeroides sp.	9,10	112	1,4	
Thryssa dussumieri	7,00	70	1,1	
Scomberoides commersonianus	6,00	2	,9	
Therapon jarbua	5,60	14	,9	
Coilia dussumieri	4,20	42	,6	
Polynemus microstoma	4,20	42	,6	
Johnieops sp.	3,50	196	,5	
Mugil cephalus	2,80	14	,4	
PENAEIDAE	2,80	28	,4	
Dussumieria acuta	2,10	42	,3	
Platycephalus sp.	1,40	14	,2	
Krill	1,40	0	,2	
MISCELLANEOUS	2,94	0	,4	
	621,54		98,6	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:257
 PROJECT STATION NO.:109
 PROJECT:AS
 DATE: 07/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2412
 start stop duration Long E 06621
 TIME : 0350 0420 030(min) Purpose code:1
 LOG : 7976 7978 1,5 TOWING DIR:055
 FDEPTH: 086 087 WIRE OUT :0450m SPEED:3,0
 BDEPTH: 0086 0087

TOTAL CATCH: 00155,9KG. CATCH/HOUR: 00311,8KG. SORTED:087,9KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Nemipterus japonicus	180,00	1630	57,7	15
METAPENAEIDAE	40,00	0	12,8	
Saurida tumbil	21,00	120	6,7	
Platycephalus sp.	17,00	260	5,4	
Upeneus sundaicus	10,00	110	3,2	
Trichiurus lepturus	10,00	40	3,2	
Sepia sp	8,00	280	2,5	
Lepidotrigla bentuviai	7,00	300	2,2	
Harpodon sp.	5,00	50	1,6	
Apogon sp	4,00	390	1,2	
Champsodon sp.	4,00	400	1,2	
Pseudorhombus arsius	2,00	10	,6	
Cynoglossus bilineatus	1,00	180	,3	
Fistularia petimba	1,00	20	,3	
Muraenesox bagio	1,00	30	,3	
Acropoma japonicum	,50	80	,1	
Saurida undosquamis	,20	10	,0	
	311,70		99,3	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:258
 PROJECT STATION NO.:110
 PROJECT:AS
 DATE: 07/06 1984 GEAR TYPE:PT No:2 POSITION:Lat N 2359
 start stop duration Long E 06600
 TIME : 0715 0740 025(min) Purpose code:1
 LOG : 8006 8007 1,2 TOWING DIR:045
 FDEPTH: 070 070 WIRE OUT :0200m SPEED:3,0
 BDEPTH: 0240 0240

TOTAL CATCH: 00002,0KG. CATCH/HOUR: 00004,8KG. SORTED:002,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Benthosema pterotum	4,80	0	100,0	
	4,80		100,0	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:259
 PROJECT STATION NO.:111
 PROJECT:AS
 DATE: 07/06 1984 GEAR TYPE:PT No:6 POSITION:Lat N 2359
 start stop duration Long E 06559
 TIME : 0845 0915 030(min) Purpose code:1
 LOG : 8012 8014 1,4 TOWING DIR:045
 FDEPTH: 075 130 WIRE OUT :0300m SPEED:2,8
 BDEPTH: 0240 0233

TOTAL CATCH: 00003,0KG. CATCH/HOUR: 00006,0KG. SORTED:003,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Benthosema pterotum	6,00	0	100,0	
	6,00		100,0	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:260
 PROJECT STATION NO.:112
 PROJECT:AS
 DATE: 07/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2434
 start stop duration Long E 06635
 TIME : 1540 1610 030(min) Purpose code:1
 LOG : 8079 8081 1,4 TOWING DIR:220
 FDEPTH: 052 055 WIRE OUT :0300m SPEED:2,8
 BDEPTH: 0052 0055

TOTAL CATCH: 00178,1KG. CATCH/HOUR: 00356,2KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	85,20	264	23,9	
Gazza minuta	44,40	1332	12,4	
Pomadasys hasta	42,00	24	11,7	
Leiognathus sp	38,40	9600	10,7	
Saurida tumbil	26,40	2	7,4	
Nemipterus japonicus	18,00	168	5,0	
CARCHARHINIDAE	15,60	12	4,3	
Lactarius lactarius	12,00	156	3,3	
Scomberomorus guttatus	12,00	12	3,3	
Loligo sp	12,00	0	3,3	
Platycephalus sp.	9,60	144	2,6	
Leiognathus equulus	7,20	36	2,0	
Dussumieria acuta	7,20	324	2,0	
Psettodes erumei	6,00	12	1,6	
Acropoma japonicum	6,00	1236	1,6	
Ilisha melastoma	4,00	24	1,1	
Sphyræna obtusata	4,00	36	1,1	
METAPENAEIDAE	2,00	0	,5	
Lagocephalus lunaris	1,80	12	,5	
Ariomma indica	1,20	12	,3	
Apogon sp	1,20	132	,3	
	356,20		98,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:261
 PROJECT STATION NO.:113
 PROJECT:AS
 DATE: 07/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2444
 start stop duration Long E 06640
 TIME : 1855 1910 015(min) Purpose code:1
 LOG : 8106 8107 0,6 TOWING DIR:094
 FDEPTH: 031 031 WIRE OUT :0200m SPEED:2,4
 BDEPTH: 0031 0031

TOTAL CATCH: 00393,1KG. CATCH/HOUR: 01572,4KG. SORTED:131,7KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	400,00	0	25,4	
Otolithes ruber	336,00	1680	21,3	
Lactarius lactarius	160,00	3440	10,1	
Thryssa sp	104,00	1040	6,6	
Formio niger	80,00	80	5,0	
Alutera monoceros	80,00	80	5,0	
Thryssa dussumieri	64,00	320	4,0	
Lutjanus malabaricus	60,00	8	3,8	
Thryssa vitrirostris	60,00	1440	3,8	
Johnius sp.	40,00	640	2,5	
Pomadasys hasta	36,40	12	2,3	
Arius thalassinus	30,00	20	1,9	
PENAEIDAE	18,00	0	1,1	
CARCHARHINIDAE	16,00	16	1,0	
Krill	16,00	0	1,0	
Carangoides malabaricus	16,00	80	1,0	
Polynemus microstoma	16,00	160	1,0	
Gazza minuta	8,00	320	,5	
Pomadasys stridens	8,00	80	,5	
Pomadasys maculatus	8,00	80	,5	
Trigla sp.	8,00	80	,5	
Platycephalus sp.	8,00	80	,5	
	1572,40		99,3	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:262
 PROJECT STATION NO.:114'
 PROJECT:AS
 DATE: 07/06 1984 GEAR TYPE:PT No:4 POSITION:Lat N 2445
 start stop duration Long E 06631
 TIME : 2030 2100 030(min) Purpose code:1
 LOG : 8118 8119 1,4 TOWING DIR:090
 FDEPTH: 001 001 WIRE OUT :0050m SPEED:2,8
 BDEPTH: 0033 0030

TOTAL CATCH: 00518,4KG. CATCH/HOUR: 01036,8KG. SORTED:294,9KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	240,00	0	23,1	
SHRIMPS	160,00	0	15,4	
Thryssa sp	160,00	0	15,4	
Spyraena putnamiae	160,00	96	15,4	
Scomberoides commersonianus	96,00	32	9,2	
Scomberomorus guttatus	76,80	128	7,4	
Ilisha melastoma	64,00	64	6,1	
Sardinella gibbosa	32,00	480	3,0	17
Dussumieria acuta	32,00	1056	3,0	18
Gazza minuta	16,00	64	1,5	
	1036,80		99,5	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:263
 PROJECT STATION NO.:115
 PROJECT:AS
 DATE: 08/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2451
 start stop duration Long E 06615
 TIME : 0155 0225 030(min) Purpose code:1
 LOG : 8171 8172 1,4 TOWING DIR:230
 FDEPTH: 090 094 WIRE OUT :0450m SPEED:3,2
 BDEPTH: 0090 0094

TOTAL CATCH: 00363,6KG. CATCH/HOUR: 00727,2KG. SORTED:028,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Nemipterus japonicus	546,00	9100	75,0	19
Trichiurus lepturus	96,20	104	13,2	
Lepidotrigla bentuviai	20,80	728	2,8	
Platycephalus sp.	20,80	312	2,8	
Acropoma japonicum	7,80	1118	1,0	
PENAEIDAE	7,80	104	1,0	
Saurida tumbil	5,20	26	,7	
Therapon sp.	5,20	26	,7	
Lagocephalus lunaris	5,20	26	,7	
Epinephelus diacanthus	5,20	26	,7	
Sepia sp	2,60	104	,3	
Apogon sp	1,30	52	,1	
Fistularia petimba	1,30	26	,1	
Decapterus russelli	1,30	26	,1	
Champsodon sp.	,26	26	,0	
Leiognathus sp	,26	26	,0	
	727,22		99,2	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:264
 PROJECT STATION NO.:116
 PROJECT:AS
 DATE: 08/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2510
 start stop duration Long E 06626
 TIME : 0505 0535 030(min) Purpose code:1
 LOG : 8199 8201 1,3 TOWING DIR:150
 FDEPTH: 033 038 WIRE OUT :0200m SPEED:2,6
 BDEPTH: 0033 0038

TOTAL CATCH: 00292,5KG. CATCH/HOUR: 00585,0KG. SORTED:046,1KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Otolithes ruber	192,00	848	32,8	
Ancharius brevibarbis	126,40	128	21,6	
Thryssa vitrirostris	88,00	1568	15,0	20
Torpedo marmorata	32,00	32	5,4	
Pampus chilensis	24,00	16	4,1	
Acanthopagrus sp.	24,00	16	4,1	
Argyrosomus sp.	21,80	2	3,7	
Pomadasys stridens	19,20	480	3,2	
Trichiurus lepturus	16,00	192	2,7	
Alutera monoceros	11,20	16	1,9	
SHRIMPS	9,60	128	1,6	
Lactarius lactarius	9,60	96	1,6	
Pennahia sp.	4,80	16	,8	
Rhabdosargus sarba	3,20	16	,5	
Carangoides malabaricus	1,60	16	,2	
Platycephalus sp.	1,60	16	,2	
	585,00		99,4	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:265
 PROJECT STATION NO.:117
 PROJECT:AS
 DATE: 08/06 1984 GEAR TYPE:PT No:2 POSITION:Lat N 2501
 start stop duration Long E 06608
 TIME : 0945 1000 015(min) Purpose code:1
 LOG : 8230 8231 1,2 TOWING DIR:040
 FDEPTH: 070 070 WIRE OUT :0175m SPEED:4,0
 BDEPTH: 0093 0093

TOTAL CATCH: 00015,5KG. CATCH/HOUR: 00062,0KG. SORTED:015,5KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Leiognathus sp	60,00	0	96,7	
Benthoosema pterotum	2,00	0	3,2	21
	62,00		99,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:266
 PROJECT STATION NO.:118
 PROJECT:AS
 DATE: 08/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2505
 start stop duration Long E 06600
 TIME : 1535 1605 030(min) Purpose code:1
 LOG : 8278 8279 1,5 TOWING DIR:180
 FDEPTH: 095 104 WIRE OUT :0450m SPEED:3,0
 BDEPTH: 0095 0104

TOTAL CATCH: 00544,7KG. CATCH/HOUR: 01089,4KG. SORTED:079,1KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Nemipterus japonicus	666,40	9658	61,1	22
Trichiurus lepturus	95,20	136	8,7	
Lagocephalus sp	85,00	34	7,8	
Argyrosomus hololepidotus	84,00	10	7,7	
Sepia sp	78,20	1360	7,1	
Platycephalus sp.	30,60	442	2,8	
Lutjanus argentimaculatus	16,00	2	1,4	
Polynemus microstoma	6,80	68	,6	
Sphyræna obtusata	6,80	68	,6	
Pennahia sp.	6,80	34	,6	
Saurida undosquamis	3,40	68	,3	
Lepidotrigla bentuviai	3,40	102	,3	
Acropoma japonicum	3,40	578	,3	
Apogon sp	3,40	612	,3	
	1089,40		99,6	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:267
 PROJECT STATION NO.:119
 PROJECT:AS
 DATE: 08/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2512
 start stop duration Long E 06556
 TIME : 1830 1900 030(min) Purpose code:1
 LOG : 8303 8305 1,5 TOWING DIR:030
 FDEPTH: 026 022 WIRE OUT :0150m SPEED:3,0
 BDEPTH: 0026 0022

TOTAL CATCH: 00324,0KG. CATCH/HOUR: 00648,0KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	200,00	0	30,8	
Pennahia sp.	90,00	954	13,8	
Megalaspis cordyla	55,80	72	8,6	
Pomadasyd hasta	54,00	36	8,3	
Ancharius brevibarbis	40,00	0	6,1	
Thryssa mystax	27,00	324	4,1	
Therapon jarbua	25,20	2	3,8	
Lactarius lactarius	23,40	252	3,6	
Pampus chilensis	21,60	36	3,3	
Otolithes ruber	18,00	36	2,7	
Torpedo marmorata	18,00	36	2,7	
PENAEIDAE	18,00	72	2,7	
Muraenesox bagio	16,00	0	2,4	
Johnius sp.	14,40	594	2,2	
GYMNURIDAE	10,00	10	1,5	
Thryssa vitrirostris	9,00	612	1,3	
DASYATIDAE	4,80	2	,7	
Sphyræna obtusata	1,80	36	,2	
Gazza minuta	,90	18	,1	
	647,90		98,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:268
 PROJECT STATION NO.:120
 PROJECT:AS
 DATE: 08/06 1984 GEAR TYPE:PT No:4 POSITION:Lat N 2516
 start stop duration Long E 06558
 TIME : 1955 2015 020(min) Purpose code:1
 LOG : 8306 8307 1,0 TOWING DIR:210
 FDEPTH: 001 001 WIRE OUT :0050m SPEED:3,0
 BDEPTH: 0018 0018

TOTAL CATCH: 00029,9KG. CATCH/HOUR: 00089,7KG. SORTED:000,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Scomberomorus commersoni	23,40	3	26,0	
Scomberomorus guttatus	18,00	18	20,0	
Lactarius lactarius	10,80	129	12,0	
Spyraena putnamiae	9,90	3	11,0	
Trichiurus lepturus	9,00	0	10,0	
CARCHARHINIDAE	6,00	3	6,6	
Sardinella melanura	4,50	39	5,0	
Scomberoides tol	4,50	3	5,0	
Thryssa dussumieri	2,70	90	3,0	
Dussumieria acuta	,45	18	,5	
Gazza minuta	,30	9	,3	
	89,55		99,4	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:269
 PROJECT STATION NO.:121
 PROJECT:AS
 DATE: 09/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2510
 start stop duration Long E 06540
 TIME : 0130 0200 030(min) Purpose code:1
 LOG : 8361 8363 1,6 TOWING DIR:035
 FDEPTH: 020 020 WIRE OUT :0100m SPEED:3,2
 BDEPTH: 0020 0020
 TOTAL CATCH: 00096,7KG. CATCH/HOUR: 00193,4KG. SORTED:024,2KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Acanthopagrus sp.	48,00	40	24,8	
Trichiurus lepturus	40,00	152	20,6	
Ancharius brevibarbis	30,40	32	15,7	
Pomadasys commersonni	20,00	8	10,3	
Cynoglossus bilineatus	13,60	0	7,0	
Megalaspis cordyla	12,00	8	6,2	
Otolithes ruber	9,60	8	4,9	
SPHYRNIDAE	9,60	8	4,9	
Platycephalus sp.	7,20	40	3,7	
Lactarius lactarius	2,40	32	1,2	
Johnius sp.	,40	24	,2	
Pomadasys stridens	,16	16	,0	
Pampus argenteus	,80	8	,4	
	194,16		99,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:270
 PROJECT STATION NO.:122
 PROJECT:AS
 DATE: 09/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2511
 start stop duration Long E 06524
 TIME : 0640 0710 030(min) Purpose code:1
 LOG : 8411 8413 1,6 TOWING DIR:040
 FDEPTH: 022 022 WIRE OUT :0150m SPEED:3,2
 BDEPTH: 0022 0022
 TOTAL CATCH: 02000,0KG. CATCH/HOUR: 04000,0KG. SORTED:018,8KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	1600,00	0	40,0	
Pennahia sp.	520,00	5200	13,0	
Ancharius brevibarbis	400,00	0	10,0	
DASYATIDAE	312,00	104	7,8	
Thryssa mystax	187,20	5616	4,6	
Johnius sp.	156,00	10608	3,9	
Pomadasys maculatus	156,00	1664	3,9	
Lactarius lactarius	124,80	416	3,1	
Otolithes ruber	114,40	312	2,8	
Pampus chilensis	62,40	104	1,5	
Ilisha sp.	52,00	104	1,3	
METAPENAEIDAE	20,80	104	,5	
Polynemus microstoma	15,60	312	,3	
Epinephelus malabaricus	11,20	2	,2	
Lagocephalus spadiceus	10,40	104	,2	
Carangoides malabaricus	10,40	104	,2	
Drepane longmanna	7,60	6	,1	
Pomadasys commersonni	6,80	2	,1	
Acanthopagrus bifasciatus	5,00	4	,1	
Thryssa dussumieri	3,74	312	,0	
Scomberoides tol	1,00	2	,0	
Pseudorhombus arsius	1,00	2	,0	
Cynoglossus bilineatus	1,00	2	,0	
MYLIOBATINAE	1,00	2	,0	
Acanthopagrus sp.	5,00	4	,1	
MISCELLANEOUS	208,00	0	5,2	
	3993,34		98,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:271
PROJECT STATION NO.:123

PROJECT:AS
DATE: 09/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2512
start stop duration Long E 06514
TIME : 0955 1015 020(min) Purpose code:1
LOG : 8441 8442 1,0 TOWING DIR:180
FDEPTH: 027 027 WIRE OUT :0150m SPEED:3,0
BDEPTH: 0027 0027

TOTAL CATCH: 02499,7KG. CATCH/HOUR: 07499,1KG. SORTED:018,7KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	4500,00	0	60,0	
Ancharius brevibarbis	1500,00	0	20,0	
Pomadasys commersonni	247,20	72	3,2	
Pennahia sp.	232,80	1905	3,1	
Pampus chilensis	176,40	141	2,3	
Acanthopagrus sp.	141,00	141	1,8	
Otolithes ruber	141,00	141	1,8	
Lactarius lactarius	70,50	213	,9	
Pterois sp	63,60	69	,8	
Muraenesox bagio	60,00	0	,8	
Torpedo marmorata	60,00	60	,8	
GYMNURIDAE	60,00	60	,8	
Polynemus sextarius	42,30	6	,5	
Pomadasys maculatus	35,40	141	,4	
Pomadasys stridens	28,20	141	,3	
Psettodes erumei	28,20	69	,3	
Lutjanus johnii	28,20	69	,3	
Lutjanus erythropterus	28,20	69	,3	
Johnius sp.	21,00	354	,2	
Gazza minuta	14,10	69	,1	
Nemipterus japonicus	10,50	69	,1	
Upeneus vittatus	10,50	69	,1	
	7499,10		98,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:273
PROJECT STATION NO.:125

PROJECT:AS
DATE: 09/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2510
start stop duration Long E 06500
TIME : 1330 1400 030(min) Purpose code:0
LOG : 8476 8478 1,4 TOWING DIR:180
FDEPTH: 019 023 WIRE OUT :0100m SPEED:2,8
BDEPTH: 0019 0023

TOTAL CATCH: 00648,7KG. CATCH/HOUR: 01297,4KG. SORTED:018,2KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	300,00	66	23,1	
Pennahia sp.	300,00	3000	23,1	
Muraenesox bagio	120,00	120	9,2	
Ancharius brevibarbis	96,00	600	7,3	
Lagocephalus spadiceus	84,00	60	6,4	
Lactarius lactarius	78,00	240	6,0	
GYMNURIDAE	60,00	60	4,6	
Argyrosomus hololepidotus	47,00	10	3,6	
Pomadasys hasta	32,00	22	2,4	
Pomadasys commersonni	31,00	12	2,3	
Johnius sp.	30,00	60	2,3	
Formio niger	24,00	10	1,8	
Pampus chilensis	22,00	22	1,6	
Drepane longimana	13,80	8	1,0	
Argyrops spinifer	12,00	4	,9	
Thryssa mystax	12,00	360	,9	
Pomadasys maculatus	12,00	120	,9	
Acanthopagrus sp.	8,00	4	,6	
CARCHARHINIDAE	6,00	2	,4	
Epinephelus diacanthus	4,00	2	,3	
Scomberoides tol	3,00	2	,2	
Megalaspis cordyla	2,60	2	,2	
	1297,40		99,1	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:272
 PROJECT:AS PROJECT STATION NO.:124
 DATE: 09/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2507
 start stop duration Long E 06446
 TIME : 1900 1915 015(min) Purpose code:1
 LOG : 8515 8515 0.8 TOWING DIR:000
 FDEPTH: 014 017 WIRE OUT :0100m SPEED:3.0
 BDEPTH: 0014 0017
 TOTAL CATCH: 01891,0KG. CATCH/HOUR: 07564,0KG. SORTED:013,9KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	1600,00	0	21,1	
Pennahia sp.	1372,40	16364	18,1	
Ancharius brevibarbis	800,00	0	10,5	
SHRIMPS	800,00	0	10,5	
Johnius sp.	422,00	11084	5,5	
Krill	400,00	0	5,2	
Muraenesox bagio	400,00	0	5,2	
Otolithes ruber	396,00	1320	5,2	
Epinephelus diacanthus. subsp	369,60	264	4,8	
Pomadasystridens	264,00	1320	3,4	
Pomadasystridens maculatus	264,00	1056	3,4	
GYMNURIDAE	240,00	160	3,1	
Carangoides malabaricus	52,80	528	,6	
Pomadasystridens commersonni	28,00	8	,3	
Diplodus sargus kotschy	26,40	264	,3	
Polynemus sextarius	26,40	264	,3	
Ilisha sp.	26,40	264	,3	
Lactarius lactarius	26,40	264	,3	
Acanthopagrus bifasciatus	24,00	20	,3	
Torpedo marmorata	16,00	8	,2	
Megalaspis cordyla	10,00	8	,1	
	7564,40		98,7	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:274
 PROJECT:AS PROJECT STATION NO.:126
 DATE: 09/06 1984 GEAR TYPE:PT No:2 POSITION:Lat N 2457
 start stop duration Long E 06429
 TIME : 2205 2235 030(min) Purpose code:1
 LOG : 8543 8544 1,0 TOWING DIR:100
 FDEPTH: 160 160 WIRE OUT :0350m SPEED:2,0
 BDEPTH: 0330 0330
 TOTAL CATCH: 00015,0KG. CATCH/HOUR: 00030,0KG. SORTED:015,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Trichiurus lepturus	20,00	30	66,6	
Salps	4,00	100	13,3	
SHRIMPS	2,00	0	6,6	
Benthoosema pterotum	3,00	0	10,0	23
LOLIGINIDAE	1,00	6	3,3	
	30,00		99,8	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:275
 PROJECT:AS PROJECT STATION NO.:127
 DATE: 10/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2504
 start stop duration Long E 06415
 TIME : 0230 0300 030(min) Purpose code:1
 LOG : 8583 8585 1,7 TOWING DIR:170
 FDEPTH: 020 023 WIRE OUT :0100m SPEED:3,4
 BDEPTH: 0020 0023
 TOTAL CATCH: 00499,2KG. CATCH/HOUR: 00998,4KG. SORTED:026,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Pennahia sp.	427,80	1860	42,8	
Ancharius brevibarbis	296,00	296	29,6	
GYMNURIDAE	67,00	2	6,7	
Thryssa mystax	44,60	1412	4,4	
Acanthopagrus sp.	44,60	74	4,4	
Torpedo marmorata	26,00	74	2,6	
Ilisha sp.	18,60	186	1,8	
Scomberoides commersonianus	17,00	4	1,7	
Trichiurus lepturus	11,20	112	1,1	
Nemipterus japonicus	11,20	74	1,1	
Lutjanus argentimaculatus	1,60	2	,1	
Thryssa vitrirostris	7,40	930	,7	
Argyrops spinifer	6,00	2	,6	
Formio niger	4,00	2	,4	
Pomadasystridens maculatus	3,80	38	,3	
Polynemus microstoma	3,80	38	,3	
Otolithes ruber	1,80	38	,1	
	992,40		98,7	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:278
 PROJECT STATION NO.:130
 PROJECT:AS
 DATE: 10/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2507
 start stop duration Long E 06320
 TIME : 2030 2100 030(min) Purpose code:1
 LOG : 8743 8745 1,5 TOWING DIR:064
 FDEPTH: 016 015 WIRE OUT :0100m SPEED:3,0
 BDEPTH: 0016 0015

TOTAL CATCH: 00437,2KG. CATCH/HOUR: 00874,4KG. SORTED:357,3KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Ancharius brevibarbis	400,00	0	45,7	
Argyrosomus hololepidotus	130,00	12	14,8	
JELLYFISH	100,00	0	11,4	
MYLIOBATINAE	60,00	4	6,8	
Muraenesox bagio	40,00	40	4,5	
Trichiurus lepturus	30,00	40	3,4	
DASYATIDAE	20,00	4	2,2	
Argyrops spinifer	15,12	6	1,7	
Epinephelus diacanthus	15,12	20	1,7	
Pomadasys commersonni	11,80	2	1,3	
Otolithes ruber	11,80	34	1,3	
Formio niger	8,40	4	,9	
Pampus chilensis	8,40	6	,9	
Pomadasys hasta	7,60	4	,8	
Acanthopagrus sp.	7,00	6	,8	
Ilisha sp.	4,00	40	,4	
Lactarius lactarius	3,40	6	,3	
Pomadasys maculatus	,68	6	,0	
Pomadasys stridens	,68	6	,0	
Polynemus sextarius	,40	4	,0	
MISCELLANEOUS	,00	0	,0	
	874,40		98,9	

R/V DR. FRIDTJOF NANSEN CATCH DATA FISHING STATION NO.:279
 PROJECT STATION NO.:131
 PROJECT:AS
 DATE: 11/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2501
 start stop duration Long E 06300
 TIME : 0115 0145 030(min) Purpose code:1
 LOG : 8787 8789 1,4 TOWING DIR:180
 FDEPTH: 023 030 WIRE OUT :0150m SPEED:2,8
 BDEPTH: 0023 0030

TOTAL CATCH: 00385,0KG. CATCH/HOUR: 00770,0KG. SORTED:035,0KG.

SPECIES	CATCH PER HOUR		% OF TOT.C.	SAMP.NO
	weight	numbers		
Pennahia sp.	176,00	3564	22,8	
Ancharius brevibarbis	94,60	66	12,2	
Polynemus sextarius	77,00	506	10,0	
Torpedo marmorata	77,00	44	10,0	
Acanthopagrus sp.	72,60	44	9,4	
Pampus chilensis	57,20	44	7,4	
Thryssa mystax	44,00	814	5,7	
Trichiurus lepturus	41,80	110	5,4	
Pomadasys hasta	35,20	22	4,5	
Carangoides malabaricus	26,40	10	3,4	
Ilisha sp.	24,20	220	3,1	
Ariomma indica	19,80	22	2,5	
Otolithes ruber	13,20	44	1,7	
Lactarius lactarius	4,40	44	,5	
Upeneus vittatus	2,20	22	,2	
Pomadasys olivaceum	2,20	22	,2	
Pomadasys maculatus	2,20	22	,2	
	770,00		99,2	

SPECIES	CATCH PER HOUR	% OF TOT. C.	SAMP. NO
Nemipterus japonicus	208.00	0	32.1
Lagoccephalus spadicus	24.00	32	3.7
Septa sp	19.20	32	2.9
Fistularia sp	19.20	16	2.9
CARCHARINIDAE	16.00	8	2.4
Ariomma indica	16.00	112	2.4
Ulua mentalis	8.00	48	1.2
Trichurus lepturus	6.40	16	.9
Muraenesox bagio	6.00	4	.9
Epinephelus diacanthus	3.20	16	.4
RHINOPTERIDAE	3.00	2	.4
Trachurus indicus	2.40	16	.3
Saurida tumbil	2.40	32	.3
Lepidotrigla benvuatai	1.60	48	.2
Saurida undosquamis	.96	48	.1

R/V DR. FRIDTJOF NANSEN CATCH DATA PROJECT:AS
 DATE: 11/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2454 Long E 06157
 start stop duration TIME : 1935 2005 030(min)
 LOG : 8945 8947 1.5 TOWING DIR:100
 FDEPTH: 094 100 WIRE OUT :0400m SPEED:3.0
 BDEPTH: 0094 0100
 TOTAL CATCH: 00323.9KG. SORTED:032.0KG.
 CATCH/HOUR: 00647.8KG. SORTED:032.0KG.

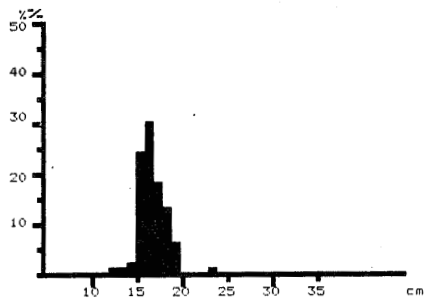
SPECIES	CATCH PER HOUR	% OF TOT. C.	SAMP. NO
JELLYFISH	10.00	0	90.9
Loligo sp	1.00	0	9.0

R/V DR. FRIDTJOF NANSEN CATCH DATA PROJECT:AS
 DATE: 11/06 1984 GEAR TYPE:PT No:4 POSITION:Lat N 2457 Long E 06204
 start stop duration TIME : 1650 1720 030(min)
 LOG : 8924 8925 1.3 TOWING DIR:000
 FDEPTH: 001 001 WIRE OUT :0050m SPEED:2.6
 BDEPTH: 0063 0046
 TOTAL CATCH: 00005.5KG. SORTED:005.5KG.
 CATCH/HOUR: 00011.0KG. SORTED:005.5KG.

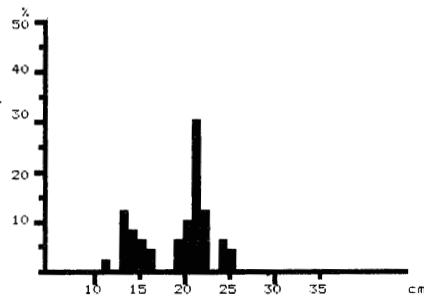
SPECIES	CATCH PER HOUR	% OF TOT. C.	SAMP. NO
Pomadasya hasta	40.40	26	26.9
Acantthopagrus sp.	25.20	18	16.8
Lactarius lactarius	14.18	200	9.4
Torpedo marmorata	14.00	6	9.3
DASYATIDAE	10.00	4	6.6
Decapterus russelli	8.30	488	5.5
Diagramma picta	8.00	2	5.3
Carangoides chrysophrys	6.00	2	4.0
Epinephelus diacanthus	3.00	6	2.0
Carangoides malabaricus	2.42	6	1.6
RHINOPTERIDAE	2.00	2	1.3
Scorpaenomorax guttatus	2.20	2	1.4
Muraenesox bagio	2.20	2	1.4
Alutera monoceros	1.82	6	1.2
Pomadasya olivaceum	1.82	18	1.2
Leiognathus sp	1.82	124	1.2
Sphyræna obtusata	1.82	24	1.2
PENAEIDAE	1.24	12	.8
Gazza minuta	1.24	40	.8
Pomadasya maculatus	1.24	12	.8
Sardinella gibbosa	.64	6	.4
Lagoccephalus spadicus	.36	6	.2

R/V DR. FRIDTJOF NANSEN CATCH DATA PROJECT:AS
 DATE: 11/06 1984 GEAR TYPE:BT No:1 POSITION:Lat N 2504 Long E 06222
 start stop duration TIME : 1105 1135 030(min)
 LOG : 8872 8874 1.5 TOWING DIR:220
 FDEPTH: 031 022 WIRE OUT :0200m SPEED:3.0
 BDEPTH: 0031 0022
 TOTAL CATCH: 00075.0KG. SORTED:061.7KG.
 CATCH/HOUR: 00150.0KG. SORTED:061.7KG.

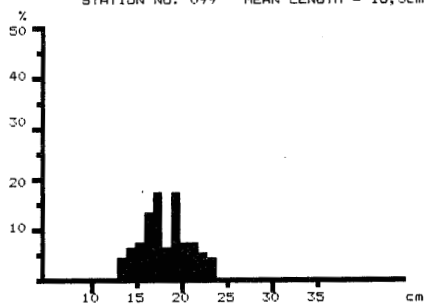
ANNEX II : Length frequency distributions
some important species.



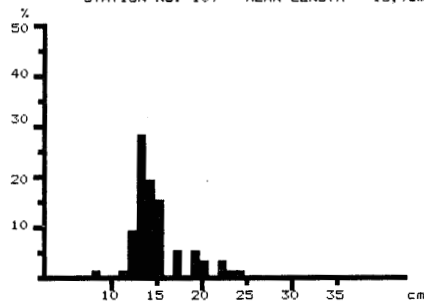
Nemipterus japonicus
STATION NO. 099 MEAN LENGTH = 16,3cm N= 81



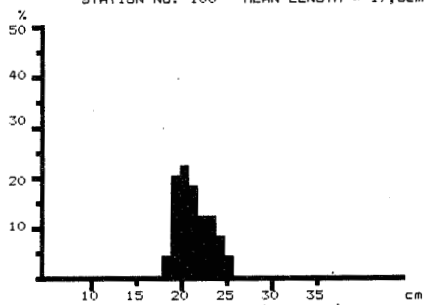
Nemipterus japonicus
STATION NO. 109 MEAN LENGTH = 18,9cm N= 50



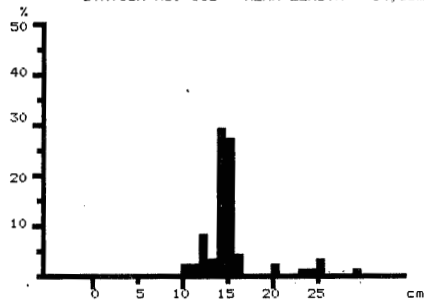
Nemipterus japonicus
STATION NO. 100 MEAN LENGTH = 17,8cm - N= 88



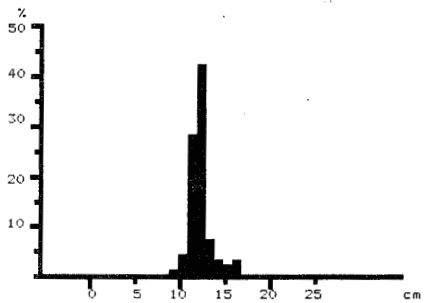
Nemipterus japonicus
STATION NO. 115 MEAN LENGTH = 14,8cm N= 52



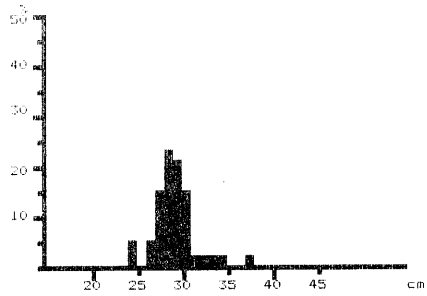
Nemipterus japonicus
STATION NO. 106 MEAN LENGTH = 21,0cm N= 50



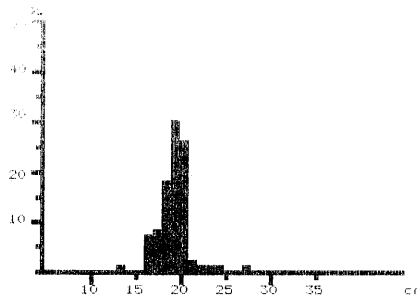
Nemipterus japonicus
STATION NO. 118 MEAN LENGTH = 15,3cm N= 101



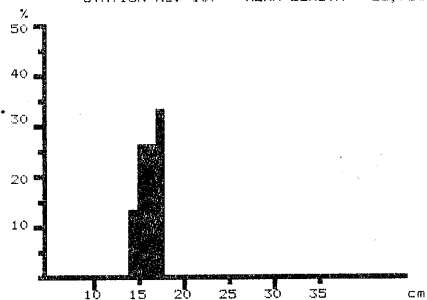
Nemipterus japonicus
STATION NO. 134 MEAN LENGTH = 12,0cm N= 114



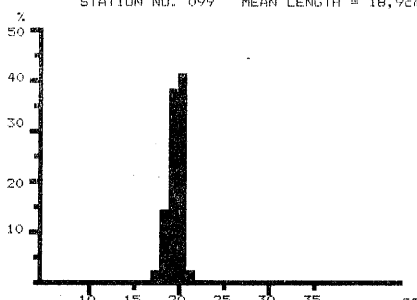
Ilisha melastoma
STATION NO. 107 MEAN LENGTH = 28,7cm N= 38



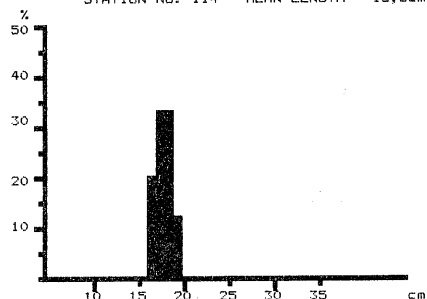
Carangoides malabaricus
STATION NO. 099 MEAN LENGTH = 18,9cm N= 82



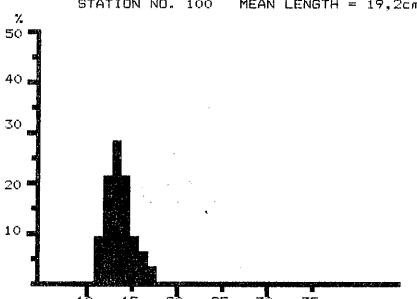
Sardinella gibbosa
STATION NO. 114 MEAN LENGTH = 15,8cm N= 15



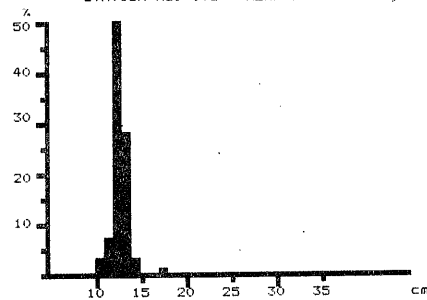
Dussumieria acuta
STATION NO. 100 MEAN LENGTH = 19,2cm N= 34



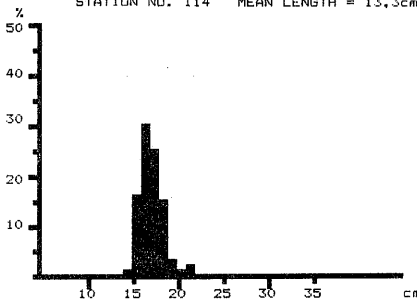
Sardinella longiceps
STATION NO. 096 MEAN LENGTH = 17,3cm N= 24



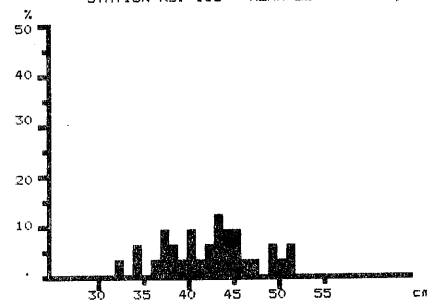
Dussumieria acuta
STATION NO. 114 MEAN LENGTH = 13,3cm N= 32



Cubiceps cubiceps
STATION NO. 136 MEAN LENGTH = 12,3cm N= 56

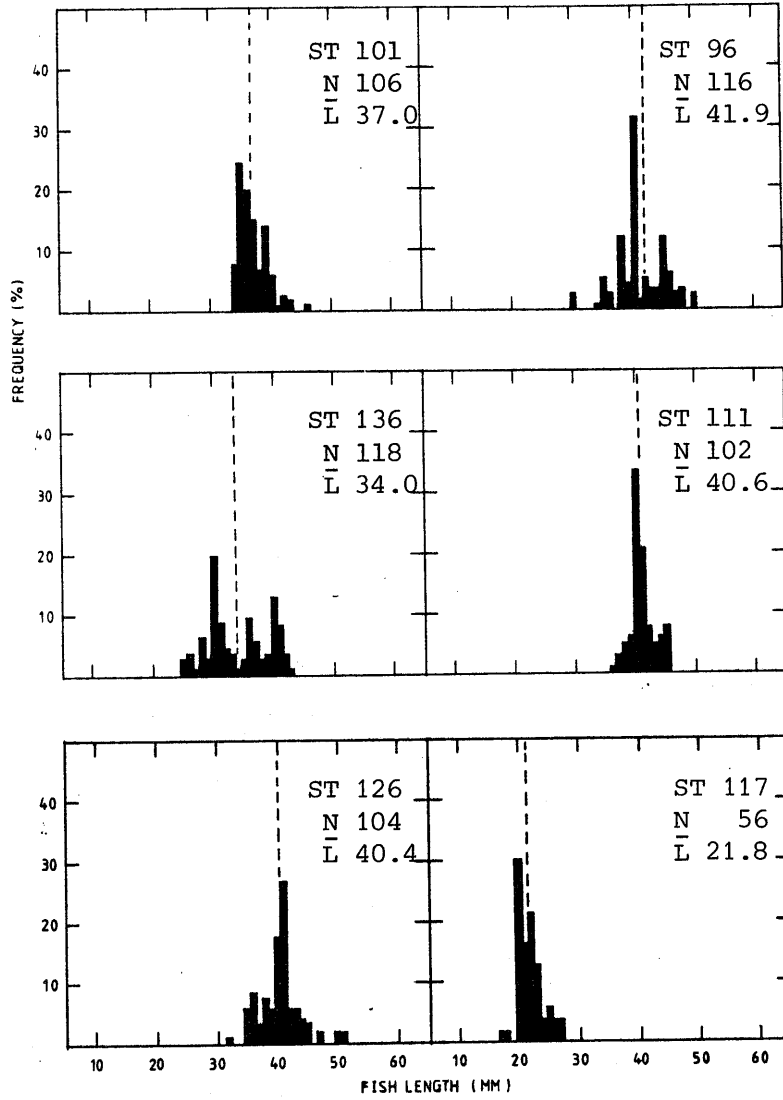


Thryssa vitirostris
STATION NO. 116 MEAN LENGTH = 16,7cm N= 101



Pomadasys hasta
STATION NO. 107 MEAN LENGTH = 42,0cm N= 33

LENGTH FREQUENCY DISTRIBUTION OF BENTHOSEMA PTEROTUM



ANNEX III

Settings and performance of acoustic instruments

Echo sounders

Frequency	38 kHz	120 kHz
Basic range	0-100/0-250+250	0-100
* Bandwidth	3.3 kHz	3.3 kHz
* Pulse length	1.0 ms	1.0 ms
TVG and gain	20 log R-20 dB	20 log R-0 dB
Recorder gain	7	5/6
* Transmitter power	4813 W	233 W
Transducer dimension (Ceramic)	8° x 8° (30 x 30 cm)	10° (Circular)
Discriminator	4-7	5-6
* Source level + voltage response	140.7 dB	114.9 dB
Measured	May 1984	August 1983

Integrators	QD/38 kHz	QM/120 kHz
* Integrator threshold(All ch.)	10 mV	10 mV
* Integrator gain	30 dB	10 dB x 10
* Depth intervals	/4-25/25-50/50-75/ /75-100/100-125/ /125-150/150-200/ /200-250/250-400/	A: 4-50 B: 50-100
Bottom channels	/ BI 6.0 m BII 0.1-0.4 m	
Bottom stop	On	On
xx) Calculated instrumental constant (C_I)	0.082	

* Parameters changed or new from previous cruises on R/V "Dr. Fridtjof Nansen" due to installation of Simrad EK-400 echo sounders and QD-integrator. Parallell integration on QD and QM ("old settings") were made for reference purposes.

Sonar ST (18 kHz) was operated in areas with schooling activity. Sonar S 109 was not used due to malfunctions.

XX) Scaling factor - 10.0(Used for mapping purposes)

ANNEX IV

Fishing gear

Bottom trawl:

High opening shrimp and fish trawl with rubber bobbins of 50 cm diameter. Headrope 41 m. Opening height during trawling approximately 6 m. Mesh size in the wings 40 mm, gradually reduced to 20 mm in the cod end.

Pelagic trawl:

Capelin trawl with four equal panels, approximately 30 x 30 m at opening. Height during trawling varying between 12 and 15 m, the larger when trawling with extra floats at the surface. Mesh size at cod end 20 mm.

The pelagic trawl is monitored with a cable connected net sonde.