UNDP/FAO PROGRAMME GLO/82/001

Reports on surveys with R/V Dr. Fridtjof Nansen

The Pelagic and Demersal Fish Resources of Oman

Final Report from Surveys 1983–84

Institute of Marine Research, Bergen

«Dr. Fridtjof Nansen»

The fishery research vessel «Dr. Fridtjof Nansen» belongs to the Norwegian Agency for Development Cooperation (NORAD). It was designed and built for scientific and exploratory investigations of fishery resources of developing countries, under a joint plan with the Fisheries Department of FAO based on a funding of operation to be shared by FAO and Norway.

Since 1975 the vessel has carried out surveys in almost all countries surrounding the Indian Ocean (except India and some of the smaller island states). Since 1981 she has also surveyed the West African continental shelf, from Morocco to Angola.

The Institute of Marine Research, Bergen is under a subcontract with NORAD responsible for the operation of the vessel, and the various research programmes were planned and conducted jointly with the relevant fisheries research organizations in the countries concerned.

Results of the previous surveys have been reported on in a number of cruise- and progress reports under each programme.

RESULTS OF THE R/V DR. FRIDTJOF NANSEN SURVEYS IN OMAN 1983-84.
Pelagic and demersal fish.

PELAGIC AND DEMERSAL FISH RESOURCES OF OMAN

RESULTS OF THE R/V DR. FRIDTJOF NANSEN SURVEYS IN OMAN 1983-84

FINAL REPORT

BY

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1.1 Background and objectives

Since the International Indian Ocean Expedition (IIOE, 1959-65), which produced abundant data on the oceanographic and biological environment, the seas off the coasts of Oman have been known to belong to the high productive areas of the world in terms of primary and secondary production.

Even though direct data on fish resources were missing, it was assumed that the area could hold considerable fish resources.

Based on the findings from IIOE, a joint programme between the Norwegian Agency for International Development (NORAD) and the Food and Agriculture Organisation of the United Nations (FAO) was set up to investigate the fish resources of the Arabian Sea. In the period from January 1975 to November 1976 the R/V "Dr. Fridtjof Nansen" carried out five coverages of the coastal waters from Pakistan to Somalia, including Oman. Based on the acoustic data collected during these surveys, the fish resources of Oman were estimated to the average level of 600 thousand tonnes for the small pelagic fish and 120 thousand tonnes for demersal fish, making it one of the most productive areas in the Indian Ocean.

Under the UNDP/FAO programme GLO/82/001 "Survey and identification of World Marine Resources" it was agreed with the Ministry of Agriculture and Fisheries of Oman, to carry out four additional surveys in Oman waters in the period April 1983 to October 1984.

The main objectives of these surveys were to update the previous findings and provide more detailed information on the state of the resources with a more intensive sampling programme than during the earlier surveys.

1.2 Plan

The level of the small pelagic resources was to be assessed by acoustic surveys, while the demersal resources were to be estimated by concurrent trawl surveys. In addition, a few hydrographical sections were to be worked out along the coast in order to evaluate the strength of the upwelling system. The acoustic data, combined with the trawl sampling programme, would also provide information on species distribution and composition of the fish community in Oman waters.

The timing of the surveys was planned as follows:

I	March 1983 (pre-monsoon conditions)
II	November-December 1983 (NE-monsoon conditions)
III	April- May 1984 (immediate pre-monsoon conditions)
IV	September 1984 (immediate post-monsoon conditions)

Due to a major engine breakdown in September 1984,the fourth survey had to be cancelled. Thus,an unfortunate gap in the study of the year cycle became inevitable.

In the survey plan, the emphasis was put on covering intensively the shelf area from Ras al Hadd southward to Salalah because of the high bioproductivity of this region. The shelf north of Ras al Hadd is narrow and with much lower level of production. This area was not covered in the first survey.

The first survey was partially overlapping with a special survey on the mesopelagic resources in the Gulf of Oman, while the second survey included an acoustic coverage of the mesopelagic fish in the same area. The results from the investigations on mesopelagic fish have been reported elsewhere (Gjøsæter and Tilseth 1983, Strømme and Tilseth 1983, Scharfe 1984) and will not be dealt with in the present report.

Preliminary cruise reports have been issued shortly after each of the three surveys which took place according to the original plan. The present report is a final summary report, based on the results from these three surveys and on knowledge from previous work.

The participating staff is listed in Annex I and information on the R/V "Dr. Fridtjof Nansen", instruments and gear used, are given in Annex II.

1.3 The survey coverages

Figures 1-3 show the cruise tracks and stations worked on the three surveys. The operational characteristics of the surveys are summarized in Table 1.
The distance between the main acoustic transects was 10 nm and the shelf was usually surveyed perpendicular to the coast from 15m out to the 200m

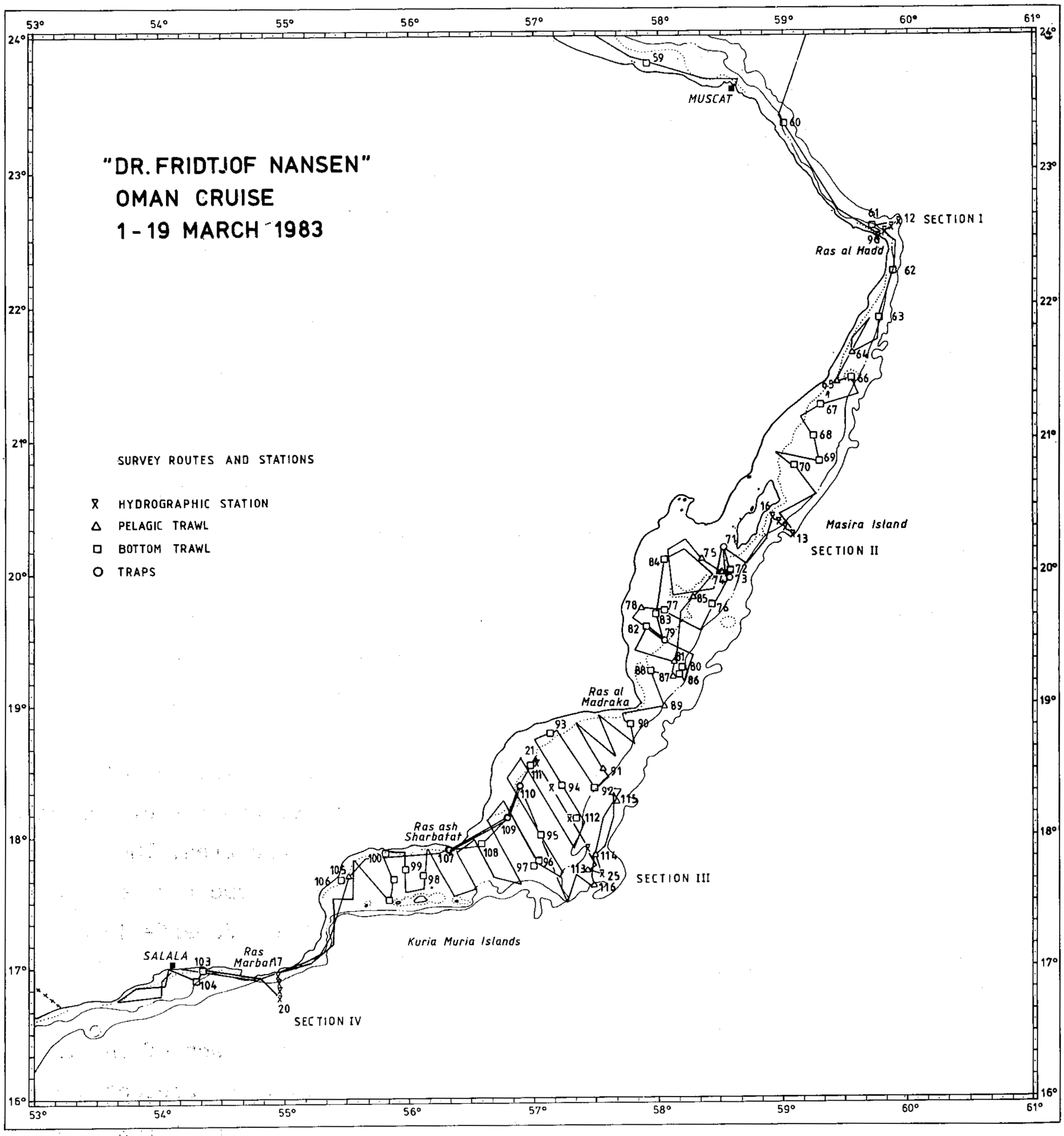


Figure 1. Cruise track and stations during the first survey, 1-19 March 1983.

depth limit, which was well into the continental slope. Areas of less than 15m depth represent a very small fraction of the shelf, and apart from a small area south-west of Masirah island, the survey grid practically covered the whole shelf.

Estimates of survey intensity are also shown in Table 1, given as ratios between nautical miles steamed and 100 nm^2 covered during the three surveys. Survey intensities for the R/V "Dr. Fridtjof Nansen" usually range

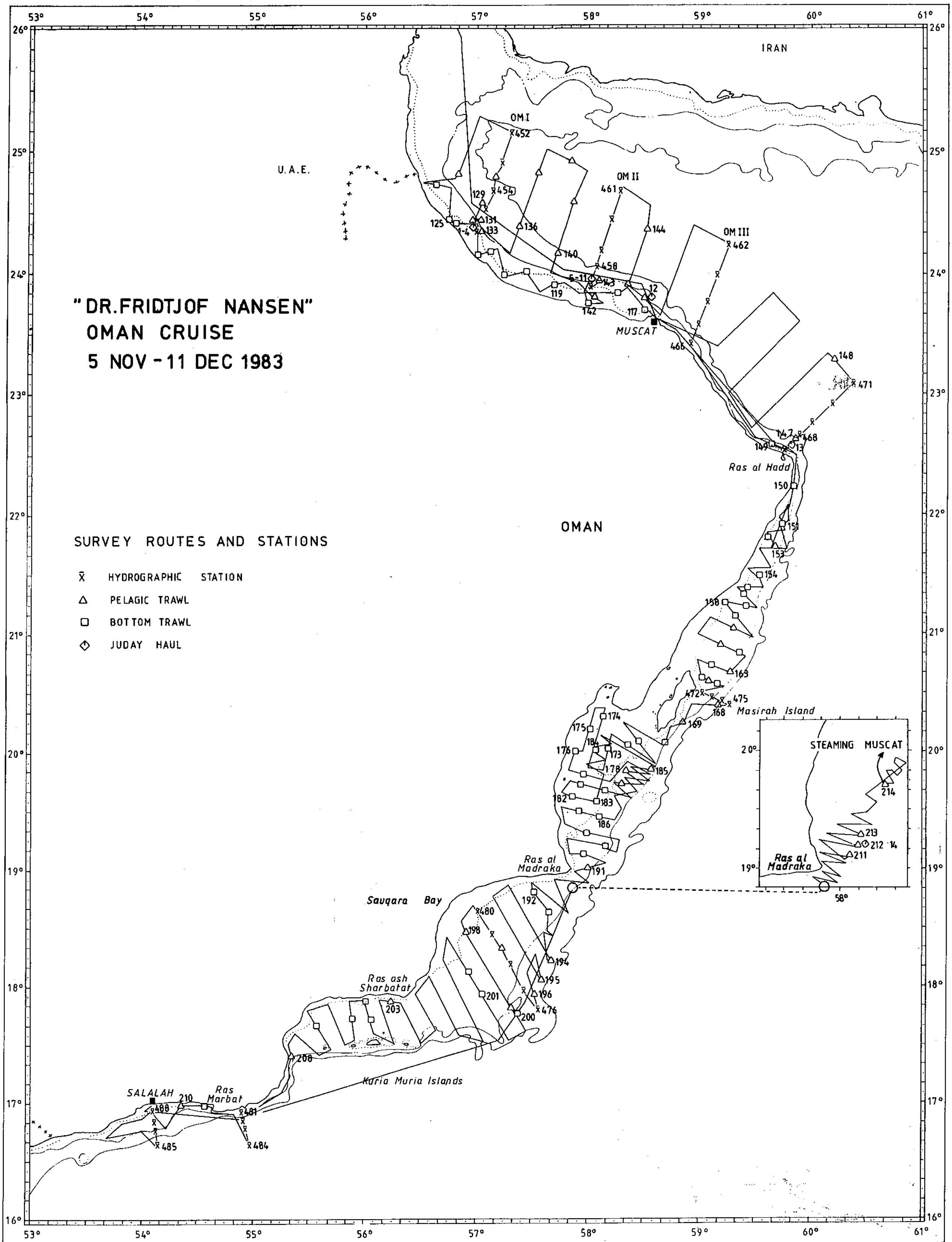


Figure 2. Cruise track and stations during the second survey, 5 November - 11 December 1883.

between 5-40 nm/nm ^{2} The latest coverages in Oman thus belong to the more intensive worked out so far.

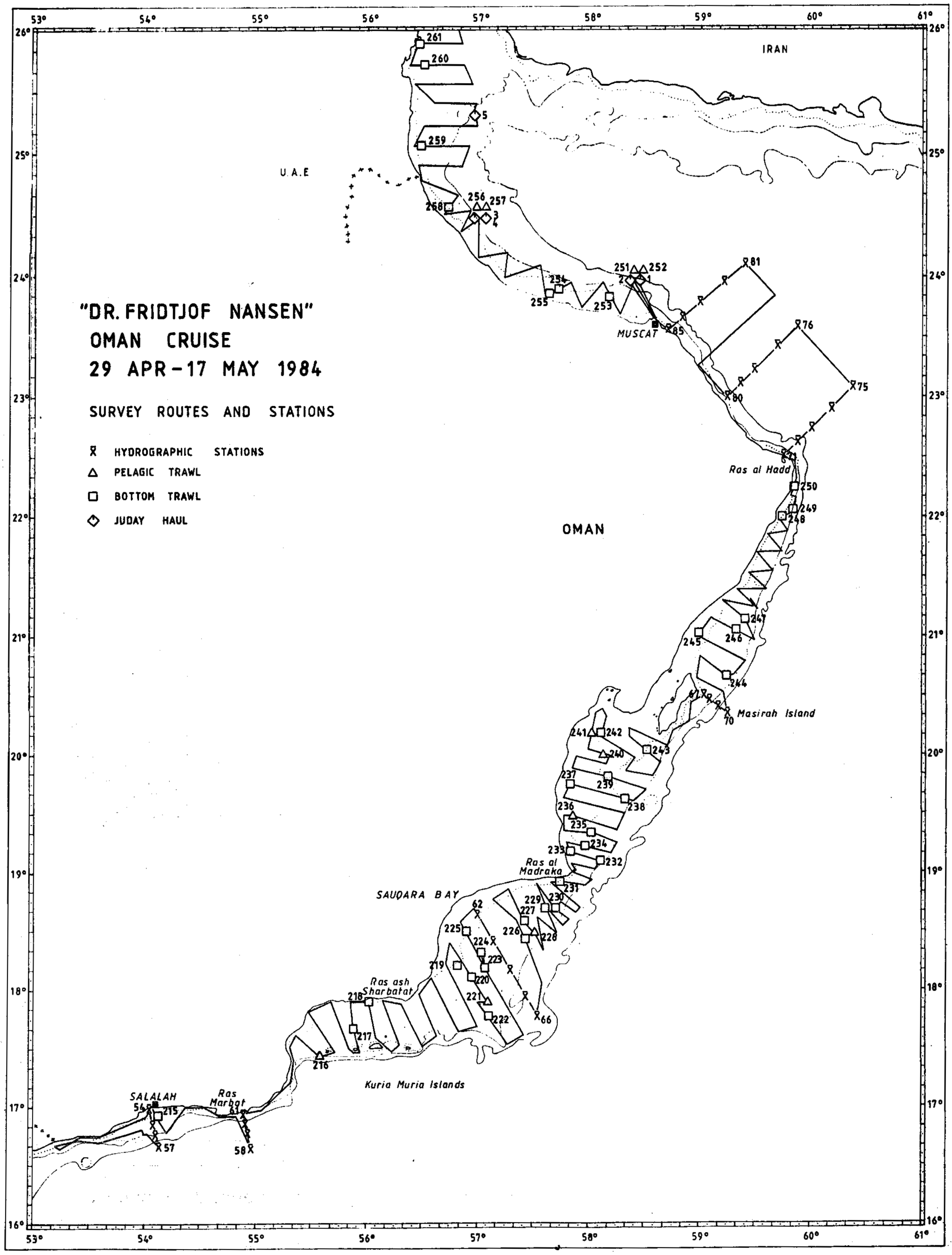


Figure 3 Cruise track and stations during the third survey, 29 April - 17 May 1984.

Table 1 Operational features of the surveys.

Survey	Dates	Region	Days at sea	Distance travelled in survey area (nm)	Survey intensity nm /100 nm^2	Number of fishing stations	Number of hydrographic stations
I	1983 1-19 March	North of Ras al Hadd	1	260	12.1	3	4
		Ras al Hadd-Masirah Isl.	2	370	15.9	9	4
		Masirah Isl.-Ras al Madraka	3	575	19.2	19	0
		Ras al Madraka-Ras Marbat	7	1390	23.2	25	9
		West of Ras Marbat	1	200	30.9	2	0
II	1983 5 Nov-11 Dec	North of Ras al Hadd	2	370	17.2	13	20
		Ras al Hadd-Masirah Isl.	3	520	22.3	20	4
		Masirah Isl.-Ras al Madraka	7	1090	36.3	26	0
		Ras al Madraka-Ras Marbat	6	1190	19.8	17	9
		West of Ras Marbat	1	190	29.7	2	4
III	1984 29 Apr-17 May	North of Ras al Hadd	2	370	17.2	4	15
		Ras al Hadd-Masirah Isl.	2	390	16.7	7	4
		Masirah-Isl. Ras al Madraka	3	515	17.2	12	0
		Ras al Madraka-Ras Marbat	5	1080	18.0	16	9
		West of Ras Marbat	1	185	28.9	1	4

Corrected for port calls, calibration stops and deep sea (mesopelagic) surveys

2. RESULTS FROM THE ACOUSTIC SURVEYS.

Acoustic surveys combined with trawling for identification of the acoustic registrations provide data on distribution, abundance and species composition of the small pelagic resources. For the surveys in Oman, it is assumed that the survey grid totally encompasses the pelagic stocks in the area. Furthermore, no serious loss of acoustic data due to poor weather conditions has occurred. However, although the frame conditions were most favourable for acoustic surveys, the estimates are still vulnerable to sampling errors and random statistic variance.

Acoustic surveys are less suitable for the evaluation of demersal species . This is mainly because the density level of the demersal stocks is much lower than the small pelagic stocks, making the relative sampling error and variance much higher. Therefore, less emphasis is put on the acoustic results concerning demersal stocks. They will be more thoroughly covered in the trawl-survey section.

2.1 The acoustic method and its limitations.

Acoustic abundance estimation of fish is based on the principle that the intensity of the echoes reflected from the fish in the sea is linearly proportional to the density of fish in situ. By an electronic instrument, called echo integrator, the echoes received over fixed intervals of the vessels survey track are made representative for indices of fish abundance within these intervals. Apart from being density dependent, these indices are also dependent of the type of species and the size of the fish. To convert these indices of density into absolute densities one has therefore to apply both species dependent and size dependent correction factors. Information on these factors is usually aquired through calibration procedures on fish in situ or from experimental setups with fish in cages. Absolute densities are converted into absolute abundances by multiplying the densities of fish by the area of the fish distribution.

In spite of its relatively simple basic principles,the acoustic method has several limitations which always should be kept in mind when interpreting the results from acoustic surveys and applying them for fishery development purposes. Of the limiting factors the main are:

a) Underrepresentation of bottom dwelling fishes. Fish that stay close to the bottom, especially rays and flat fishes, are detected as part of the bottom and will not be distinguished by the echo integrator. In addition, due to a so called dead-zone, the fish immediately off the bottom are not fully represented in the estimates. All this leads to a certain underrepresentation of demersal fish, especially those living very close to the bottom.

b) Screening effect from plankton. Plankton is also detected by the acoustic system, and it is the task of the scientist on basis of the characters of the echo-traces and composition in the trawl catches to separate the density indices into plankton and fish. Various methods are available, both special acoustic/electronic setups and procedures for reading the echo-traces. But in areas with dense concentrations of plankton combined with scattered and low densities of fish, a correct separation of the echo-indices into fish and plankton is difficult. In such cases the plankton can represent up to several hundred times the amount of fish recordings, and assessing the fish abundance has more the character of qualified guesses than estimates. This factor does not seriously affect the total estimates if it concerns small areas only, but it might be significant in those regions where low-densities are found over large areas and will thus sum up to considerable total abundances.

c) Disproportional sampling in multispecies fish communities. Ideally, when several species are present in the same area one should distribute the indices of total density recorded by the acoustic system into indices of species densities and convert these indices into absolute abundance estimates by applying species and size dependent conversion factors on the indices. When the behavioural pattern of the mixing species (i.e. schooling pattern, depth preferences, day/night behaviour etc.) are quite similar, it is an ardous, if not impossible task to separate the species on basis of the echo traces. The species composition in the trawl catches are used as assistance in splitting the total estimates down to species or species group levels. But the catchability of the trawl is highly species and size dependent, and the distribution in the catches are not directely representative of the distribution in situ. In areas where the fish biomass is mainly made up of some few dominating species or species groups, the estimation of abundance is less complicated than in cases where a multitude of species contribute to the total abundance. In the last case the estimates suffer from low precision, both on the total and on the group/ species level.

In acoustic surveys, separate estimates of pelagic and demersal fish are usually made to provide useful information to two different fisheries, the demersal and the small pelagic fishery. A total estimate is less useful. The separation into these two categories is usually relatively easy, based on the echotraces and the information from the trawl catches. The small-pelagic fish usually form distinct aggregations which can be easily separated. At times, however, the same species can be present in high abundances both in the pelagic and in the demersal community. In such cases even the separation into pelagic and demersal becomes difficult.

d) Lack of information on the acoustic properties of tropical fish species. As already mentioned, the conversion factor applied on the indices of abundance, to convert them into absolute abundances,are species dependent. Aquisition of the basic information leading to these factors is an ardous task, and for most tropical species this work is at present in its most initial phase or not really started at all. In lack of detailed information on the dominating species,one often has to apply values from similar and better known species from temperate waters. In addition, when dealing with multispecies occurrences of fish, it is almost impossible to calculate the various conversion factors to use in the estimates and a rough effective overall factor has to be applied.

All these limitation factors, when applicable, lower the precision of the acoustic estimate.

The suitability of Omani waters for acoustic surveys.

The pelagic fish community in Omani waters is made up of relatively few species mainly concentrated in high densities. The demersal community is characterized by a multitude of species. The demersal biomass has a scattered distribution, with only very few dense patches. The occurrence of plankton did not constitute a serious problem . As a general conclusion, acoustic research can easily be applied to the stocks of small pelagic fish found in Omani waters, but this method does not suite as well the demersal stocks.

2.2 The Small Pelagic Fish Resources.

The small pelagic resources in Oman waters consist mainly of *Trachurus indicus*, *Sardinella longiceps* and *Sardinella gibbosa*. Less dominating, but important, are *Stolephorus punctifer*, *Dussumieria acuta*, *Decapterus russelli*, *Rastrelliger kanagurta*, *Selar chrumenophthalmus* and *Etrumeus teres*. While the stocks of *Sardinella longiceps*, occurring in shallower waters, have been exploited by the beach-seine fishery, the presence of much bigger stocks of *Trachurus indicus*, farther offshore, has been less known.

2.2.1 Distribution and relative abundance during the 1983-84 surveys, by regions.

Figures 4-6 show the distributions of small pelagic fish from the three surveys. The distributions are given in four density levels: scattered, gathered, dense and very dense, which roughly correspond to 14- 140 tonnes/nm2, 140-280 t/nm2, 280-1400 t/nm2 and > 1400 t/nm2 respectively.

The dominant species in the different locations were identified by trawling.

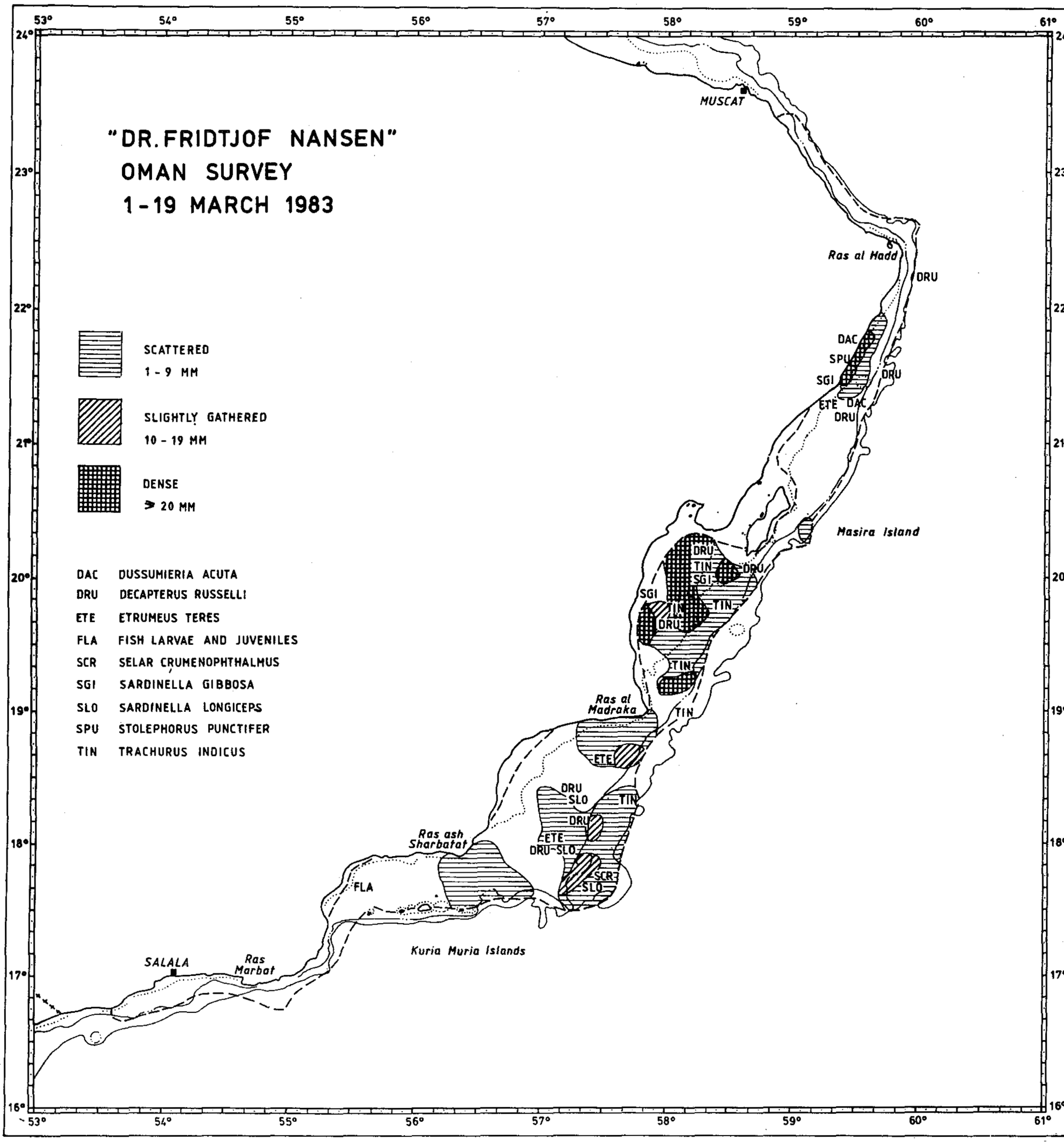


Figure 4. Distribution of small pelagic fish during the first survey, based on acoustic registrations.

A. North of Ras al Hadd

In this area, small pelagic fish is nearly absent. During the two coverages made in this region, only very few scattered occurrences were located. These were mainly of Dussumieria acuta. This species was present in 6 out

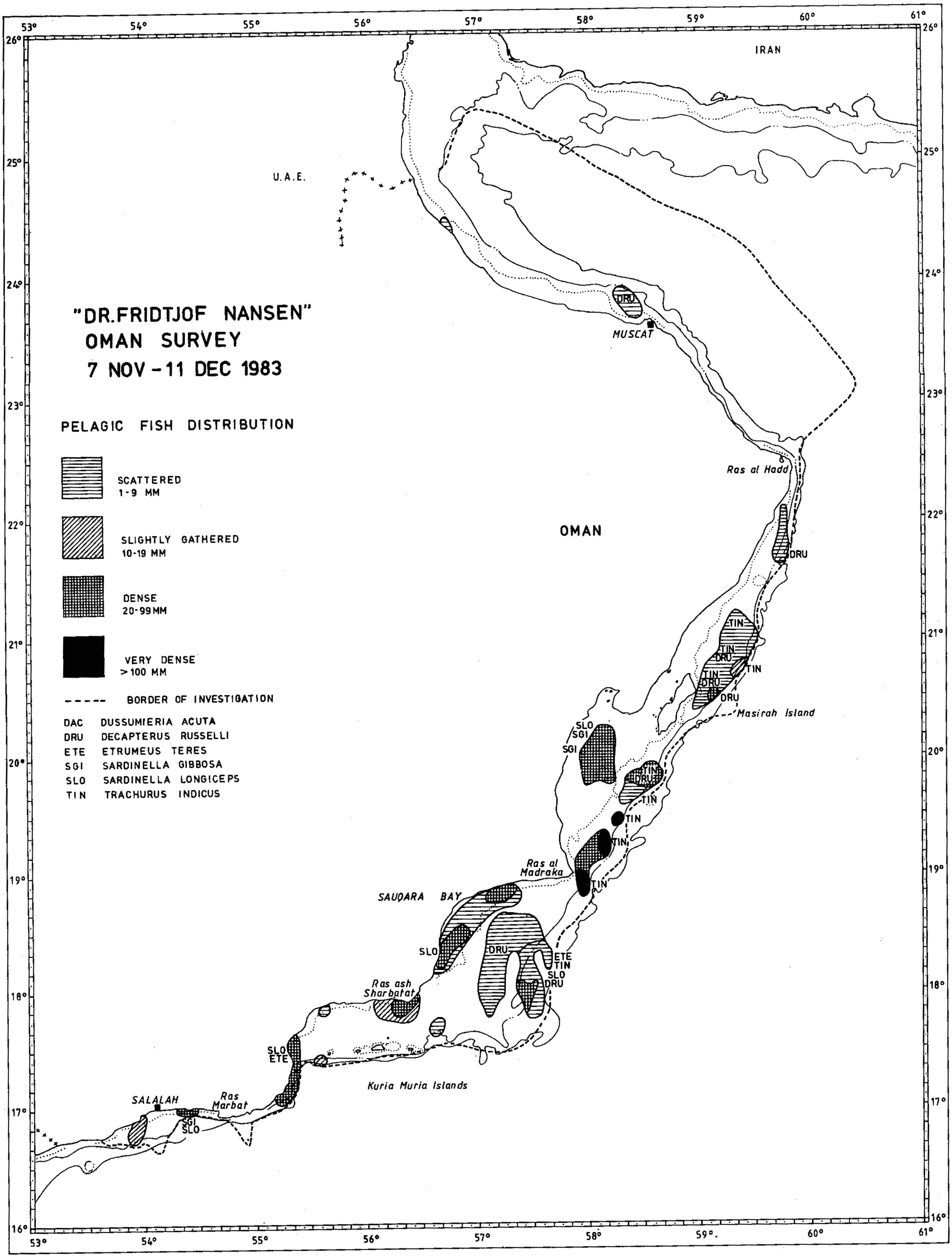


Figure 5. Distribution of small pelagic fish during the second survey, based on acoustic registrations.

of 17 hauls, with an average catch of 115 kg/hour, all hauls included, representing 20 % of all fish caught in the area.

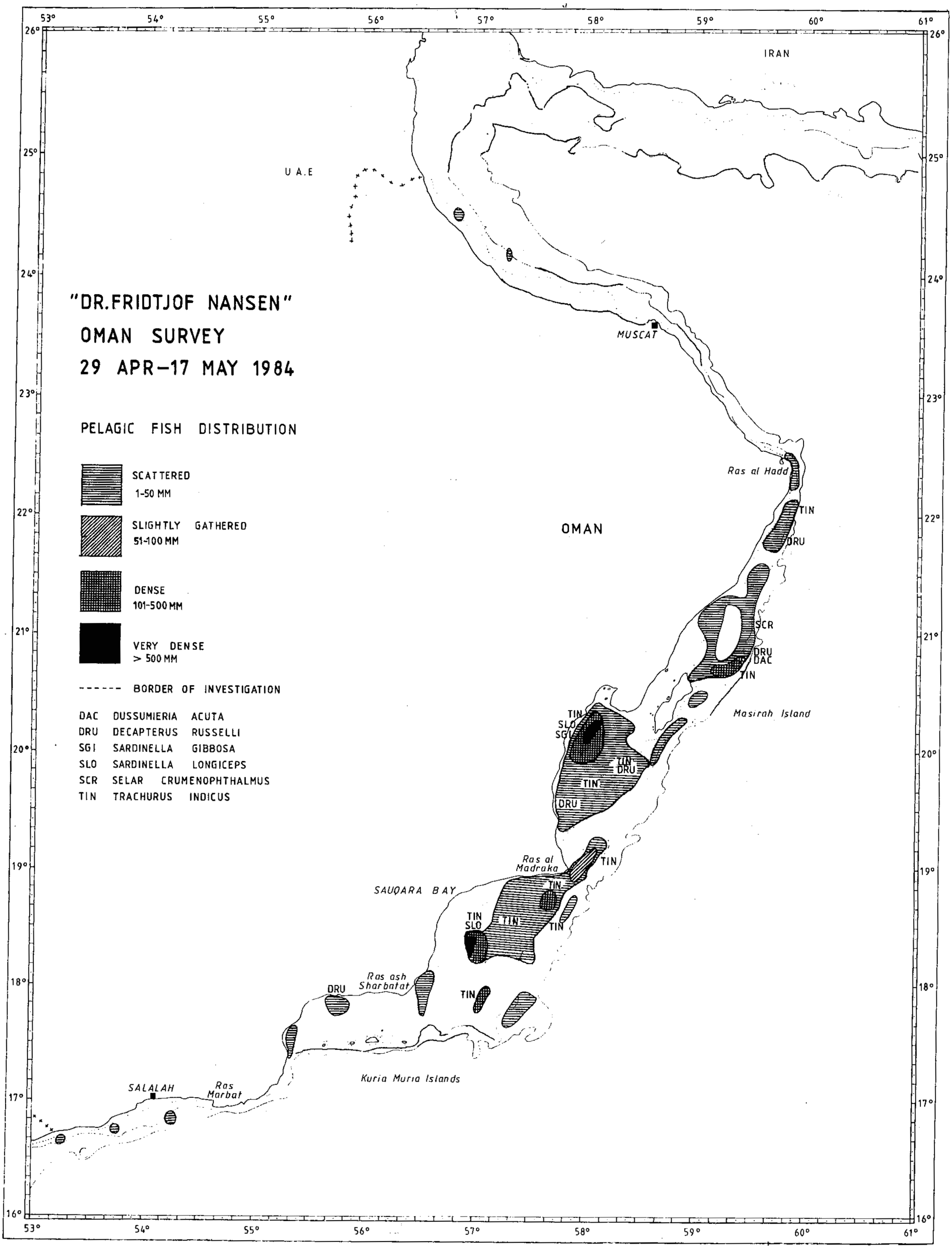


Figure 6. Distribution of small pelagic fish during the third survey, based on acoustic registrations.

B. Ras al Hadd - Masirah Island

In the Ras al Hadd - Masirah Island area, scattered to dense occurrences of small pelagic fish were found during all three coverages. The main species were Trachurus indicus, Decapterus russelli, and Sardinella gibbosa in order of importance. Also present, but in lesser quantities, were Dussumieria acuta, Stolephorus sp. and Etrumeus teres. Information on the relative abundance of the most important pelagic species in the catches is given below:

	Bottom trawl		Pelagic trawl	
Species	% of pel. fish	% of all fish	% of pel. fish	% of all fish
T. indicus	60	16	62	41
D. russelli	27	7	16	11
S. gibbosa	-	-	7	5
D. acuta	-	-	8	5
Stolephorus spp.	-	-	4	3
E. teres	-	-	3	2
Other pelagic	13	3	-	-
Total pelagic	100	26	100	67
Number of hauls	28		9	
Mean pelagic catch/hour	280		786	

The main purpose of the trawling is to identify the acoustic registrations. In addition, many of the bottom hauls are carried out in a semi random trawl survey programme. The average catches thus do not reflect the catches to be expected in a commercial fishery, but can be used as a rough indication of the level of the resources in and between regions. Expected commercial catch rates will be discussed in section 3.3.

C. Masirah Bank

From the southern tip of Masirah Island to Ras al Madraka, also referred to as the Masirah Bank region, the small pelagic resources consisted mainly of Trachurus indicus, Sardinella gibbosa, Sardinella longiceps and Decapterus russelli, with very small fractions of anchovies (Thryssa sp. and Stolephorus sp.). The pelagic fish distribution in the catches was as follows:

	Bottom trawl		Pelagic trawl	
	% of pel.	% of all	% of pel.	% of all
Trachurus indicus	93	60	93	88
Sardinella gibbosa	-	-	3	3
Sardinella longiceps	-	-	1	1
Decapterus russelli	7	4	2	2
Total pelagic	26	100	67	100
Number of hauls	34		20	
Mean pelagic catch/hour	1728 Kg		2550 Kg	

Trachurus indicus (the Indian horse mackerel) has its distributional center of gravity in this area. The greatest concentrations were found close to the shelf edge during all three surveys,with mean lengths of 16cm, 24cm and 24cm respectively. During the second survey (November), younger specimens, around 10 cm mean length were located closer to the shore, at around 20-25 m depth. These probably recruited to the main stock at the shelf edge in the following spring, thus lowering its average length.

During the two surveys in spring (survey I and III) the highest catches of Indian horse mackerel were obtained in the 90-100 m bottom depth zone. 90% of the total catch of Trachurus indicus came from this area. In November (survey II) the maximum catches were obtained in the 130-140m bottom depth zone.

Sardinella gibbosa and S. longiceps have their centre of distribution on the Masirah Bank,in the shallow waters between 20 and 30 m bottom depth, S. gibbosa also occurring in shallower waters, to 14 m bottom depth. The mean length from the samples varies between 14 and 17 cm total length (TL), with no clear seasonal variation. The highest catches were obtained where the two species co-occurred, S. gibbosa being slightly dominating.

Decapterus russelli 'is distributed from 14 to 100 m bottom depth. The highest catches occurred from 20 to 50 m bottom during the first two surveys, while during the third survey this species seemed to concentrate between 75 and 100 m depth. The mean lenth from the samples collected in the course of the three surveys is 17 cm TL.

D. Sauquara region

The region from Ras al Madraka to Ras Marbat, including Sauquara Bank and the shelf north of Kuria Muria Islands, is in this report referred to as the Sauquara region. The small pelagic resources in this area consisted of Trachurus indicus, Sardinella longiceps, Etrumeus teres and Decapterus russelli. The pelagic fish distribution in the catches is given below:

	Bottom trawl		Pelagic trawl	
	% of pel	% of all	% of pel	% of all
Trachurus indicus	73	58	12	6
Sardinella longiceps	16	13	75	40
Decapterus russelli	11	9	-	-
Etrumeus teres	-	-	13	7
Total pelagic	100	80	100	53

Trachurus indicus was located in scattered occurrences in a band off the shelf edge (150 m bottom depth) and slightly outwards. During the second coverage, the Indian horse mackerel was almost absent, the few catches below 3 kg/hour. During the third survey (May 1984), good catches of this species were obtained from the 50-80 m bottom depth zone. The mean lengths found in this region are the same as in the Masirah Bank.

Sardinella longiceps was located from about 20 m bottom depth to beyond the continental slope, with highest concentrations in bottom depths less than 60 m. Scattered, off-shelf occurrences were observed during the first two surveys and consisted of larger fish (range 20-24 cm) than in the shallow waters (range 14-17 cm). During the third survey, all sardinella caught was within the 20-24 cm size range.

Decapterus russelli was located from 70 m bottom depth to beyond the shelf edge. Best catches were obtained between 70 and 120 m bottom depth during the first two surveys. During the third survey, this species was virtually absent, with few and small catches close to the shore. Size ranged between 12 and 19 cm TL during the first survey, and between 19 and 30 during the second survey.

Etrumeus teres was caught from 20 m bottom depth to beyond the shelf edge (pelagic). Young specimens in the 7-14 cm range were found in the shallow waters, while from 70 m and outwards the range was 15-20 cm. The catches were not substantial and of the 8 catches only one exceeded 100 kg/hour. The off-shelf catches were on scattered registrations and were less than 3 kg/hour.

A special phenomenon in this area is the co-occurrence of Trachurus indicus, Sardinella longiceps and Etrumeus teres in the pelagic waters immediately off the shelf edge. These species formed a scattered longitudinal band of registrations along the continental slope during the first two surveys. This indicates that the hydrographic conditions of this area could favour plankton production above the average. It would be interesting to investigate, in the course of future research, the migration of this fish in relation to the strength of the upwelling. Our data are unfortunately too limited to allow such a study.

E. Salalah region

The region from Ras Marbat and eastward to the PDR-Yemen border, is referred to, in this report, as the Salalah region. This area lies in the outskirts of the upwelling zone and this is reflected both in the lower primary production as well as in the lower fish densities. Only 5 trawl hauls were carried out in this region and small pelagic species were caught only once. Among these, Sardinella gibbosa, S. longiceps, Trachurus indicus and Decapterus russelli. Only S. gibbosa exceeded 100 kg/hour. The area is thus not considered as promising for commercial pelagic fisheries after our investigations.

2.2.2 Biomass Estimates - Small Pelagic Fish

Table 2 shows the provisional biomass estimates of small pelagic fish from the survey reports. Through a second critical evaluation of the source data, some of the biomass figures have been revised. This mainly because the average fish size, in areas of very high fish densities, was found to be lower than the average for the region. As the calibration coefficient applied in the biomass calculations is fish-size dependent, this affects the estimates. Furthermore, the size of the areas represented by high densities have been slightly modified. Table 3 shows the revised and final estimates of the small pelagic fish in Oman waters. The same results are visualized in Figure 7.

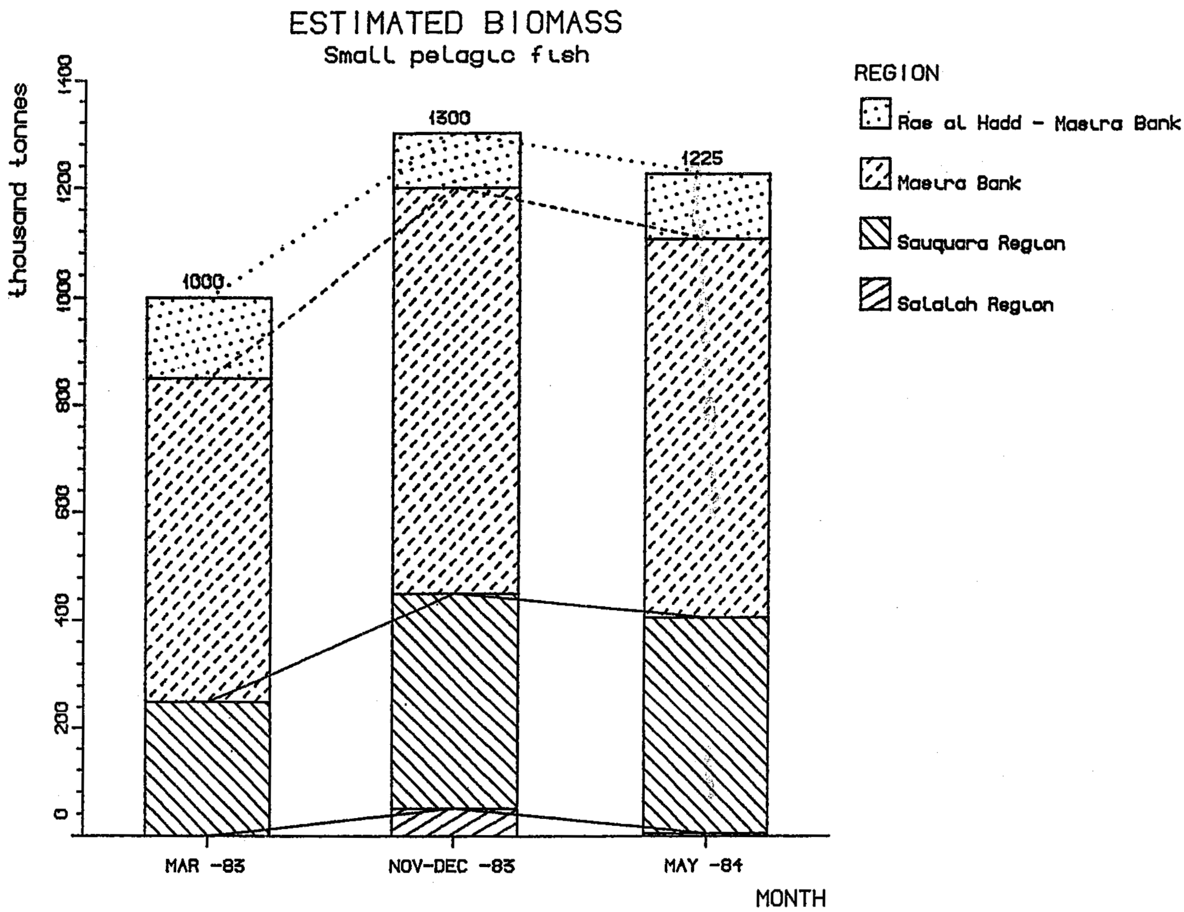


Figure 7. The estimates of small pelagic fish, and their regional distribution.

The estimates of the total biomass of small pelagic fish from the three surveys ranges between 1 and 1.3 million tonnes (av. 1.2 million tonnes). The first survey was carried out with analog integrators with some saturation problems on very high fish densities. This does not apply for the second and third surveys where new digital integrators were used. Probably,the lower density levels recorded during the first survey can be explained with the loss of information due to the above mentioned saturation problem of the analog integrator. Therefore, we do not consider the difference in total biomass obtained from the surveys as evidence of

Table 2 Provisional biomass estimates from the survey reports. Small pelagic fish. Rounded figures, thousand tonnes.

Region	SURVEY I Mar-Apr '83	SURVEY II Nov-Dec '83	SURVEY III May '84
A North of Ras al Hadd	N.S.	10	0
B Ras al Hadd - Masira	150	100	75
C Masira Bank	600	850	1100
D Sauquara & Kuria Muria Banks	250	400	500
E Salalah region	0	50	5
Total	1000	1400	1680

NS = not surveyed

any real difference. We consider 1.2 million tonnes as a reasonable figure to reflect the size of the standing stock of small pelagic fish in Oman waters, practically all of which is found between Ras al Hadd and Ras al Marbat. The main resources are found on the Masirah Bank, average 600 thousand tonnes and 60% of the total. Of the remaining 40 %, 10% is allocated to the region Ras al Hadd - Masirah and 30% to the Sauquara Bank. The seasonal fluctuations in biomass within regions are mainly caused by migration between regions. The Ras al Hadd - Masirah Island region is relatively stable in terms of fish resources. Some migration of Trachurus indicus between this region and Masirah bank can be inferred from the catch records. The main regional fluctuations are caused by migration of Trachurus trecae and, partly, Sardinella gibbosa and S. longiceps between Masirah and Sauquara Bank.

The estimated average density of the standing stock of small pelagic fish is shown in Table 4. The Masirah Bank (A) holds 225 tonnes of fish per nm 2 on an average yearly basis, while in the nearby regions (B and D) this drops to 55-60 tonnes/nm^2. The main upwelling in Oman takes place between Ras al Hadd and Ras al Madraka , and the average density for this super-region is 100 tonnes/nm2.

Table 3 Revised biomass estimates. Small pelagic fish. Rounded figures, thousand tonnes

Region	SURVEY I Mar-Apr '83	SURVEY II Nov-Dec '83	SURVEY III May '84	AVERAGE	AVERAGE REGIONAL DISTR. (%)	MAXIMUM FLUCTUATION (%)
A North of Ras al Hadd	N.S.	10	0	0	0	0
B Ras al Hadd - Masira	150	100	120	125	10	50
C Masira Bank	600	750	700	680	60	25
D Sauquara & Kuria Muria Banks	250	400	400	350	30	60
E Salalah region	0	50	5	-	-	-
Total	1000	1300	1225	1175	100	30

NS = not surveyed

Table 4 Average small pelagic fish densities in the various regions. (tonnes/nm^2)

A North of Ras al Hadd	0
B Ras al Hadd - Masira	55
C Masira Bank	225
D Sauquara & Kuria Muria Banks	60
E Salalah region	0
B-D Ras al Hadd - Ras al Marbat	100

The following list gives, for comparison, densities from other regions surveyed by the R/V Dr. F. Nansen with the same method:

t/nm^2		
100 - 110	:	West Sahara, Senegal, Guinea
90	:	Northeast Somalia
75	:	Mauritania
60 - 80	:	Ivory Coast, Ghana
30 - 40	:	Tanzania, Mozambique
25	:	Burma, Bangladesh
18	:	Kenya, Thailand, Malaysia

The shelf south of Ras al Hadd, and especially the Masirah Bank, thus stands out as one of the worlds richest in terms of fish densities. However, fish densities do not directly reflect the production level and expected yield from an area. Therefore, comparison between the above areas and Oman should take into account that most of those areas are heavily exploited while Oman waters are virtually virgin.

As an example of high densities of fish that can be met in Oman waters we will refer to an intensive mini-survey carried out on an extreme dense aggregation of Trachurus indicus at the shelf edge of Masirah Bank at the end of the second survey. The aggregation formed a band along the shelf edge, 60nm long and about 4 nm wide. The estimated abundance of this aggregation was 205 thousand tonnes, with the extremely high average density of 3100 tonnes per nm^2.

The density distribution pattern of the small pelagic fish is shown in Table 5. Only about 15 to 25 % of the total is found in "scattered" to "slightly gathered" concentrations. Consequently, 75 to 85 % is located in "dense" to " very dense" aggregations, very vulnerable to commercial

Table 5 Distribution of biomass on density levels (% of total biomass)

Density	Equivalent range (t/nm^2)	SURVEY I	SURVEY II	SURVEY III	AVERAGE
Scattered	3-150	20	14	22	18
Slightly gathered	150-300	3	3	5	4
Dense	300-1500	64	54	28	49
Very dense	>1500	13	29	45	29

fishing.

Table 6 shows the tentative species distribution in the aggregations of small pelagic fish, by region and by survey. Trachurus indicus dominates the Masirah Bank during all surveys, the Ras al Hadd - Masirah Island region during the two last surveys and the Sauquara Bank during the last survey only. Second in importance is Decapterus russelli, closely followed by Sardinella gibbosa and S. longiceps. As average for all regions and all surveys the analysis indicates that Trachurus indicus makes up 48% of the biomass, Decapteraus russelli 24%, Sardinella longiceps 14% and Sardinella gibbosa 11%.

Table 6 Tentative species composition in dense and very dense registrations of small pelagic fish, expressed as % of the estimated biomass

	B				C				D				B - D
	Ras al Hadd-Masira				Masira Bank				Sauquara & Kuria Muria Banks				Ras al Hadd - Ras al Marbat
Species / Survey >	I	II	III	Av.	I	II	III	Av.	I	II	III	Av.	Av.
Trachurus indicus	0	75	70	48	50	60	50	53	20	10	85	38	48
Sardinella gibbosa	25	0	0	8	20	15	15	17	0	5	0	2	11
Sardinella longiceps	5	0	0	2	10	10	15	12	25	35	10	23	14
Decapterus russelli	25	25	30	27	20	15	15	17	55	50	5	37	24
Others	45	0	0	15	0	0	5	2	0	0	0	0	3

* Dussumieria acuta, Etrumeus teres etc.

2.2.3 Results from Earlier Surveys Dr. Fridtjof Nansen.

The R.V. "Dr. Fridtjof Nansen" has carried out 5 acoustic surveys in Oman waters in the period 1975-76. The biomass estimates of small pelagic fish for the super-region Ras al Hadd to Ras al Marbat (B-D) were as follows (thousand tonnes):

Cruise 1 and 2	Apr-May ´75	:	80
Cruise 3	Oct-Nov ´75	:	820
Cruise 4	Feb-Mar ´76	:	570
Cruise 5	May-Jun ´76	:	480
Cruise 6	Aug-Sep ´76	:	530

The mean from all surveys is 500 thousand tonnes and the mean of the four most consistent estimates is 600 thousand tonnes.

The results from the Arabian Sea Survey Programme (1975-76) suffer from limitations due to the very extensive programme which envisaged a survey of the whole region from Pakistan to Somalia in five coverages. Sampling intensity, both acoustically and in terms of fishing stations, had to be sacrified to the wide area coverage. The average sampling intensity during the five coverages in Oman was 11.8 nm/100nm, compared to the 20.2 $nm/100nm^2$ for the 1983-83 surveys. If we consider the Masirah Bank area, the most important for Trachurus indicus, the differences become even greater: 10 nm/100 nm^2, to the recent 24.2 $nm/100nm^2$ average intensity from the latest surveys.

Due to the open sampling track in the 1975-76 surveys, which was laid out before the real importance of the region in terms of fishery resources was known, it is possible that aggregations which are limited in extent, but strong in density, have been missed by the sampling track. This is especially applicable for the stocks of Trachurus indicus in Oman, as this species frequently forms such schools in the area. The biomass in the Masirah Bank area may therefore have been underestimated during the 1975-76 surveys.

However, it is striking that no major catches of Trachurus indicus were made in the Masirah Bank area in 1975-76. Of the 22 fishing stations carried out in the Masirah bank during those surveys, Trachurus indicus was present in 5 hauls and only in very small fractions of the total catches. These findings indicate that a major ecological shift might have occurred in the region between the periods 1975-76 and 1983-84. Unfortunately, available data cannot form the basis for the analysis of the above hypothesis. If major concentrations have not consistently escaped detection due to the relatively open sampling track in 1975-76, our data point to a major increase in the total biomass and to the relative importance of Trachurus indicus in the area. If so, considerable fluctuations in total biomass in the region might also take place in the future. Until more data become available, we consider this as the most reasonable and safe conclusion.

2.2.4 Estimates of Yield of the Small Pelagic Resources.

Estimates of the maximum sustainable yield (MSY) have usually been calculated according to the simple formula:

$$MSY = 1/2\ MB_0$$

where M is the natural mortality and B_0 is the unexploited virgin biomass. Recent investigations have shown that in addition to the natural mortality the age at recruitment to the fishery, the age at first maturity and the fish's growth rate are important parameters when assessing the MSY. The equation above can lead to serious overestimates if a species is long-lived, or recruits early to the fishery (Beddington & Cooke, 1983). For a first assessment of the yield from the resources in Oman waters we will use the functions developed by Beddington & Cooke. Little is known about the biology of small pelagic fishes in Oman waters and the parameters for the functions have to be taken from neighbouring regions, from similar species or just general assumptions have to be made. In lack of precise data the assessed MSY is rough.

Investigations from other areas of the Indian Ocean provide the following K values (Pauly, 1978):

Sardinella longiceps	0.4 - 0.6
Sardinella gibbosa	1.1
Decapterus russelli	1.1

K values for *Trachurus indicus* are not found in the literature, but rough calculations from the changes in modal length observed during the survey period, indicate a K value of about 0.7 in the SW monsoon and immediate post monsoon periods, dropping to 0.3 during the NE monsoon and up to the arrival of the new SW monsoon. The same growth pattern is believed to apply to the other pelagic species: high growth in the period May-November and low growth in the period November-May. A rough, all-year growth coefficient for all pelagic species could therefore be 0.5. The small pelagic species in Oman waters are relatively short lived , with a longevity of about 4-5 years. The natural mortality coefficient for fishes of such a life span is usually within the range 0.8 to 1.0 in unexploited populations (Hoenig, 1984). Most of the young fish seems to recruit to the parent stock within one year. For a first rough assessment of the yield we therefore use M = 0.8, K = 0.5 and recruitment age = 1 year for the pelagic stocks in Oman. Applying this to the functions developed by Beddington and Cooke we come to an exploitation rate of 23% of the initial total biomass which is also, well below the critical value for recruitment (Beddington and Cooke, 1983). Applying this exploitation level to our biomass estimates, we obtain the following yield-estimates (thousand tonnes):

Total yield	270
By species:	
Trachurus indicus	130
Sardinella gibbosa	30
Sardinella longiceps	40
Decapterus russelli	60
Others	10

The yield by species is obtained by using data in Table 3, and should only be considered as tentative.

The above yields are based on the production level of 1983-84 and are valid only if the stocks maintain such production level. Variations in the ecological system may induce long term changes in the fish production and species composition. As already mentioned, the relatively low estimates from the 1975-76 surveys and the minor importance of Trachurus indicus might coincide with a low level in the natural fluctuations in the fish community. It is therefore of vital importance that the level of the pelagic stocks is monitored when under exploitation to ensure that the fisheries are regulated in accordance with the long-term natural fluctuations in the bioproductivity of the stocks. Given the production level of 1983-84, the above total yield should be within the safe limit to ensure recruitment.

2.2.5 Nursery Areas

Masirah Bank seems to be the main nursery area on the basis of the length distributions. The shallow waters of less than 50m bottom depth were found to be an important nursery ground for immature Trachurus indicus, Sardinella gibbosa and S. longiceps. This area is probably of vital importance for the regeneration of the small pelagic fish stocks, and should not been given access to by any industrial fisheries. For the same reason, the small scale artisanal beach-seine fisheries in the Masirah region should preferably be regulated in order to avoid fishing on the immature parts of the stock. Juvenile specimens of the small pelagic fish were also caught in the very shallow waters between Ras al Madrak and Salalah.

2.3. Acoustic estimates of the demersal resources during the 1983-84 surveys

The estimates of the demersal stocks, based on the information from the acoustic system, are given in Table 7, and Figures 8-10 show the distribution of demersal fish from the registrations by the same system.

In general, acoustic methods tend to underestimate the abundance of the demersal resources.

Table 7 Acoustic biomass estimates of the demersal resources. Rounded figures,thousand tonnes.

	SURVEY I Mar-Apr '83	SURVEY II Nov-Dec '83	SURVEY III May '84
A North of Ras al Hadd	N.S.	15	10
B Ras al Hadd - Masira	50	10	5
C Masira Bank	25	10	10
D Sauquara & Kuria Muria Banks	160	25	40
E Salalah region	0	0	5
Total	235	60	70

N.S.= Not surveyed

In the course of the latest Oman surveys, the demersal resources were acoustically registrated only in scattered and very scattered distributions. At such levels,the accuracy of the estimates is generally low, as registrations easily fall below the threshold of the system. The precision also suffers of bad resolution of the system at low densities. As a consequence of these drawbacks, less emphasis has been put on the acoustic estimates concerning demersal resources, while trawl data have been used as the prevailing source for these biomass estimates

3. RESULTS FROM THE TRAWL SURVEYS 1983-84

3.1 The estimates of the demersal resources

Biomass estimates from the trawl survey programme are shown in Table 8. These estimates concern demersal fish only, as small pelagic fish has been

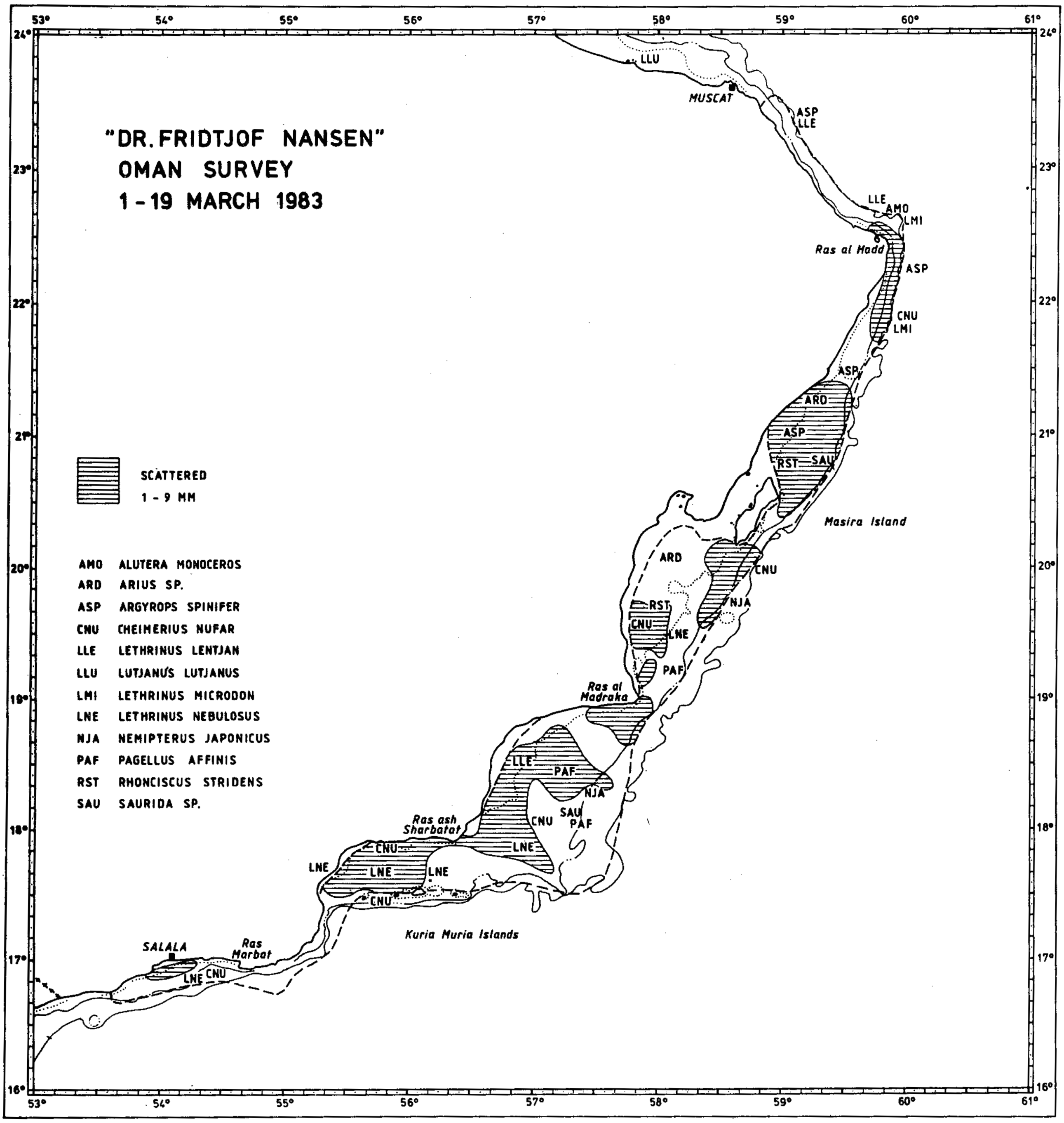


Figure 8. The distribution of demersal fish during the first survey based on registrations by the acoustic system.

excluded from the calculations when present in the catches. The estimates from the first surveys, given in the cruise reports, have been revised, as some night hauls had erroneously been included in the calculations.

The precision of the regional estimates from single surveys is low as few hauls have been carried out in each region in the course of each survey, which gives a high standard error in the data. A random very high or low catch can severely bias the estimates when the hauls are few. This effect is smaller in the total estimates as negative and positive sampling errors tend to balance with a higher number of samples. Therefore total estimates give higher precision and are thus more reliable than the regional ones.

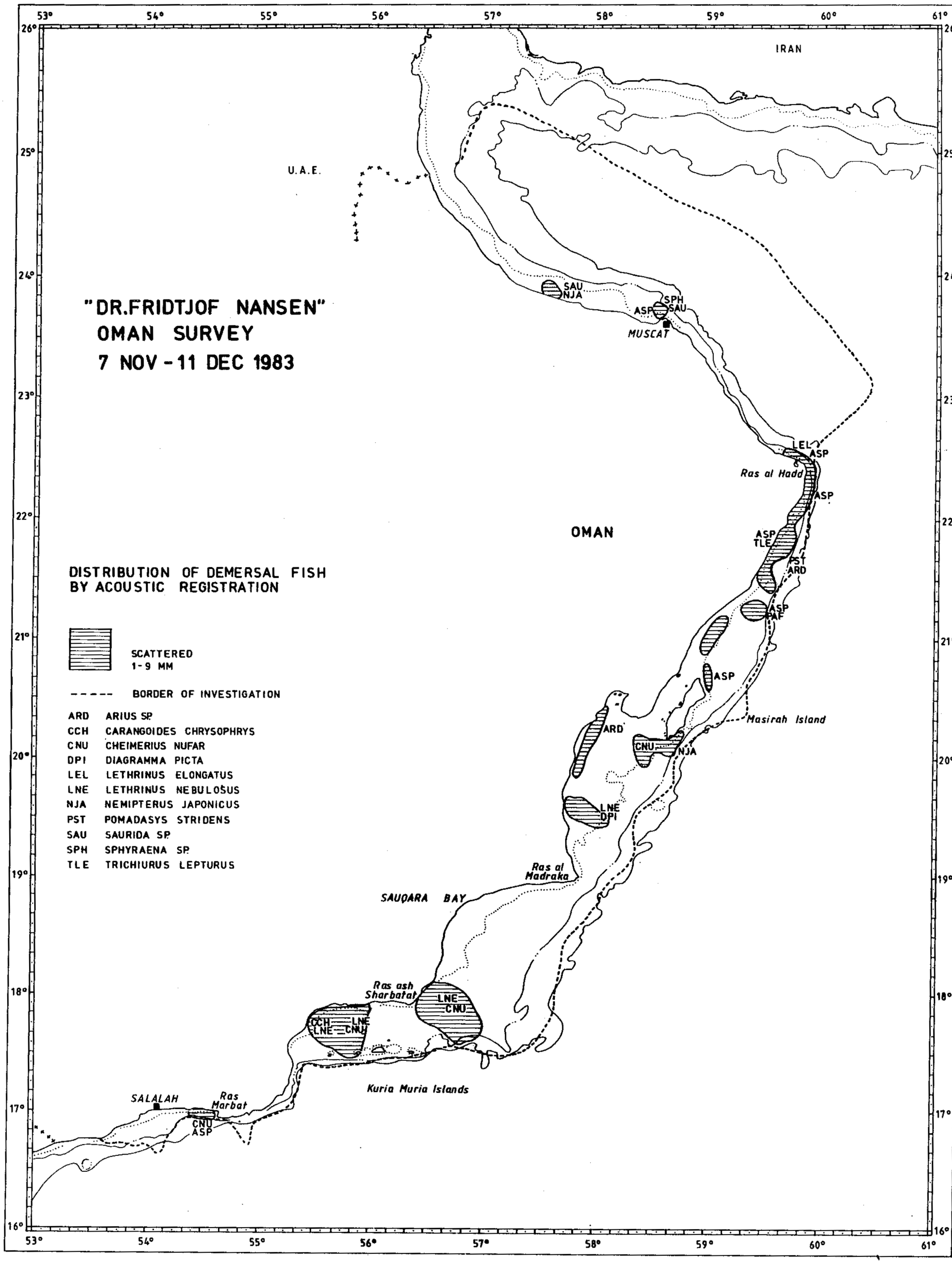


Figure 9. The distribution of demersal fish during the second survey based on registrations by the acoustic system.

The total estimates from the two spring surveys are corresponding, both 335 thousand tonnes, while the Nov-Dec survey gives an estimate about 20% lower, i.e. 260 thousand tonnes. As discussed below, this drop could indicate more a sampling error than an actual decline in the level of the

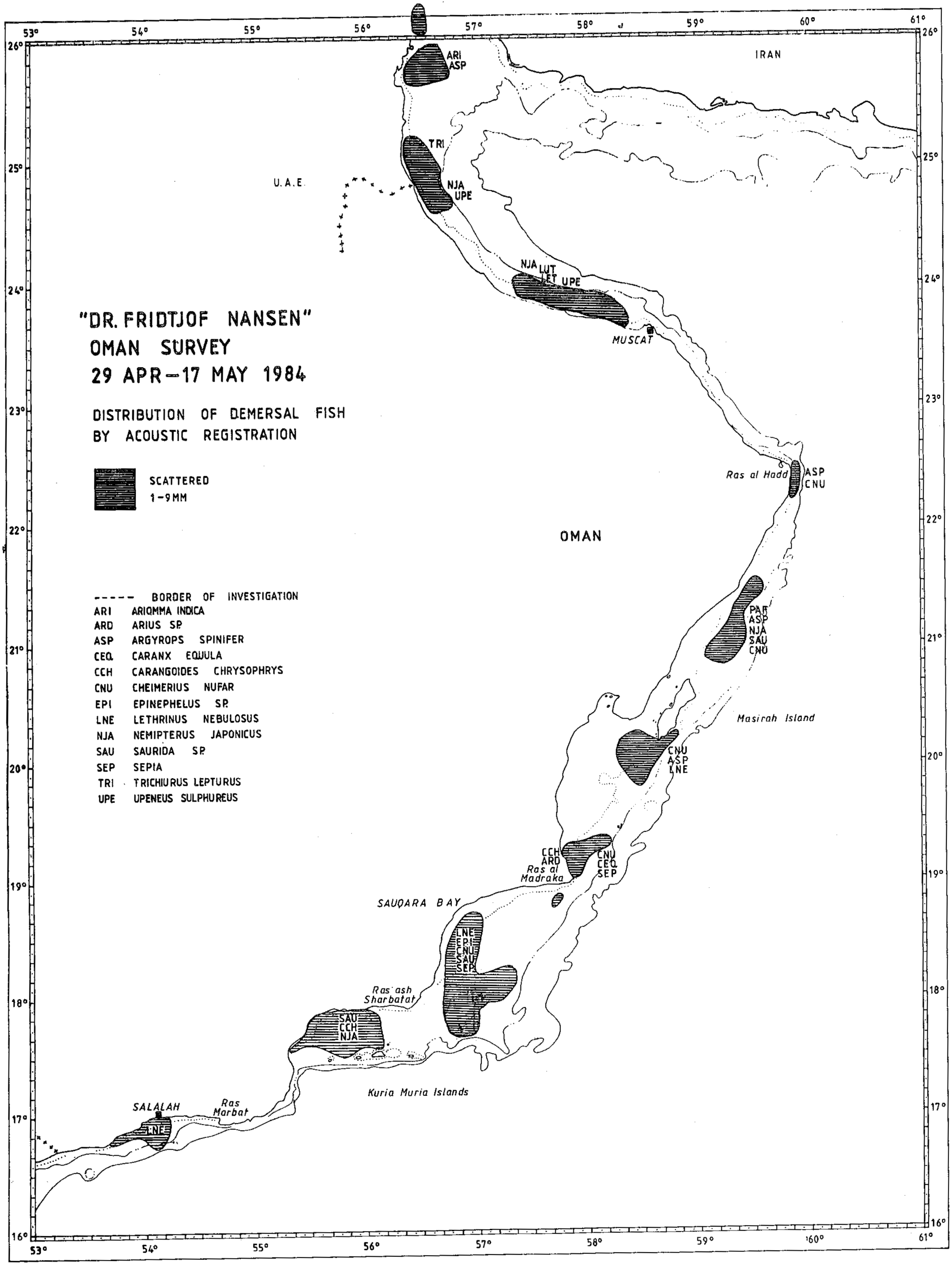


Figure 10. The distribution of demersal fish during the third survey based on registrations by the acoustic system.

biomass.

Table 9 shows the average catches of demersal fish from all random hauls grouped by four depth zones and by the three surveys. These averages

Table 8 Trawl survey biomass estimates of demersal fish. Rounded figures thousand tonnes.

	SURVEY I Mar-Apr '83	SURVEY II Nov-Dec '83	SURVEY III May '84	AVERAGE	ADJUSTED AVERAGE	ALL SURVEYS TREATED AS ONE
A North of Ras al Hadd	N.S.	N.S.	75	(75)	(75)	
B Ras al Hadd - Masira	125	60	85	90	105	
C Masira Bank	50	125	115	95	95	
D Sauquara & Kuria Muria Banks	160	75	135	125	145	
E Salalah region	N.S	N.S	N.S			
Total south of Ras al Hadd	335	260	335	310	345	315 +28% (95 % conf.lim.)

conf.lim.)

N.S.= Not surveyed

can represent indexes of the estimated fish densities in the zones.

Table 9 Average catches of demersal fish, by depth strata and surveys. Random trawling, kg/hour. Number of hauls in brackets.

Survey Period	10-30m	31-60m	61-100m	101-150m
I Mar-Apr '83	600(4)	710(14)	560(8)	2270(2)
II Nov-Dec '83	630(9)	690(14)	236(11)	45(2)
III Apr-May '83	843(8)	630(10)	900(16)	625(2)
I-III	705(21)	681(38)	613(35)	980(6)

A drastic drop in the average catches in the deeper zones was observed during the Nov-Dec survey. This drop should be seen in connection with the presence of oxygen-depleted waters on the shelf. During this survey,the 1 ml/l oxycline was located at around 50 m bottom depth on Masirah and Sauquara banks, while in the spring surveys the same oxycline was found lower than 100 m in March 83 and from 75 to 100 m in May 84 The appearance of oxygen-depleted waters on the shelf is connected to the S.W.-monsoon-induced upwelling, likely to be at its strongest at the peak and at the end of the monsoon period. Unfortunately we have no data for this period.

The lower catches in the deeper zones during the second survey are therefore likely due to lower density of fish in this area as the fish have escaped into shallower and oxygen-rich waters. This is also reflected in the higher average catches in the shallow waters in the same period (Table 9).

Because of this seasonal migration pattern, it is important that sampling is done at all depth strata. As the migration into very shallow waters was brought to light only in later analysis, the sampling programme had not been laid out to study this phenomenon.

Only on the Masirah Bank, which consists of extensive areas of shallow waters, there has been adequate sampling of this depth stratum. In the other two regions, Ras al Hadd - Masirah and Sauquara & Kuria Muria banks, where the shallow water areas are limited, but with seasonally -high fish densities, the sampling programme does not allow to quantify the biomass and evaluate its contribution to the total biomass.

Likely, the biomass estimates in the regions Ras al Hadd - Masirah and Sauquara & Kuria Muria banks have been underestimated during the Nov-Dec survey due to undersampling in the shallower waters. The higher estimates from the two other surveys are considered more representative of the true biomass level.

To conclude, the biomass figures given in Table 7 are not believed to reflect any seasonal variation, neither within regions, nor in the total estimate. The variations shown are expected to be due to high standard error in the sampling and to undersampling in shallow waters where fish concentrate in the high and post monsoon period.

Revised estimates for the regions Ras al Hadd-Masirah and Sauquara & Kuria Muria banks , based only on the figures from the spring surveys, are 105 and 145 thousand tonnes. A total revised estimate for all Oman would then be (in thousand tonnes):

B Ras al Hadd- Masirah	C Masirah Bank	D Sauquara & Kuria Muria Banks	B - E Total south of Ras al Hadd
105	95	145	345

A total estimate with confidence limits for the whole shelf Ras al Hadd to Ras al Marbat has also been calculated directly treating all random day hauls from the whole survey programme as a single series of data (total 105 hauls). This gives an estimate of 315 thousand tonnes with a precision of + 28% within 95% confidence limit. However, this estimate also suffers from undersampling in shallow waters and is therefore probably slightly negatively biased.

Estimated mean densities of demersal fish within regions, based on the trawl survey data are (thousand tonnes):

A	B	C	D	B - D
North of Ras al Hadd	Ras al Hadd Masirah	Masirah Bank	Sauquara and Kuria Muria Banks	Ras al Hadd-Ras al Marbat
18.8	37.5	27.1	24.7	28.4

3.2 Comparisons with other estimates of the demersal resources.

The acoustic estimates of the demersal stocks from the 1975-76 "Dr Fidtjof Nansen" surveys are as follows (thousand tonnes):

Survey 1 & 2	Apr-May ´75	113
Survey 3	Oct ´75	115
Survey 4	Feb ´76	40
Survey 5	Apr-May ´76	124
Survey 6	Sep ´76	127

From Kesteven et al., 1980

The low level of fish abundance recorded during the fourth survey is likely due to sampling errors or problems in classification of the acoustic targets into the demersal and pelagic categories. The other estimates are in close agreement with each other, lie between 113 and 127 thousand tonnes and represent about 35% of our estimate. No seasonal fluctuation can be observed from these data.

By comparing the acoustic and trawl estimates on demersal resources from the latest series of surveys no covariation in the estimates can be found (thousand tonnes):

	SURVEY I	SURVEY II	SURVEY III
Trawl	335	260	335
Acoustic	235	60	70

While the three trawl surveys give fairly consistent estimates, the drastic drop from the first to the second acoustic estimate can only be ascribed to limitations in the acoustic method itself. When the fish are dispersed in a very scattered pattern, the resolution in the acoustic system is very low, and registrations fall partially below the threshold of the system. This tends to give unprecise and negatively biased estimates.

The 1975-76 surveys of the R.V. "Dr. F.Nansen" have already been critically evaluated in connection with the estimates of small pelagic fish in the previous chapter. The generally low sampling intensity during these surveys applies especially to the shallow waters which probably hold considerable resources during the peak and at the end of the SW-monsoon. This will add to the general tendency of acoustic estimates to underestimate demersal resources.

During the discussion on the estimates of the small pelagic fish, it was suggested that the differences between the pelagic estimates between the 1975-76 surveys and the ones in 1983-84, might indicate a major ecological shift in the ecosystem, giving a higher carrying capacity for the pelagic fish resources. If so, this would also partially explain the increase in the latest estimates of the demersal resources as compared to the earlier ones. However, our data are not sufficient to confirm this hypothesis.

In a study on the fishery resources of Oman, Vidal-Junemann (1981) have estimated the demersal fish resources in the region Ras al Hadd to Ras al Marbat to 260 thousand tonnes. This figure is obtained by linking together information from a shallow water trawl survey (< 40m bottom depth), with catch data from commercial trawlers on the best fishing grounds and with the acoustic estimates of demersal fish by the 1975-76 R/V " Dr. Fridtjof Nansen" surveys. If one keeps in mind that the acoustic estimates of demersal fish probably are underestimated, and that reported catches from the commercial fishery mainly concerns marketable species, this estimate does not seem to conflict with the 345 thousand tonnes estimated from our surveys. The last estimate includes all demersal fish and is corrected for the seasonal drop in average density due to migration into shallow waters during the period of upwelling.

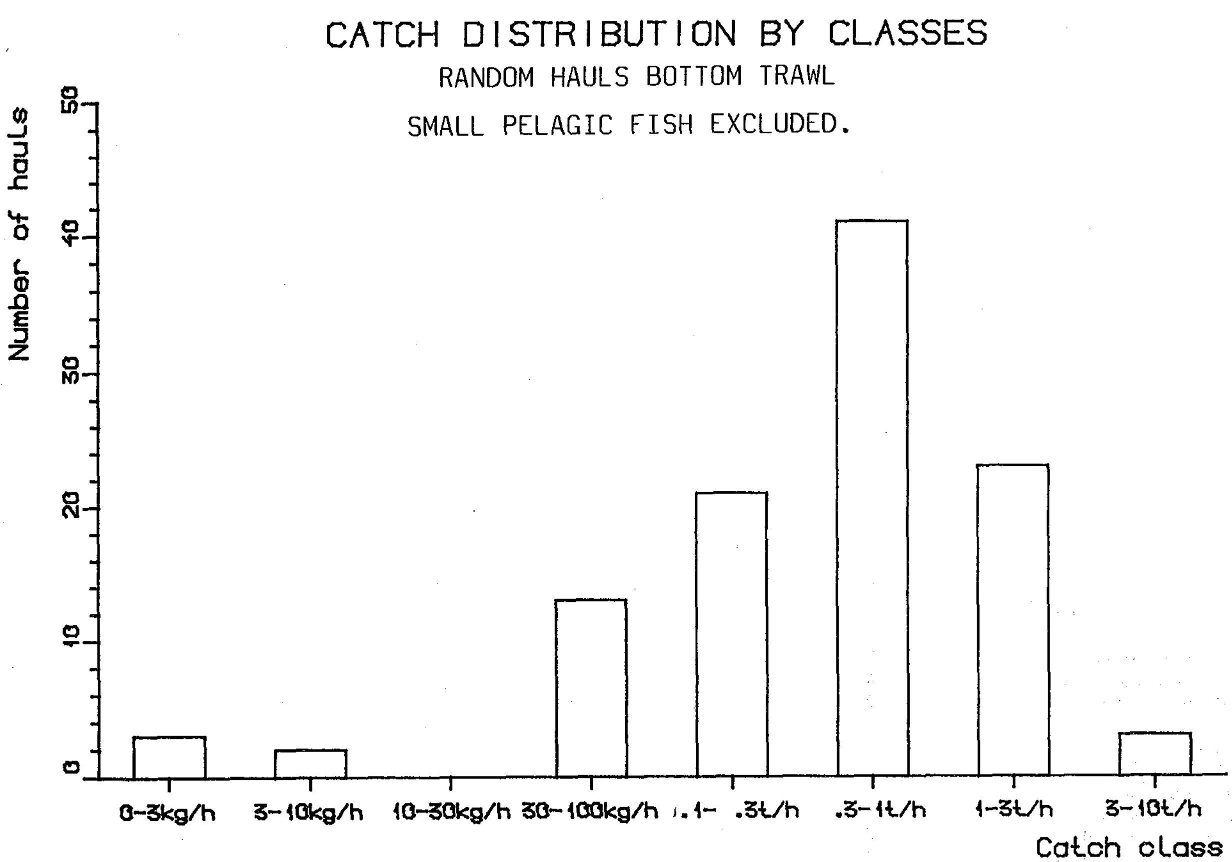
We do therefore not consider our estimate of 345 thousand tonnes to be in contradiction with earlier estimates.

Absolute estimates from trawl surveys are dependent upon the gear´s catchability coefficient (q) , applied in the calculations. While we have used q=1 in our calculations, values in the range 0.5 - 1.0 can be found from other studies. The absolute estimates are inversely related to the size of q , and applying q=0.5 in our estimates will increase them to the double. In lack of detailed knowledge about the catch properties of the bottom trawl we have used a catchability coefficient which gives estimates that falls in the lower side of the range likely possible. In other words, our figures may underestimate the resources, but will then represent minimum assesments from which safe management actions can be taken.

3.3 The catches of demersal fish.

Figure 11 shows the distribution of the catches grouped in approximate logaritmic increasing classes. The distribution is based on 106 random trawl stations.

The random hauls give an average catch of 784 kg/hour in a trawl with approximately 20m between the wings (for more details about gear, see Appendix II). Figure 11 shows that 39 % (41 hauls) fall between 300 and 1000 kg/hour and 80 % (85 hauls) between 100 and 3000 kg/hour. Only 3% (3 hauls) exceed 3 tonnes/hour. Catches from commercial trawlers with aimed trawling and concentrated effort in areas of high densities would likely give a distribution shifted to the right in Figure 11.



N= 106; ĉ= 784 Kg/hour

Figure 11. Catch distribution of demersal fish in the random bottom trawl hauls.

Tables 10-13 show the catch distribution and importance in the catches of the dominating demersal species in four regions: 1) North of Ras al Hadd 2) Ras al Hadd - Masirah Island, 3) Masirah Bank and 4) Sauquara and Kuria Muria Banks respectively. Table 14 shows a similar analysis for all hauls carried out in Oman. From our observations, the dominating species seem to be Nemipterus japonicus, closely followed by Argyrosomus hololepidotus, Arius thalassinus and Argyrops spinifer. The importance of Argyrosomus hololepidotus may have been overestimated as its rank in the table is based on one extremely high and incidental catch in very shallow waters (9200 kg/hour, st. 174).

Tables 10-14 include all species contributing down to 2 % each of the total catch. The remaining species, grouped as other fish are those contributing 1 % or less each to the total catch.

Table 10 Catch distribution by demersal species in bottom trawl. Region A, North of Ras al Hadd, all surveys. Random trawling. Total number of hauls: 17.

Species	Number of catches in catch groups: 1-9 kg/h	10-49 kg/h	50-199 kg/h	200-499 kg/h	>500 kg/h	% of total	Mean catch (kg/hour)
Saurida tumbil	8	1	4	0	1	15	72.6
Upeneus sulphureus	0	2	1	0	1	13	59.2
Sphyraena barracuda	5	4	0	1	1	8	36.0
Nemipterus japonicus	3	2	3	1	0	6	29.5
Leiognathus fasciatus	0	3	0	1	0	5	24.6
Carangoides malabaricus	5	7	1	0	0	5	21.7
Argyrops spinifer	3	6	2	0	0	3	15.2
Gnathanodon speciosus	0	2	1	0	0	2	11.8
Sepia sp.	1	4	2	0	0	2	11.3
Trichiurus lepturus	5	3	1	0	0	2	9.9
Nemipterus sp.	0	1	1	0	0	2	9.3
Sharks	1	0	1	0	0	2	9.3
Carcharhinidae	1	5	0	0	0	2	8.6
Lutjanus malabaricus	0	3	1	0	0	2	8.4
Psettodes erumei	3	5	0	0	0	2	7.2

Table 11 Catch distribution by demersal species in bottom trawl. Region B, Ras al Hadd - Masira Island, all surveys.
Random trawling. Total number of hauls : 28

Species	Number of catches in catch groups: 1-9 kg/h	10-49 kg/h	50-199 kg/h	200-499 kg/h	>500 kg/h	% of total	Mean catch (kg/hour)
Argyrops spinifer	0	5	6	5	3	28	220.0
Nemipterus japonicus	4	4	6	0	2	13	101.1
Pomadasys stridens	2	3	4	3	0	8	61.8
Saurida sp.	0	1	0	0	1	5	39.8
Arius sp.	1	1	1	0	1	4	35.5
Pagellus affinis	5	2	8	0	0	4	35.1
Arius thalassinus	3	3	0	0	1	4	32.0
Cheimerius nufar	3	5	3	1	0	3	27.0
Lethrinus elongatus	0	0	1	1	0	3	21.5
Trichiurus lepturus	1	2	2	1	0	3	20.4
Carangoides chrysophrys	2	3	2	1	0	2	16.9
Saurida undosquamis	3	4	3	0	0	2	16.6
Lethrinus nebulosus	1	3	3	0	0	2	12.9

Table 12 Catch distribution by demersal species in bottom trawl. Region C Masira Bank , all surveys.

Random trawling. Total number of hauls : 34

catch Species (kg/hour)	Number of catches in catch groups 1-9 kg/h	10-49 kg/h	50-199 kg/h	200-499 kg/h	>500 kg/h	% of total	Mean
Argyrosomus hololepidotus	0	0	1	0	1	29	275.8
Arius thalasinus	3	6	2	1	2	19	191.8
Pomadasys stridens	2	0	0	0	2	9	86.6
Nemipterus japonicus	5	3	1	1	1	9	82.2
Lethrinus nebulosus	2	2	3	0	1	4	37.8
Lepidotrigla betuviae	0	0	0	1	1	3	30.2
Cheimerius nufar	2	1	3	2	0	3	26.5
Rhinobathidae	0	0	1	0	1	2	20.6
Rays	1	0	0	2	0	2	17.9

Table 13 Catch distribution by demersal species in bottom trawl. Region D, Sauquara and Kuria Muria Banks, all surveys.

Random trawling. Total number of hauls : 39

catch Species (kg/hour)	Number of catches in catch groups 1-9 kg/h	10-49 kg/h	50-199 kg/h	200-499 kg/h	>500 kg/h	% of total	Mean
Nemipterus japonicus	1	2	2	3	1	16	99.6
Lethrinus nebulosus	3	2	9	7	1	14	90.7
Pagellus affinis	5	1	1	1	2	10	64.7
Cheimerius nufar	3	6	13	1	0	8	48.8
Lepidotrigla bentuviae	1	1	0	1	1	7	42.4
Charybdis edwardsi	0	0	0	0	1	6	35.7
Saurida sp.	2	1	0	0	1	5	29.6
Saurida undosquamis	0	1	2	1	1	4	25.9
Epinephelus sp.	4	4	3	1	0	3	18.0
Sepia sp.	3	0	4	0	0	2	13.4
Carangoides chrysophrys	4	7	3	0	0	2	11.4

Table 14 Catch distribution by demersal species in bottom trawl All Oman, all surveys.
Random trawling. Total number of hauls : 123

catch Species (kg/hour)	Number of catches in catch groups 1-9 kg/h	10-49 kg/h	50-199 kg/h	200-499 kg/h	>500 kg/h	% of total	Mean
Nemipterus japonicus	12	10	12	5	4	11	81.3
Argyrosomus hololepidotus	0	0	1	0	1	10	76.2
Arius thalasinus	15	21	6	1	4	9	69.9
Argyrops spinifer	14	20	14	6	3	8	61.0
Lethrinus nebulosus	7	10	16	8	2	6	45.8
Pomadasys stridens	6	6	5	3	2	5	39.3
Cheimerius nufar	8	13	20	5	0	4	33.6
Pagellus affinis	12	7	10	1	2	4	29.9
Lepidotrigla bentuviae	5	3	0	2	2	3	22.4
Saurida sp.	4	4	0	0	2	3	18.9
Saurida undosquamis	7	6	7	1	1	2	13.9
Saurida tumbil	12	3	6	0	1	2	11.9
Charybdis edwardsi	0	0	0	0	1	2	11.3

3.3.1 Distribution of abundances by species based on catch data.

Distribution of the total estimated biomass of demersal species can tentatively be assessed by applying the relative distribution of the species in the catches (the % distribution in Table 14) to the total estimate. Table 15 shows these estimates.

Table 15. Distribution of total estimated demersal biomass by species.

Species	% in catch	Biomass thousand tonnes
Nemipterus	11	38
Argyrosomus hololepidotus	10	35
Arius thalassinus	9	31
Argyrops spinifer	8	28
Saurida	7	24
Lethrinus nebulosus	6	21
Pomadadys stridens	5	17
Cheimerius nufar	4	14
Pagellus affinis	4	14
Lepidotrigla bentuviae	3	10
Other fish, not more than 1% each	33	113
Total	100	345

3.4 Distribution of catch and biomass by commercial value.

In order to have an idea of how the demersal resources are distributed according to economic groupings, the catches from the bottom trawl have been distributed into four economic classes according to the species market value (see list below). As basis for this groupings, fish market prices in the United Arab Emirates,for the period May-June 1978, have been used (FAO 1981).

Division of the most common species into classes according to their market value. Based on fish market prices UAE May-June 1978 (From FAO 1981). Species in brackets have been added by similarity to the existing groups.

Class 1 (<5 Dirham/Kg):
Megalaspis, Arius, Thunnus, Lutjanus sanguineus (Trachurus, sharks, rays, Ariomma)

Class 2 (5-9 Dirham/Kg):
Sardinella, Plectorhynchus, Scolopsis, Epinephelus, Rhabdosargus, Rachycentrum, Scarus, Chirocentrus, Scomberoides, Sphyraena, Euthynnus, Chanos, Sciaenidae, Selar, Decapterus, Caranx, Argyrops, Pomadasys, Scomberomorus (Drepane, Atule, Mullidae)

Class 3 (10-15 Dirham/Kg):
Apolectus, Carangoides, Sillaginidae, Acanthopagrus, Trachinotus, Sparidae, Elops, crabs, Seriola, Seriolina, Alepes, Pampus, Gnathanodon, Nemipterus, Mugil, Lethrinus, Siganus, Rastrelliger

Class 4 (>15 Dirham/Kg):
Siganus, shrimp, Sepia, Loligo.

Table 16 shows the distribution of the total catch according to commercial value, according to the given classification. Two distributions are given, one for demersal species only, and one including the small pelagic fish.

Table 16 Classification in economical classes of catches from bottom trawling (% of total catch).

	Demersal fish only %	Small pelagic fish included %
Class 1 (<5 Dirham/Kg)	30	61
Class 2 (5-9 Dirham/Kg)	35	26
Class 3 (10-15 Dirham/Kg)	33	12
Class 4 (>15 Dirham/Kg)	2	0.8

By distributing the estimated total demersal biomass according to the commercial composition of the total catch, a rough absolute estimate of the quality composition of the demersal fish resources of Oman can be made. This is shown in Table 17. The most valuable class (4) is estimated to only 7 thousand tonnes, while the remaining three classes constitute roughly equal amounts of the remaining biomass, 104, 120 and 120 thousand tonnes in Class 1, 2 and 3 respectively.

Table 17 Classification in economical classes of estimated biomass based on species composition in the catches and their market value.

	Thousand tonnes
Class 1 (<5 Dirham/Kg)	104
Class 2 (5-9 Dirham/Kg)	120
Class 3 (10-15 Dirham/Kg)	114
Class 4 (>15 Dirham/Kg)	7
Total	345

3.5 Estimates of Yield of the Demersal Resources

The method of Beddington and Cooke applied in 2.3.3 to assess the yield of the small pelagic fishes, cannot easily be applied to the demersal stock. The demersal biomass is composed of a variety of species with different sizes, growth patterns, natural mortalities and ages at recruitment. Nevertheless, as the much used Gulland's formula $(Y=0.5M B_0)$ seems to overestimate the yield in most instances, the influence of the growth and recruitment parameters should be taken into account, even though only rough general estimates of these parameters are available.

Vidal- Junemann (1981) classified the demersal fishes of Oman in three main groupings; a) small demersal fishes, including breams,porgies,grunts, goatfishes, lizardfishes, flat fishes and parrotfishes - all fish generally less than 50 cm maximum length, and b) larger demersal fish including scavengers, croakers, groupers, barracudas and sharks - fish with a maximum size generally exceeding 50 cm. For the small fish he suggested a natural mortality (M) within the range 0.4-0.8 and for the larger species M=0.2-0.4.

Pauly (1980) has listed growth parameters and natural mortalities for 175 fish species. Of these,34 species are from waters with a higher temperature than 20^{o}C and represent families which are common in Omani waters. Table 18 shows the range and the mean of the natural mortality (M) of these species grouped into two classes; a) less than 50cm maximum length, and b) more than 50 cm maximum length. The means of the M are 1.18 and 0.74 respectively, and this is considerably higher than the figures used by Vidal-Junemann. The lower limit used by him seems more to apply to fishes in temperate waters, while the upper limit seems more appropriate for perhaps a conservative estimate of M in tropical waters. We therefore suggest M=0.8 for the small fish and M=0.4 for the big fish as a first approximation of the natural mortality in Oman waters.

Table 18. Ranges and means of natural mortalities of selected fish species. (Raw data taken from Pauly 1980).

	No of species	Range of M	Mean of M
Big demersal fish			
>50cm max length			
Serranidae			
Lutjanidae	17	0.1 - 2.24	0.74
Sciaenidae			
Lethrinidae			
Small demersal fish			
<50cm max length			
Serranidae	17	0.34 - 1.88	1.18
Nemipteridae			
Sciaenidae			
Mullidae			

Cushing (in press) supports the critics to the equation $Y=0.5MB_0$ and agrees that it tends to overestimate the yield. He suggests the constant 0.5 be reduced to 0.4 for demersal fish and to 0.3 for small pelagics. In lack of the necessary information to use the Beddington and Cooke's method, we adopt Cushing's procedure and apply it to our calculations. The yield equation used on the demersal stock is therefore:

$$Y= 0.4\ M*B_0$$

The estimated yields by species are given in Table 19. The total estimated yield is 77 thousand tonnes, i.e. 22% of the initial biomass.

Table 19. Estimate of yield by species and by total biomass of demersal fish in Oman waters.

Species	Estimated biomass (1000 t)	Best guess of M	Equivalent estimated yield (1000 t)
Nemipterus	38	0.8	12
Argyrosomus	35	0.4	5.5
Arius	31	0.4	5
Argyrops	28	0.4	5
Saurida	24	0.4	4
Lethrinus	21	0.4	3.5
Pomadasys	17	0.8	5.5
Cheimerius	14	0.4	2
Pagellus	14	0.8	4.5
Lepidotrigla	10	0.8	3
Other fish (not more than 1% each species)	113	0.6	27
Total	345		77

As we have not been able to get information on the present level of fishing on the demersal stocks, the above calculations are made on the assumption that we are working on a biomass with a very low fishing mortality.

4. ASPECTS OF THE BIOLOGY OF SOME DOMINATING SPECIES IN OMAN WATERS.

The data gathered by the trawl sampling,combined with the data from the acoustic system,can provide useful information such as geographical distribution, migration, size distribution, aggregation patterns, behaviour and catch rates for the different species . In instances where a time series of data has been collected, growth parameters can be estimated from the length samples. All biological data from the surveys are shown in annex III to VII. Annex III shows a chronological record of all fishing operations. Annex IV shows the length measurements (average and range) , while Annex V shows the raw data from the same samples (in both cases the sorting is by species). The main catch data,sorted by species,are presented in Annex VI and finally Annex VII shows histograms of pooled length distributions of the most common small pelagic fishes. A map, at the end of the report, gives the position of all trawl hauls.

Below, more detailed information is given for the most common species.

Trachurus indicus (Arabian scad)

Figure 12 shows the distribution of the Arabian scad based on its occurrence in the trawl catches during the three coverages. The species is distributed between Ras al Hadd and Ras Ash Sharbatat and the main part of the stock seems to be restricted to this area the year around. The focal point of distribution is on the Masirah Bank where the highest densities were found during all three coverages. It might be a little early to try to depict migration patterns from three coverages only, but it seems quite possible that the species concentrates on the Masirah Bank for spawning in the early pre-monsoon period (February- March) . This is supported by the presence in May (third coverage) of juvenile specimens (5-7cm) in this area(the only time and place where such young fish were observed). The biggest specimens caught fall in the class 37-37.9cm, somewhat bigger than the maximum size reported, 35cm (in Fischer and Bianchi, eds. 1984). From the pooled length distributions of the scad (Annex VII), attempts have been made to look at the growth of the species. Length cohorts in the samples have been used as representing yearclasses in the stock. The results are shown in Figure 13. The species has been reported to reach maturity at age one year and approximately 11cm (Fischer and Bianchi, eds. 1984). This fits well with the tentative growth curve given in Figure 13. According to this curve, this species seems to have a lifespan of 4-5 years.

The catch records for the species can be found in Annex VI. The best catch was 40 tonnes/hour and the mean of the 5 biggest hauls was 26.2 tonnes/ hour. The fish could easely be caught at a trawling speed of three knots, except the fish bigger than 30 cm, which seemed to be able to escape the trawl. 59% of the total catch of this species was caught between 60 and 90m bottom depth, with an additional 10% down to 110m depth. 27% was caught between 40 and 50m bottom depth. The last were smaller fish, all less than 20cm, caught on the Masirah Bank. The bigger fish tended to concentrate at the shelf edge between 60 and 90m bottom depth.

Sardinella gibbosa, Goldstriped sardinella (Figure 14)

Except from a small concentration near Salalah during the first coverage, the goldstriped sardinella was found only between Ras al Hadd and Ras al Madrika. The main part of the stock was concentrated on the shallower areas of the Masirah bank during all three surveys. Our data do not seem to indicate any migration. The size ranged from 8.5 to 18.5 cm length. The catches were generally small, the highest being 440 kg/hour, the mean of the five best catches 390 kg/hour. 93% of the total catch of this species came from depths less than 20 meters, and practically 100 % of the catch

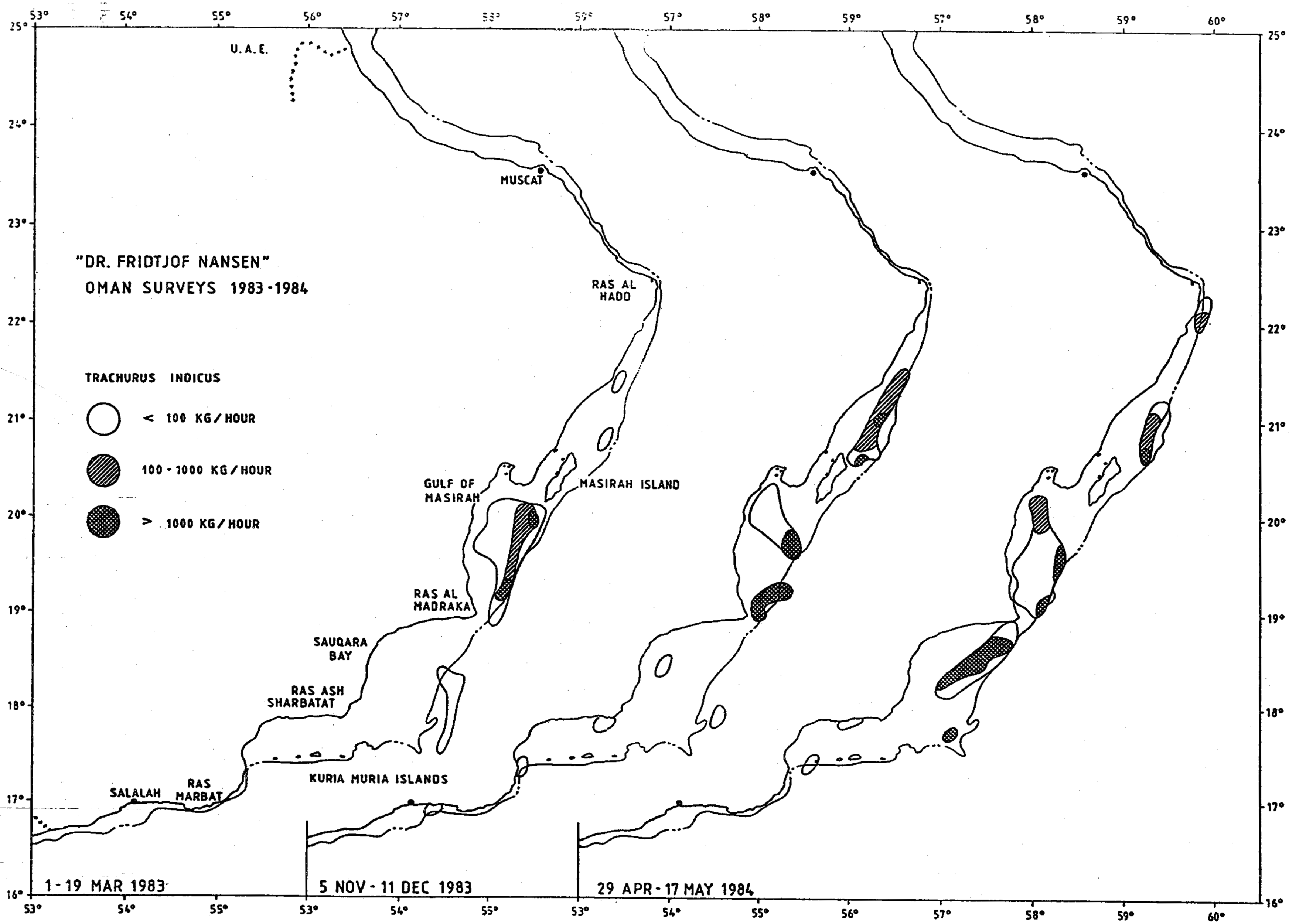


Figure 12. Distribution of arabian scad, Trachurus indicus based on occurrence in the trawl catches.

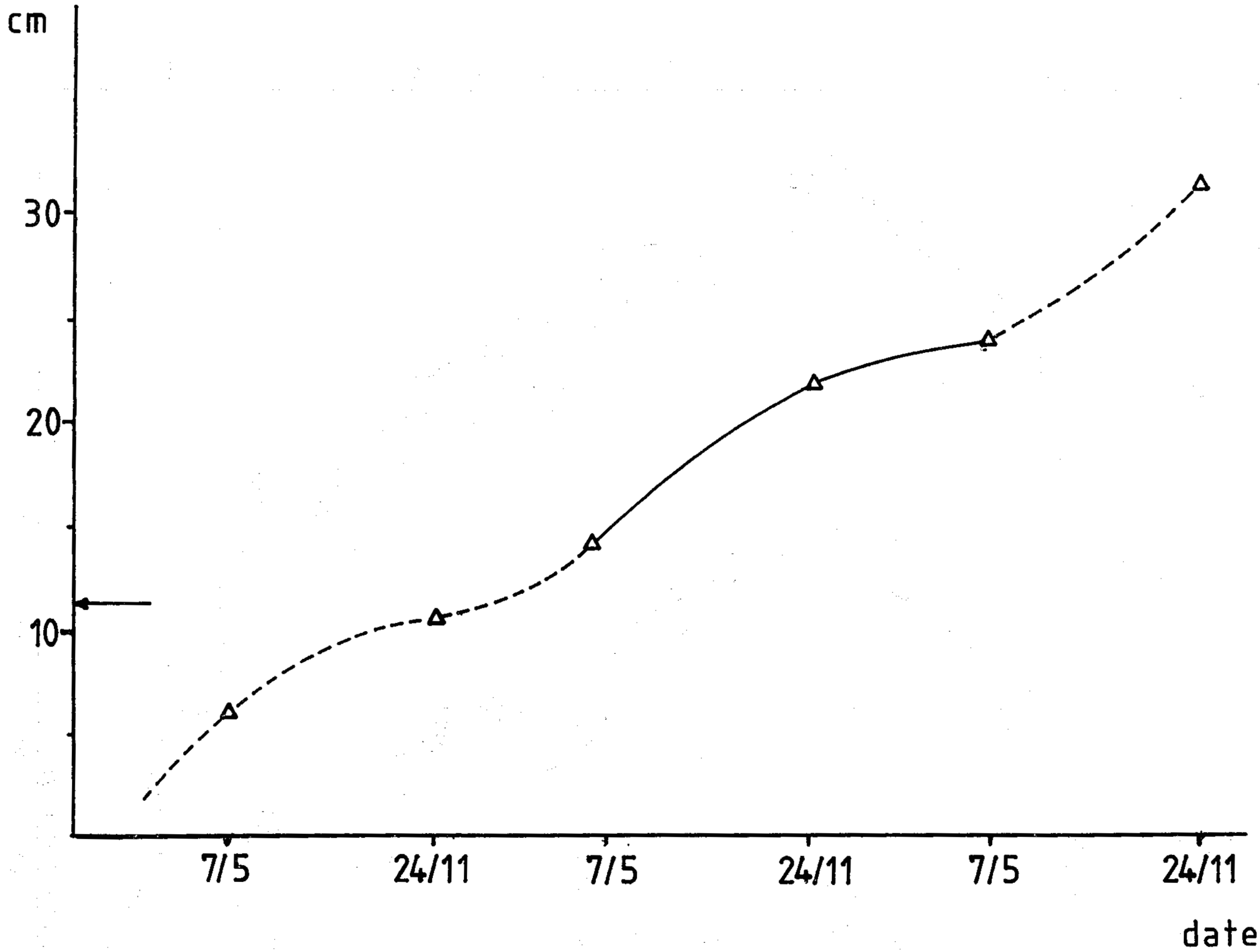


Figure 13. Tentative growth curve of Arabian scad (Trachurus indicus), based on length samples. Arrow shows possible length at first maturity. L_{∞} between 35 and 40 cm.

was from less than 30 meters depth. The only occurrences of the species in deeper waters were in the region Ras al Hadd - Masirah Island, where some scattered registrations were found around 70m bottom depth but with catches less than 10 kg/hour.

Sardinella longiceps, Indian oil-sardinella (Figure 15)
This species was quite widespread, but the main concentrations were located between Ras al Hadd and Ras Ash Sharbatat. The length ranged from 7.5 to 24cm, the smaller specimens (less than 10cm) occurring between Ras ash Sharbatat and Salalah (second coverage, Nov-Dec). The fish on the Masirah Bank had the lowest length about 2-3cm higher than the fish more south, in the same period. This is probably due to a more favourable growth in the Masirah Bank area. No spawning area could be detected. The species is known to have its main spawning just after the peak of the S-W monsoon, in August- September (Fischer and Bianchi, eds.1984). The catches were

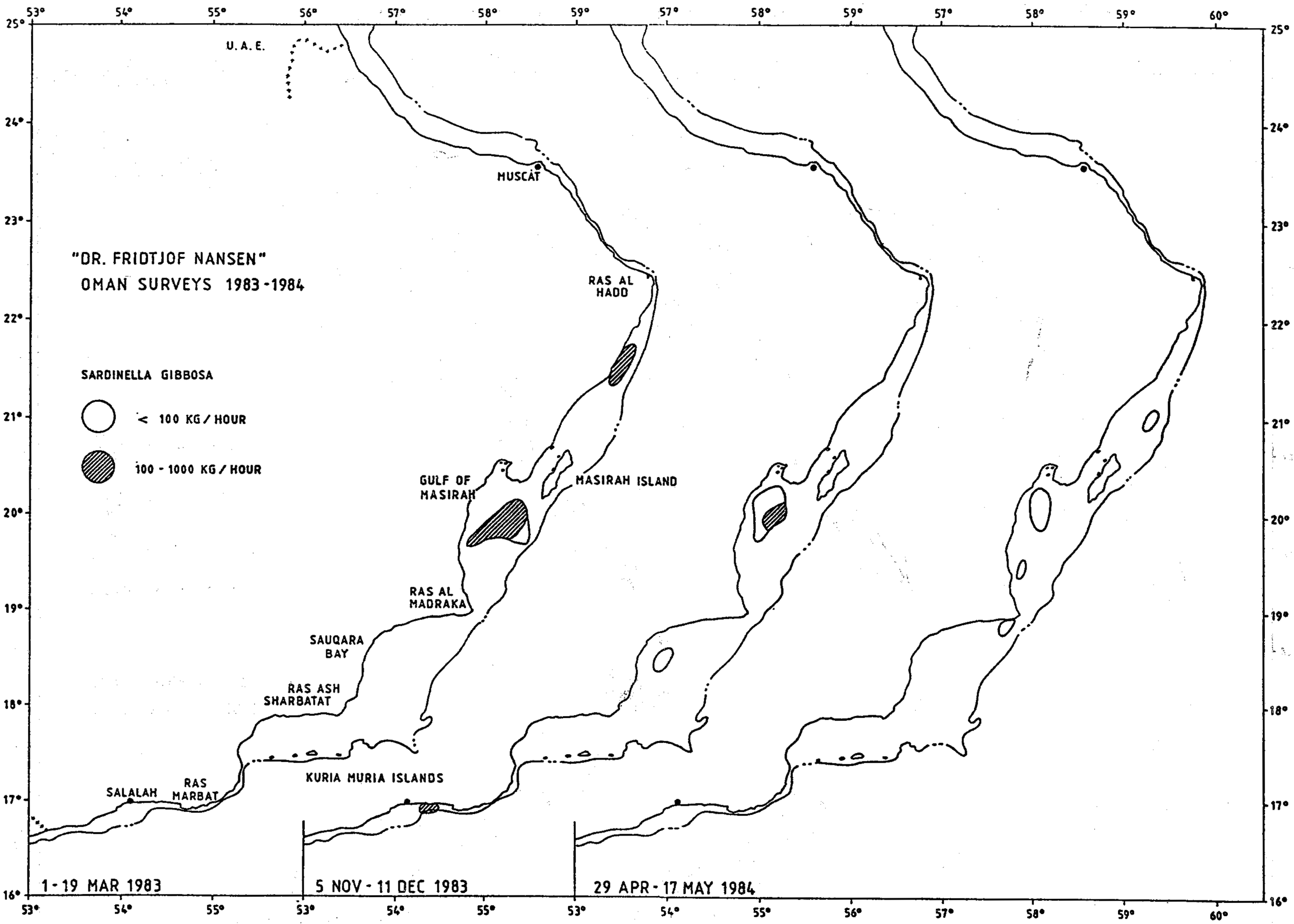


Figure 14. Distribution of gold-striped sardinella, Sardinella gibbosa, based on occurrence in the trawl-catches.

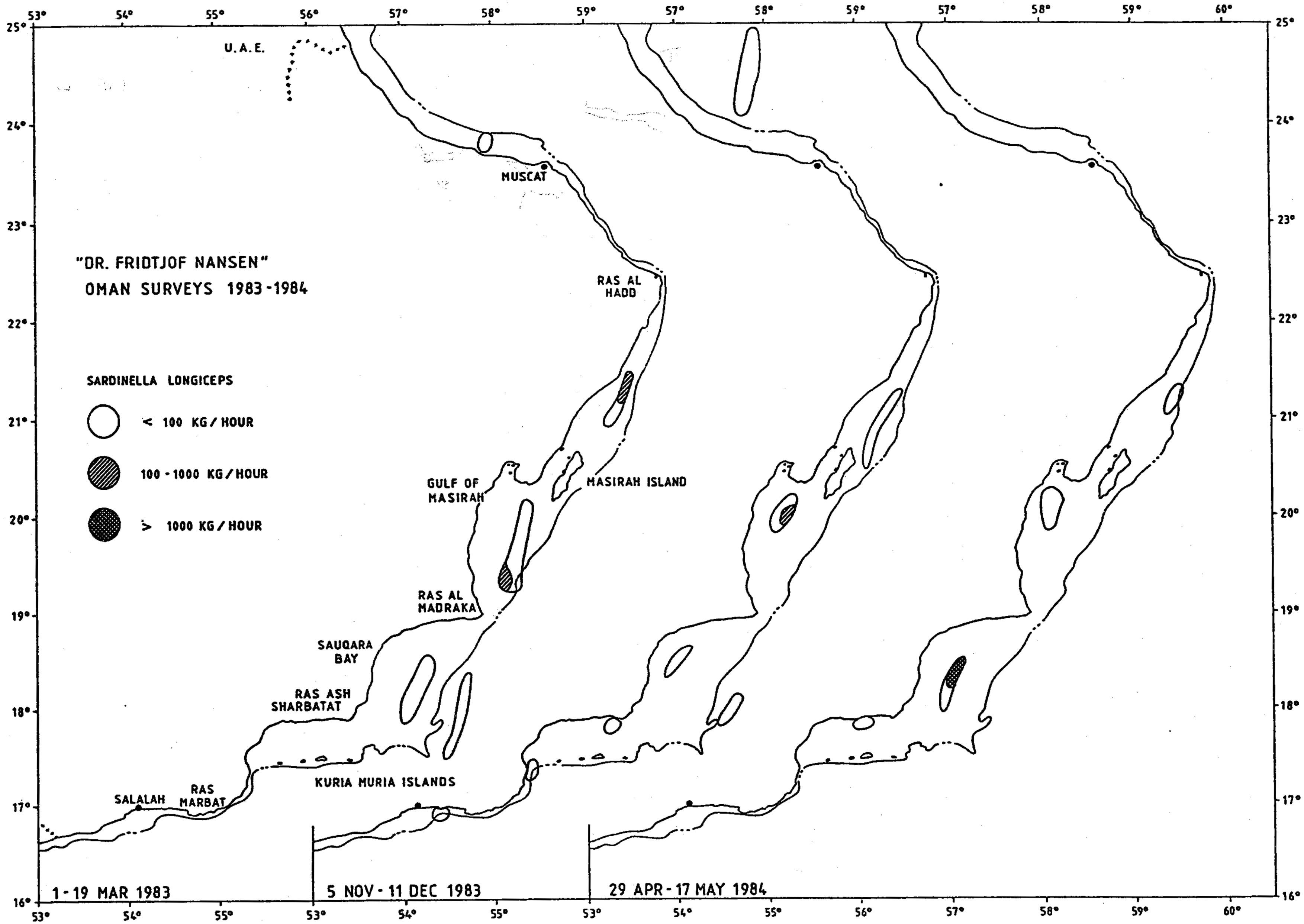


Figure 15. Distribution of indian oil-sardinella, *Sardinella longiceps*, based on occurrence in the trawl-catches.

generally low, the best being 15.7 tonnes/hour, while the second highest was only 450 kg/hour. 98% of the total catch was taken between 20 and 80 ,mainly in the shallower waters. This species was also located off the shelf, in the surface waters off the Sauquara bank, during the two first surveys. The catches never exceeded 5 kg/hour in this area. Sardinella longiceps is coocurring with S. gibbosa on the central parts of the Masirah Bank, but the first also goes more shallow than the latter.

Argyrops spinifer and A. filamentosus (Figure 16)
The soldierbreams was found all along the coast, with highest densities from Ras al Hadd to Masirah Island. The fish ranged from 22 to 64cm total length. The best catch in the bottomtrawl was 1440 kg/hour while the average of the five best catches was 866 kg/hour. The total catch from all surveys was caught between 10 and 90m. The species seemed to concentrate especially in the zone 20-50m.

Lethrinus elongatus and L. nebulosus (Figure 17)
The emperors have also their distribution along all Oman coast. But they seem more abundant between Ras Marbat and Ras al Madraka and from Ras al Hadd to Masirah Island. In the samples taken,the size of the fish ranged from 33 to 61cm. The best catch obtained was 1050 kg/hour while the mean of the five highest catches was 550 kg/hour. All fish were caught in depths less than 50m.

Other species
Decapterus russelli, the Indian scad (Figure 18), is a small pelagic species occuring along the whole Oman coast, with highest concentrations from Ras al Hadd to Masirah Island and at Masirah and Sauquara banks. The sized in the samples ranged from 6.5 to 30cm . No spawning area could be located. The best catch was 6 tonnes/hour and the mean of the five highest was 3.2 tonnes/hour. This species occurs on the bottom, at depths less than 120m, but the main abundance is between 50 and 120m bottom depth.
Dussumieria acuta, rainbow sardine (Figure 19), occurs in the pelagic community south
of Ras al Hadd. It is a small species, measured between 8 and 23 cm in the samples. The highest catch was 485 kg/hour. The species will not likely make any important contribution to a pelagic fishery.

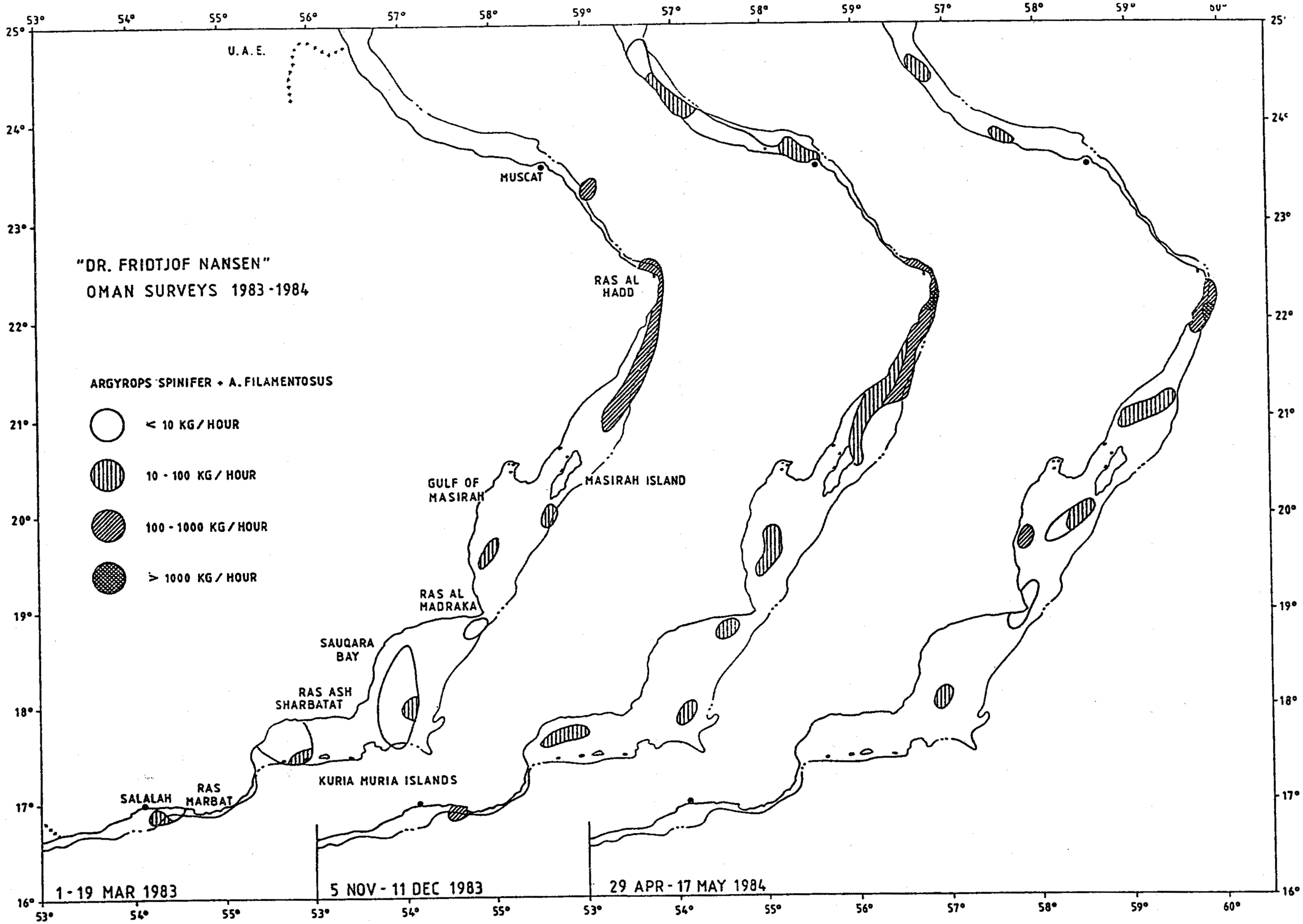


Figure 16. Distribution of Argyrops spinifer and A. filamentosus, based on occurrence in the trawl catches.

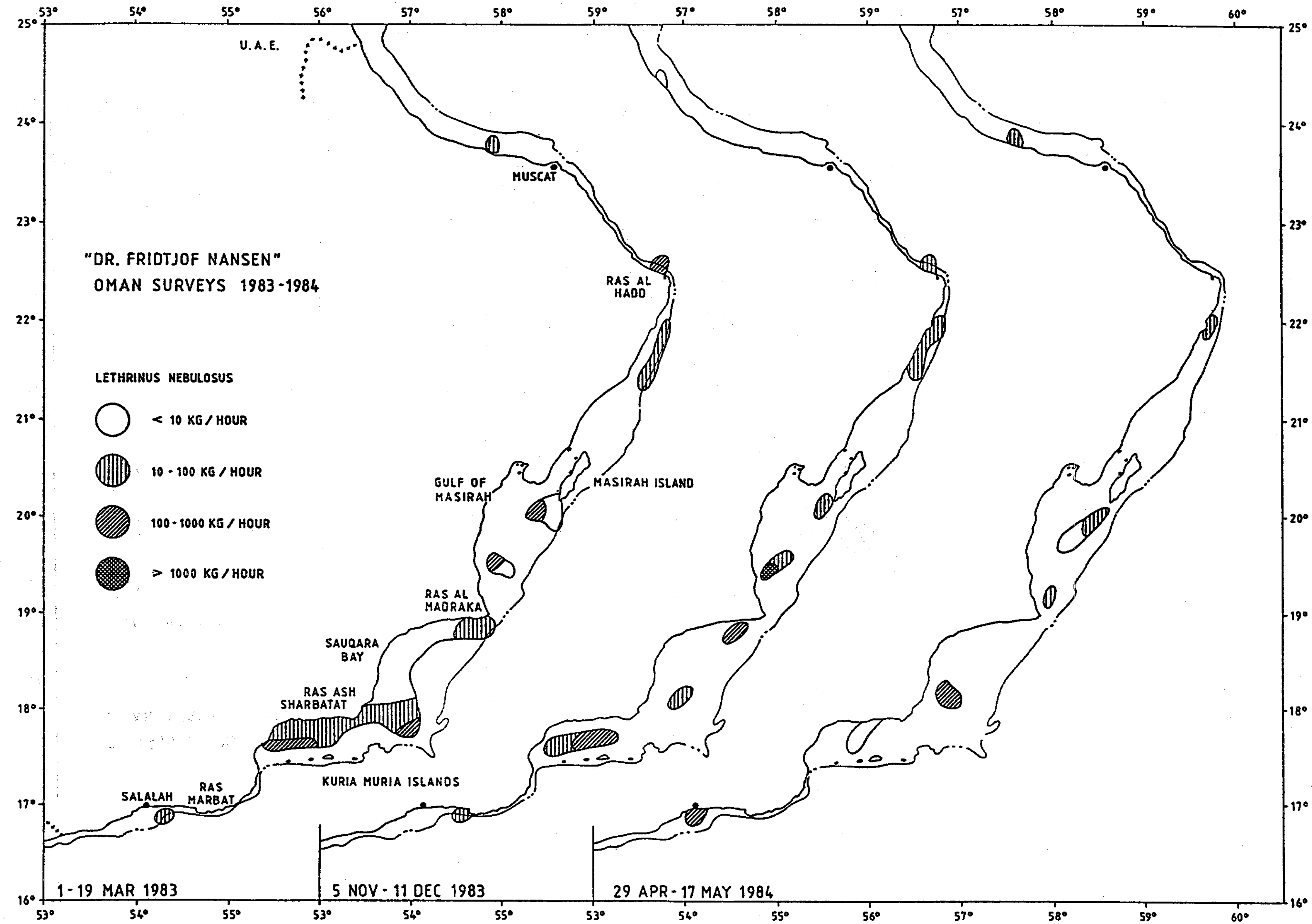


Figure 17. Distribution of <u>Lethinus nebulosus</u>, based on occurrence in the trawl catches.

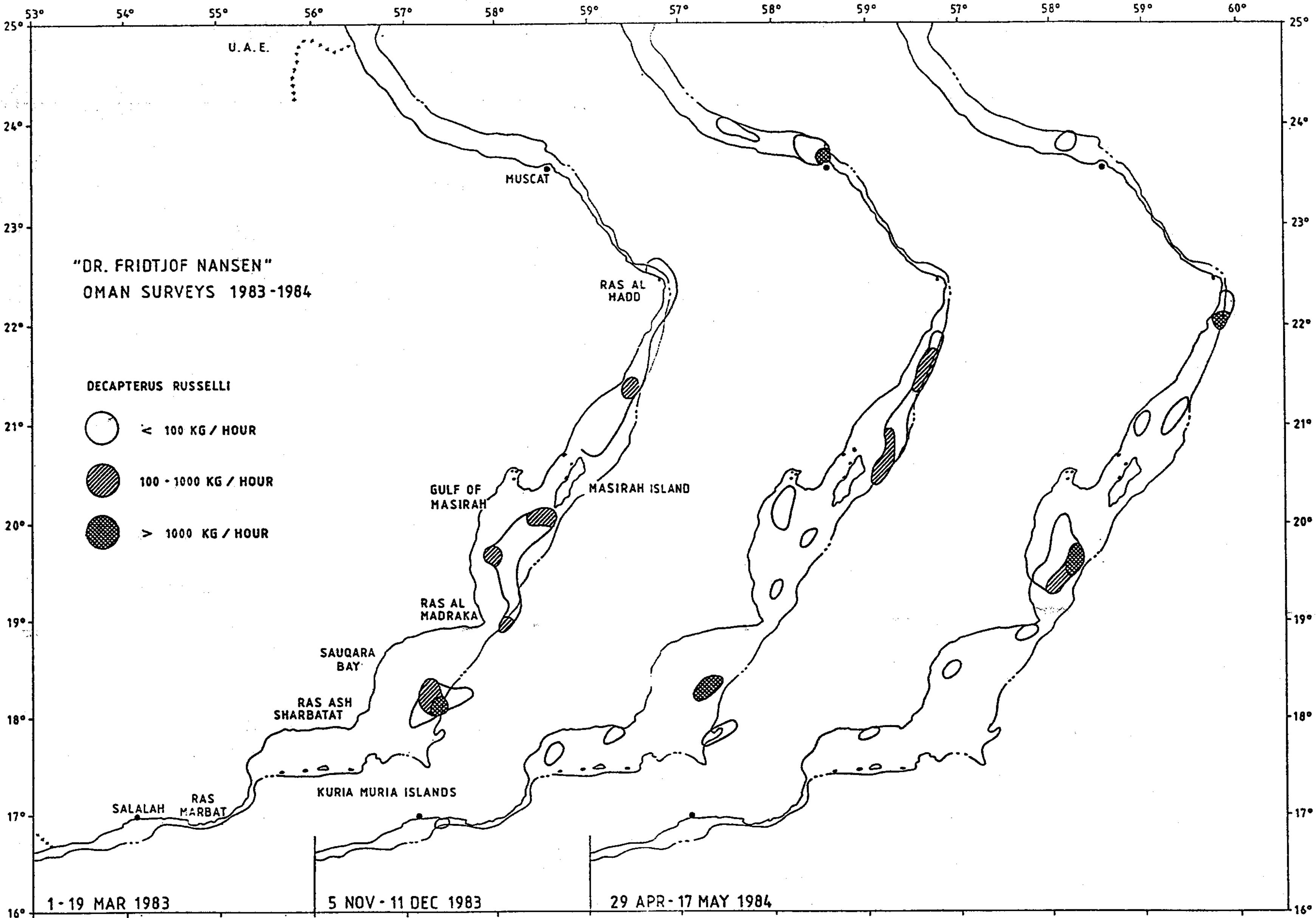


Figure 18. Distribution of indian scad, Decapterus russelli, based on occurrence in the trawl catches.

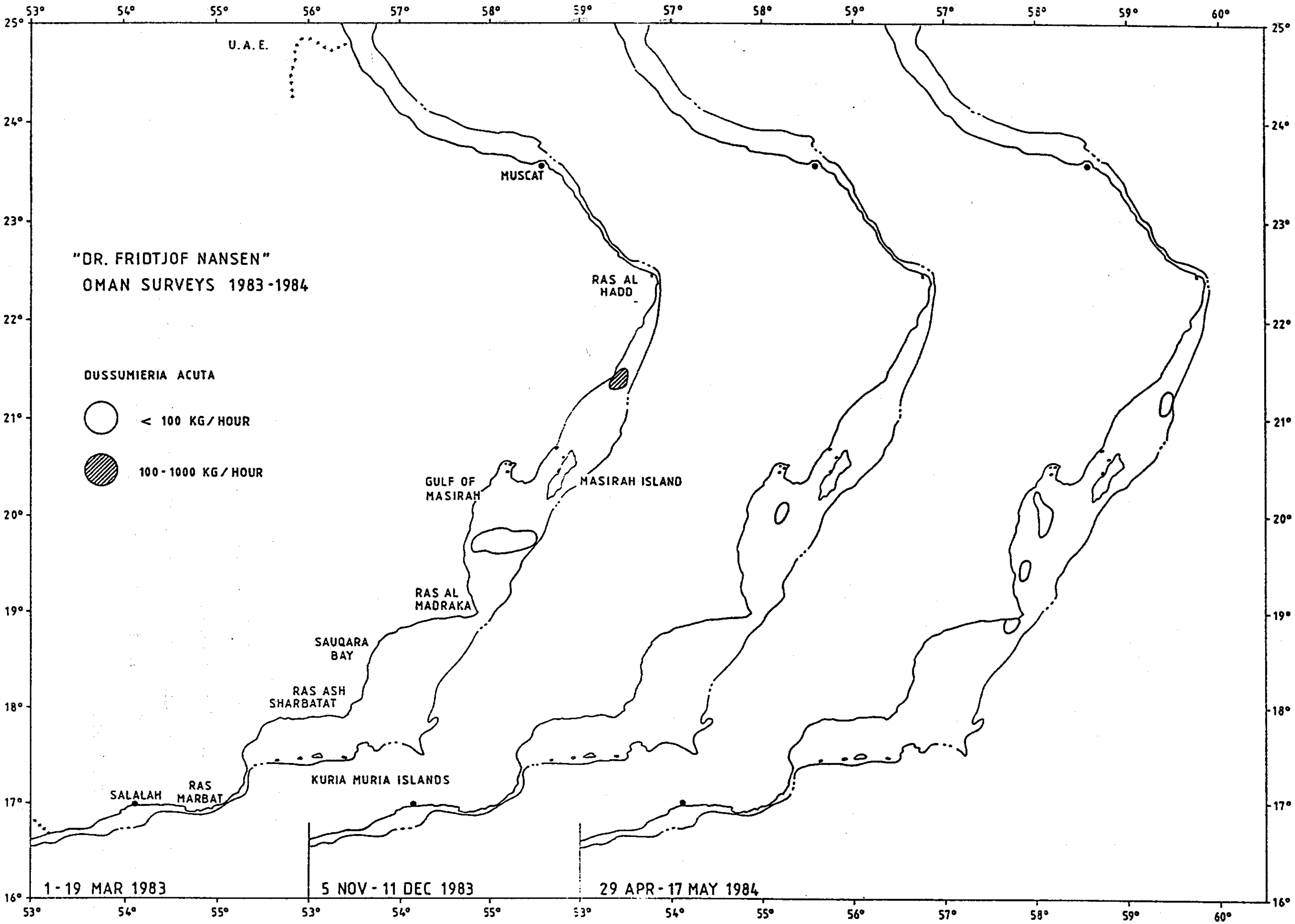


Figure 19. Distribution of rainbow sardine, _Dussumieria acuta_, based on occurrence in the trawl catches.

5 SUMMARY AND MAIN CONCLUSIONS

The R/V Dr.Fridtjof Nansen has carried out three surveys during the years 1983 and 1984. The first survey was carried out in the SW pre-monsoon season, in March 1983, the second at the onset of the NE monsoon, in November 1983,and the third at the onset of the SW- monsoon, in May 1984. A fourth survey,which was planned for September 1984, at the end of the SW-monsoon,had to be cancelled due to technical problems.

The main survey work was carried out in the region from Ras al Hadd to Salala, while the shelf further north was covered briefly during two of the surveys.

The communities of small pelagic fish were studied with the acoustic method combined with intensive trawling, to sample the acoustic registrations. The conditions were favourable for acoustic research on pelagic fish. The demersal fish were too scattered to be estimated by the acoustic method. Instead, random bottom trawl stations were set out along the cruise track in order to assess the biomass by the swept area method.

Pelagic fish

The small pelagic fish consisted mainly of the Arabian scad (Trachurus indicus), goldstriped sardinella (Sardinella gibbosa), Indian oil-sardinella (Sardinella longiceps), and the Indian scad (Decapterus russelli). Of lesser importance were the rainbow sardine (Dussumieria acuta) and round herring (Etrumeus teres).

The total biomass of small pelagic fish was estimated to 1.0, 1.3 and 1.2 million tonnes during the first, second and third survey respectively. The average estimate is 1.2 million tonnes. The region north of Ras al Hadd and the region east of Ras Marbat were almost without any pelagic fish during the time of the surveys. As an average , the region from Ras al Hadd to Masirah Island had 10% of the pelagic fish, the Masirah Bank 60% and the region from Ras Mabber to Ras Marbat, 30%.

The species composition in the catches combined with the acoustic registrations can provide information for a rough estimate of the abundance of the main species. About 50% of the biomass was constituted by

Trachurus indicus, 25% by Decapterus russelli, 15% Sardinella longiceps and 10% by Sardinella gibbosa.

About 30% of the pelagic biomass was found in aggregations classified as "Very dense" and about 50% in "Dense". These should both represent sufficient high levels for commercial fishing.

The density of fish in the high productive zone Ras al Hadd - Ras Marbat has been compared with other coastal areas of the world it represents one of the richest in terms of density.

The biomass estimates from the three surveys are all higher than estimates from five similar, but less intensive surveys carried out in Oman in the years 1975-76. It might be possible that this points to a major increase in the total productivity of the region due to an ecological shift between the two survey periods. If so, future fluctuations in the productivity should also be expected.

To assess the yield from from a biomass certain biological parameters on the species are necessary and these are lacking for most of the species in Oman, which affects the precision of the assessments. Based on our knowledge and findings, an exploitation level of 23% of the initial biomass seems justifiable. In absolute figures, a yield of 270 thousand tonnes of pelagic fish per year seems reasonable if the total ecosystem maintains the production level of 1983-1984. It is of vital importance that the levels of the fish stocks and the level of the production of the ecosystem are monitored when intensive exploitation is carried out.

The shallow waters of the Masirah bank have been found to be the most important nursery ground for the juvenile stages of the main small pelagic species. This area is probably of vital importance for the regeneration of the small pelagic fish stocks and should not be given access to by any industrial fisheries.

Demersal fish

The total biomass of demersal fish during the three surveys was estimated to 335, 260 and 335 thousand tonnes respectively. An adjusted average estimate is 345 thousand tonnes. The demersal fish community is made up of a multitude of species. Dominating in the catches were the longfin breams (Nemipterus) 11%, seabreams (Sparidae) 12%, catfish (Ariidae) 9%, croakers (Sciaenidae) 10%, grunts (Pomadasyidae) 9%, emperors (Lethrinidae) 6%, all expressed as percent of the total catch.

Data available on the fish market prices in the United Arab Emirates in 1978 have been used to classify the total demersal catch into commercial groupings. 2% of the catch was classified to a value greater than 15 Dirham/kg, 33% to 10-15 Dirham/kg, 35% to 5-9 Dirham/kg and 30% to less than 5 Dirham/kg.

Based on rough assumptions, the yield has been estimated to 22% of the biomass, representing 77 thousand tonnes. Tentative yields by species are also given in this report (the calculated yield of demersal fish by species should be adjusted when catch data become available).

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ANNEX I. Scientific staff

Cruise I 1 -19 March 1983:

From IMR, Bergen

Tore Strømme (cruise leader)
Sigmund Myklevoll
Helge Ullebust
Bjørn Bakken (instrument chief)
Helge Abrahamsen

From the Ministry of Agriculture and Fisheries, Muscat:

Nasser Murbak Salim Al Makheni

Cruise II 7 November - 11 December

Tore Strømme (cruise leader)
Snorre Tilseth
Karsten Hansen
Karin Pittman
Asbjørn Roald (instrument chief)
Tore Mørk

From FAO, Rome:

Gabriella Bianchi

From the Ministry of Agriculture and Fisheries, Muscat:

Ali Saleh Harassy

Cruise III 29 April - 17 May 1984

Tore Strømme (cruise leader)
Kjell Strømsnes
Karin Pittman
Helge Abrahamsen (instrument chief)
Tore Mørk

From the Ministry of Agriculture and Fisheries, Muscat:

Nasser Murbak Salim Al Makheni

ANNEX II

INSTRUMENTS AND FISHING GEAR USED

Acoustic instruments

SIMRAD sounders coupled to QM integrators were used for estimating fish density:

EK 38 KHz (1st and 2nd surveys): basic range 0-100 m+100m;Transmitter Ext 2.5 Kw; Bandwidth and pulse length 3 KHz, 0.6 ms; TVG and GAIN 20 log R-20 dB; Recorder gain 7; Transducer ceramic 9x8 degr.square

QM integrator: Gain 20 dB x 10, Threshold 0.8

SL+VR = 137.9 dB (Calibration 22 Nov 1982 on standard sphere)

137.9 dB (Calibration 4 Dec 1983)

EK 400/38 KHz (3rd survey): Basic range 0-100 + 100 m; Transmitter 4.813 Kw Bandwidth and pulse length 3.3 KHz, 1.0 ms; TVG 20 log R; Attenuator -20 dB; Recorder gain 7; Transducer ceramic 9x8 degr. square

SL+VR 140.7 dB (Calibration 17 May 1984 on standard sphere)

QD integrator (3rd survey): Gain 30 dB, Threshold 17 mV.

EK 400/120 Khz: Basic range 0-100m; Transmitter High, Bandwidth and pulse length 3.3 KHz, 1.0ms; TVG and GAIN 20 log R-0 dB

Recorder Gain 4; Transducer ceramic 10 degr. circular

QM integrator: Gain 10x10 Threshold 0

SL+VR = 112.2 dB (Calibration 31 Aug 1982 on standard sphere)

Hidrography

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

Fishing gear

Bottom trawl: High opening shrimp and fish trawl with rubber bobbins gear. Headline 31 m, assumed effective width 18.5 m; height during trawling abt 6 m.

Pelagic trawls: Type "Harstadtrawl", meshsize codend 21 mm, width abt 30 m, vertical opening abt 15 m; Type modified "Krilltrawl" width abt 50 m, vertical opening abt 30 m, codend meshsize 9 mm.

Annex III. Records of fishing operations FIRST SURVEY

BT=Bottom trawl PT=Pelagic trawl

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION NORTH	POSITION EAST	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
01.03	1805	59	BT	20	20	23 48'	057 53'	993,0	1986,0	Lutjanus lutjanus	438,20	22,0
										Stolephorus indicus	255,20	12,8
										Leiognathus fasciatus	228,80	11,5
										Scomberomorus commersoni	264,00	13,2
04.03	1520	60	BT	60	60	23 21'	058 57'	138,7	277,4	Lethrinus lentjan	67,40	24,2
										Lethrinus microdon	24,40	8,7
										Argyrops spinifer	104,40	37,6
										Fistularia petimba	15,00	5,4
05.03	0555	61	BT	51	45	22 35'	059 41'	1414,0	2828,0	Lethrinus lentjan	884,00	31,2
										Alutera monoceros	450,00	15,9
										Lethrinus microdon	285,00	10,0
										Argyrops spinifer	172,00	6,0
05.03	1050	62	BT	53	53	22 14'	059 51'	301,0	602,0	Argyrops sp.	332,00	55,1
										Carangoides chrysophrys	88,00	14,6
										Arius sp	40,20	6,6
										Decapterus russelli	36,00	5,9
05.03	1400	63	BT	53	47	21 55'	059 45'	219,0	657,0	Cheimerius nufar	153,00	23,2
										Lethrinus microdon	152,10	23,1
										Argyrops spinifer	47,40	7,2
										Lethrinus nebulosus	45,30	6,8
05.03	1749	64	PT	22	12	21 40'	059 30'	435,5	871,0	Dussumiera sp.	485,40	55,7
										Stolephorus punctifier	225,20	25,8
										Sardinella gibbosa	140,60	16,1
										Decapterus russelli	19,60	2,2
06.03	0150	65	PT	29	13	21 25'	059 24'	417,2	1251,6	Sardinella gibbosa	369,60	29,5
										Etrumeus teres	189,60	15,1
										Trichiurus sp.	139,50	11,1
										Decapterus russelli	128,70	10,2
										Dussumieria acuta	126,30	10,0
06.03	0550	66	BT	52	46	21 32'	059 32'	641,0	1282,0	Argyrops spinifer	432,00	33,6
										Albula vulpes	300,00	23,4
										Pagellus affinis	34,00	2,6
										Cheimerius nufar	20,40	1,5
										Gerres filamentosus	152,60	11,9
06.03	0930	67	BT	50	50	21 15'	059 17'	471,0	1884,0	Arius sp	872,00	46,2
										Rhonciscus stridens	306,00	16,2
										Trichiurus sp.	169,20	8,9
										Nemipterus japonicus	108,00	5,7
06.03	1235	68	BT	69	63	21 00'	059 14'	135,0	405,0	Spyraena putnamiae	128,10	31,6
										Pagellus affinis	123,90	30,5
										Argyrops spinifer	67,20	16,5
										Rhizoprionodon acutus	27,30	6,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	GEAR	POSITION NORTH	EAST	CATCH (KG) TOTAL	PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
06.03	1545	69	BT	92	83	20 49'	059 16'	735,0	1470,0	Saurida sp.	1088,00	74,0
										Rhonciscus stridens	113,80	7,7
										Nemipterus japonicus	107,60	7,3
										Trachurus indicus	70,00	4,7
06.03	2000	70	BT	62	62	20 45'	059 05'	327,7	655,4	Rhonciscus stridens	480,00	73,2
										Lepidotrigla sp	67,20	10,2
										Gerres filamentosus	36,00	5,4
										Saurida tumbil	32,40	4,9
07.03	1000	71	OT	16	16	20 10'	058 28'	19,5		Lethrinus nebulosus	15,60	80,0
										Lethrinus nebulosus	2,20	11,2
										Arius sp	1,00	5,1
										Plectorhynchus schotaf	,50	2,5
07.03	1645	72	BT	50	50	20 02'	058 31'	349,0	837,6	Decapterus russelli	529,20	63,1
										Cheimerius nufar	76,32	9,1
										Carangoides chrysophrys	72,00	8,5
										LOLIGINIDAE	70,20	8,3
07.03	1920	73	OT	65	65	19 57'	058 31'	18,9		MURAENIDAE	7,00	37,0
										Lethrinus nebulosus	3,70	19,5
										Rhonciscus stridens	2,05	10,8
										Arius sp	4,90	25,9
07.03	2020	74	PT	31	9	20 00'	058 27'	500,0	1000,0	Trachurus indicus	1000,00	100,0
07.03	2320	75	PT	14	1	20 05'	058 17'	677,5	1355,0	Decapterus russelli	530,40	39,1
										Trachurus indicus	286,00	21,1
										Sardinella gibbosa	150,80	11,1
										Scolopsis bimaculatus	65,00	4,7
08.03	1200	76	BT	98	92	19 45'	058 24'	234,3	400,6	Rhizoprionodon acutus	146,20	36,4
										Trachurus indicus	66,43	16,5
										Nemipterus japonicus	36,25	9,0
										Trichiurus sp.	33,68	8,4
08.03	1650	77	BT	23	17	19 43'	057 58'	28,9	57,8	Lepidotrigla sp	14,60	25,2
										Sepia sp	8,80	15,2
										TETRAODONTIDAE	6,50	11,2
										Saurida sp.	5,60	9,6
08.03	1925	78	PT	22	1	19 42'	057 48'	390,5	781,0	Sardinella gibbosa	422,00	54,0
										Decapterus russelli	256,00	32,7
										Dussumieria acuta	46,60	5,9
										Trachurus indicus	16,30	2,0
08.03	2315	79	OT	20	20	19 27'	058 01'	21,4		Lethrinus nebulosus	,79	65,8
										Epinephelus sp	,24	20,0
										Lethrinus mahsena	,12	10,0
										Lethrinus lentjan	,04	3,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION NORTH	POSITION EAST	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
09.03	0245	80	BT	90	84	19 16'	058 08'	2100,0	4200,0	Trachurus indicus	4050,00	96,4
										Rhizoprionodon acutus	60,00	1,4
09.03	0430	81	PT	84	20	19 17'	058 06'	139,5	558,0	Sardinella longiceps	453,60	81,2
										Trachurus indicus	90,00	16,1
										Decapterus russelli	8,12	1,4
										Selar crumenophthalmus	6,28	1,1
09.03	0830	82	BT	21	21	19 34'	057 51'	132,6	265,2	Cheimerius nufar	70,20	26,4
										Lethrinus nebulosus	44,80	16,8
										Alectis indicus	28,00	10,5
										Carangoides chrysophrys	14,60	5,5
09.03	1230	83	BT	21	17	19 42'	057 58'	1140,6	2281,2	Rhonciscus stridens	1193,20	52,3
										Decapterus russelli	357,20	15,6
										Arius sp	45,60	1,9
										Trachurus indicus	72,20	3,1
09.03	1605	84	BT	21	15	20 06'	058 02'	39,2	156,8	Arius sp	98,00	62,5
										Dasyatis jenkinsii	26,80	17,0
										TRIACANTHODIDAE	14,80	9,4
										Psettodes erumei	11,20	7,1
09.03	2230	85	PT	32	10	19 46'	058 14'	300,0	600,0	Trachurus indicus	358,60	59,7
										Sardinella gibbosa	153,40	25,5
										Alepes djeddaba	57,40	9,5
										Sardinella longiceps	13,40	2,2
10.03	0555	86	BT	89	89	19 14'	058 06'	173,1	346,2	Trachurus indicus	183,00	52,8
										Pagellus affinis	61,00	17,6
										Rhizoprionodon acutus	44,40	12,8
										LOLIGINIDAE	19,50	5,6
10.03	0745	87	PT	93	85	19 14'	058 07'	3120,0	12480,0	Trachurus indicus	12480,00	100,0
10.03	1010	88	BT	44	44	19 13'	057 54'	87,9	175,8	Carangoides equula	77,00	43,7
										Albula vulpes	50,20	28,5
										Gnathanodon speciosus	10,60	6,0
										Rhizoprionodon acutus	8,20	4,6
10.03	1250	89	PT	96	50	18 58'	057 58'	107,4	257,7	Trachurus indicus	144,96	56,2
										Decapterus russelli	102,72	39,8
										Sphyraena obtusata	10,08	3,9
10.03	1645	90	BT	60	54	18 49'	057 45'	63,8	127,6	Spyraena putnamiae	24,20	18,9
										Carangoides chrysophrys	23,60	18,4
										Rhizoprionodon acutus	16,80	13,1
										Gastrophysus lunaris	13,40	10,5

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION NORTH	POSITION EAST	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
11.03	0405	91	PT	112	30	18 30'	057 31'	4,6	6,9	Etrumeus teres	5,32	77,1
										Trichiurus sp.	1,65	23,9
11.03	0705	92	BT	143	140	18 19'	057 27'	2500,0	5000,0	Nemipterus japonicus	2360,00	47,2
										Nemipterus japonicus	83,60	1,6
										Charybdis edwardsi	1392,00	27,8
										Pagellus affinis	1092,00	21,8
11.03	1205	93	BT	15	15	18 45'	057 03'	114,0	228,0	PLOTOSIDAE	40,00	17,5
										Stephanolepis rectifrons	39,60	17,3
										Plectorhynchus schotaf	25,00	10,9
										Lethrinus lentjan	20,40	8,9
11.03	1615	94	BT	80	76	18 22'	057 10'	586,6	1173,2	Decapterus russelli	885,60	75,4
										Pagellus affinis	198,00	16,8
										Gastrophysus lunaris	24,30	2,0
										Loligo sp	21,60	1,8
12.03	0555	95	BT	72	66	17 58'	057 02'	319,9	639,8	Cheimerius nufar	160,80	25,1
										Etrumeus teres	121,20	18,9
										Lethrinus nebulosus	73,00	11,4
										Rhizoprionodon acutus	54,40	8,5
12.03	1105	96	BT	57	57	17 49'	056 55'	253,1	506,2	Lethrinus nebulosus	289,30	57,1
										Cheimerius nufar	80,00	15,8
										Epinephelus sp	48,00	9,4
										Megalaspis cordyla	14,50	2,8
12.03	1220	97	BT	67	61	17 46'	056 59'	365,6	731,2	Lethrinus nebulosus	510,00	69,7
										Cheimerius nufar	169,80	23,2
										Epinephelus aerolatus	23,10	3,1
										Carangoides chrysophrys	12,20	1,6
13.03	0645	98	BT	52	52	17 40'	056 06'	76,5	153,0	Lethrinus nebulosus	62,00	40,5
										Cheimerius nufar	35,40	23,1
										Carangoides chrysophrys	26,00	16,9
										Gastrophysus sceleratus	7,60	4,9
13.03	1025	99	BT	56	56	17 44'	055 56'	32,6	65,2	Rachycentron canadus	29,20	44,7
										Carangoides chrysophrys	19,00	29,1
										Seriolina nigrofasciata	7,70	11,8
										Lethrinus nebulosus	7,00	10,7
13.03	1310	100	BT	41	37	17 53'	055 43'	140,5	281,0	Cheimerius nufar	106,24	37,8
										Lethrinus nebulosus	66,40	23,6
										Carangoides chrysophrys	62,70	22,3
										Trichiurus sp.	16,40	5,8

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION NORTH	POSITION EAST	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
13.03	1525	101	BT	60	54	17 39'	055 50'	274,7	549,4	Lethrinus nebulosus	344,40	62,6
										Cheimerius nufar	80,80	14,7
										Dasyatis uarnak	60,00	10,9
										Lutjanus coccineus	16,20	2,9
13.03	1740	102	BT	74	68	17 31'	055 47'	272,0	544,0	Carcharhinus obscurus	11,20	2,0
										Cheimerius nufar	11,20	2,0
										Argyrops spinifer	25,20	4,6
										Epinephelus sp	25,20	4,6
14.03	1345	103	BT	65	65	17 00'	054 20'	37,4	112,2	Carangoides chrysophrys	76,80	68,4
										Rachycentron canadus	11,55	10,2
										Rhizoprionodon acutus	6,75	6,0
										Lagocephalus sceleratus	6,60	5,8
14.03	1555	104	BT	40	34	16 55'	054 13'	159,1	318,2	Lethrinus nebulosus	98,00	30,7
										Cheimerius nufar	84,60	26,5
										Lethrinus mahsena	41,74	13,1
										Argyrops spinifer	22,10	6,9
13.03	0440	105	PT	36	10	17 39'	055 27'	30,0	60,0	FISH LARVAE	59,00	98,3
										Loligo sp	1,00	1,6
16.03	0555	106	BT	32	32	17 37'	035 26'	134,8	808,8	Lethrinus nebulosus	381,60	47,1
										Epinephelus aerolatus	106,20	13,1
										SCIAENIDAE	85,80	10,6
										Cheimerius nufar	65,40	8,0
16.03	1300	107	OT	32	32	17 53'	056 19'	28,9		Lethrinus nebulosus	15,60	53,9
										Epinephelus sp	11,30	39,1
										Epinephelus aerolatus	2,00	6,9
16.03	1420	108	BT	48	48	17 53'	056 32'	76,5	306,0	Lethrinus nebulosus	100,80	32,9
										Epinephelus sp	76,80	25,0
										Cheimerius nufar	38,40	12,5
										Epinephelus sp	29,60	9,6
16.03	1645	109	OT	43	43	18 08'	056 41'	19,6		Lethrinus nebulosus	6,60	33,6
										Lethrinus lentjan	6,30	32,1
										ANGUILLIFORMES	3,65	18,6
										Epinephelus aerolatus	2,00	10,2
16.03	1835	110	OT	19	19	18 22'	056 51'	26,6		Epinephelus aerolatus	9,00	33,8
										Lethrinus lentjan	8,25	31,0
										Lethrinus nebulosus	5,50	20,6
										Lethrinus sp.	1,70	6,3
16.03	2355	111	BT	22	22	18 29'	056 57'	237,4	474,8	Lethrinus lentjan	120,00	25,2
										APOGONIDAE	120,00	25,2
										Lethrinus nebulosus	52,00	10,9
										Siganus sp	40,00	8,4

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION NORTH	POSITION EAST	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
17.03	0620	112	BT	114	114	18 05'	057 14'	3000,0	6000,0	Decapterus russelli	3728,00	62,1
										Saurida sp.	1124,00	18,7
										Pagellus affinis	910,00	15,1
										Nemipterus japonicus	142,00	2,3
17.03	1030	113	PT	400	60	17 46'	057 24'	7,0	7,0	Charybdis edwardsi	7,00	100,0
17.03	1440	114	PT	366	60	17 54'	057 25'	,9	1,8	Charybdis edwardsi	1,70	94,4
17.03	1945	115	PT	382	15	18 17'	057 36'	22,9	45,8	Trachurus indicus	11,20	24,4
										Champsodon sp.	10,00	21,8
										Krill	20,00	43,6
										Selar crumenophthalmus	1,70	3,7
18.03	0255	116	PT	>500	20	17 39'	057 24'	6,9	13,8	Selar crumenophthalmus	4,90	35,5
										Sardinella longiceps	3,40	24,6
										Krill	4,00	28,9
										Charybdis edwardsi	1,20	8,6

Gear codes: BT = Bottom trawl, PT = Pelagic trawl

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
08.11	1715	117	BT	71	71	N23 44'	E058 30'	1347,0	2694,0	Decapterus russelli	1936,00	71,8
										Spyraena putnamiae	452,00	16,7
										Saurida undosquamis	106,00	3,9
										Argyrops spinifer	70,00	2,5
08.11	2020	118	BT	59	59	N28 49'	E058 13'	282,7	565,4	Saurida tumbil	176,26	31,1
										Nemipterus japonicus	87,38	15,4
										SEPIIDAE	52,50	9,2
										Nemipterus bleekeri	43,50	7,6
09.11	0110	119	BT	44	44	N23 54'	E057 42'	639,9	1279,8	Saurida tumbil	812,00	63,4
										Nemipterus sp.	147,00	11,4
										SEPIIDAE	53,90	4,2
										Upeneus sulphureus	36,40	2,8
09.11	0550	120	BT	39	39	N24 02'	E057 25'	116,0	232,0	Saurida tumbil	59,40	25,6
										SEPIIDAE	39,00	16,8
										Leiognathus fasciatus	33,00	14,2
										Lutjanus lutjanus	18,00	7,7
09.11	0800	121	BT	34	34	N24 00'	E057 14'	81,6	163,2	Saurida tumbil	52,00	31,8
										Drepane punctata	44,20	27,0
										Argyrops filamentosus	8,70	5,3
										Plectorhynchus sp.	8,00	4,9
										Psettodes erumei	24,00	14,7
09.11	1045	122	BT	57	57	N24 12'	E057 07'	108,0	216,0	Spyraena putnamiae	40,00	18,5
										Carangoides malabaricus	123,60	57,2
										SEPIIDAE	13,80	6,3
										Nemipterus sp.	11,00	5,0
09.11	1240	123	BT	20	20	N24 08'	E056 58'	243,1	486,2	MYLIOBATINAE	57,60	11,8
										Drepane longmana	54,60	11,2
										Diagramma picta	44,40	9,1
										Lethrinus sp.	38,40	7,8
09.11	1540	124	BT	46	46	N24 26'	E056 51'	97,2	194,4	Spyraena putnamiae	39,60	20,3
										Rastrelliger kanagurta	28,00	14,4
										Ariomma indica	24,00	12,3
										Carangoides malabaricus	23,20	11,9
09.11	1715	125	BT	33	33	N24 29'	E056 45'	187,0	448,8	Argyrops spinifer	60,48	13,4
										Diagramma picta	56,16	12,5
										Lutjanus lutjanus	76,08	16,9
										Lethrinus miniatus	25,68	5,7
09.11	2010	126	BT	100	100	N24 45'	E056 40'	109,6	219,2	Nemipterus japonicus	66,00	30,1
										SCIAENIDAE	35,00	15,9
										Parupeneus sp.	16,80	7,6
										SEPIIDAE	15,00	6,8

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
10.11	0000	127	PT	310	50	N24 50'	E056 50'	80,0	160,0	MYCTOPHIDAE	151,20	94,5
										Trichiurus lepturus	8,80	5,5
10.11	0920	128	PT	>500	300	N24 47'	E057 09'	22,2	44,4	MYCTOPHIDAE	40,00	90,0
										Trichiurus lepturus	,80	1,8
										LOLIGINIDAE	3,00	6,7
										Decapterus russelli	,60	1,3
10.11	1300	129	PT	372	260	N24 34'	E057 03'	20,8	41,6	Trichiurus lepturus	4,00	9,6
										SALPS	1,00	2,4
										LOLIGINIDAE	,50	1,2
										MYCTOPHIDAE	36,00	86,5
10.11	1515	130	PT	292	125	N24 05'	E057 00'	60,0	120,0	MYCTOPHIDAE	120,00	100,0
10.11	1935	131	PT	300	50	N24 27'	E057 02'	125,0	250,0	MYCTOPHIDAE	250,00	100,0
10.11	2350	132	PT	292	40	N24 27'	E056 59'	360,0	720,0	MYCTOPHIDAE	720,00	100,0
11.11	0450	133	PT	275	50	N24 21'	E057 03'	330,0	660,0	MYCTOPHIDAE	660,00	100,0
11.11	1005	134	PT	287	250	N24 27'	E056 59'	41,0	82,0	MYCTOPHIDAE	82,00	100,0
11.11	1125	135	PT	292	175	N24 27'	E056 59'	902,0	1804,0	MYCTOPHIDAE	1800,00	99,7
11.11	1850	136	PT	>500	45	N24 23'	E057 23'	66,0	132,0	MYCTOPHIDAE	132,00	100,0
11.11	2215	137	PT	>500	40	N24 49'	E057 34'	55,0	110,0	MYCTOPHIDAE	110,00	100,0
12.11	0145	138	PT	>500	20	N24 54'	E057 51'	16,0	32,0	MYCTOPHIDAE	12,60	39,3
										Selar crumenophthalmus	7,60	23,7
										JELLYFISH	5,00	15,6
										Trichiurus lepturus	2,00	6,2
12.11	0455	139	PT	>500	25	N24 35'	E057 52'	15,4	30,8	Selar crumenophthalmus	9,80	31,8
										Cubiceps sp.	15,80	51,2
										Sardinella longiceps	4,00	12,9
										SCOMBRIDAE	,60	1,9
12.11	0825	140	PT	>500	340	N24 11'	E057 43'	10,8	21,6	MYCTOPHIDAE	16,40	75,9
										Selar crumenophthalmus	2,40	11,1
										Sardinella longiceps	,60	2,7
										Lestidium sp.	,50	2,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
12.11	1305	141	PT	22	1	N23 48'	E058 01'	1,0	2,0	JELLYFISH	2,00	100,0
12.11	1535	142	BT	18	18	N23 46'	E058 00'	181,4	362,8	Saurida tumbil	81,20	22,3
										Gerres filamentosus	49,80	13,7
										Gnathanodon speciosus	37,80	10,4
										R A Y S	36,00	9,9
13.11	1015	143	PT	370	280	N23 56'	E058 05'	21,3	42,6	MYCTOPHIDAE	38,00	89,2
										LOLIGINIDAE	2,80	6,5
										Trichiurus lepturus	1,80	4,2
14.11	1840	144	PT	>500	30	N24 22'	E058 32'	233,0	466,0	MYCTOPHIDAE	409,60	87,8
										Cubiceps sp.	56,40	12,1
14.11	2245	145	PT	410	225	N23 54'	E058 23'	25,0	50,0	MYCTOPHIDAE	50,00	100,0
15.11	0200	146	PT	>500	225	N23 48'	E058 32'	19,8	39,6	MYCTOPHIDAE	1,40	3,5
										Trichiurus lepturus	23,40	59,0
										Trachinocephalus sp.	11,90	30,0
										Cubiceps sp.	,80	2,0
16.11	0430	147	PT	>500	25	N22 37'	E059 51'	34,3	68,6	MYCTOPHIDAE	44,00	64,1
										Cubiceps sp.	9,60	13,9
										Saurida tumbil	9,60	13,9
										Selar crumenophthalmus	3,80	5,5
16.11	1315	148	PT	>500	290	N23 17'	E060 11'	9,6	19,2	MYCTOPHIDAE	12,40	64,5
										Cubiceps sp.	4,00	20,8
										C E P H A L O P O D A	1,20	6,2
										Sphyraena obtusata	,60	3,1
20.11	0615	149	BT	49	49	N22 35'	E059 41'	574,2	1148,4	Lethrinus elongatus	448,60	39,0
										Argyrops spinifer	229,80	20,0
										Sphyraena africana	151,80	13,2
										Lethrinus nebulosus	94,20	8,2
20.11	0945	150	BT	39	39	N22 14'	E059 50'	823,3	1646,6	Argyrops spinifer	1440,00	87,4
										Sphyraena africana	57,20	3,4
										Carangoides chrysophrys	55,60	3,3
										Gnathanodon speciosus	27,00	1,6
20.11	1420	151	BT	52	52	N21 55'	E059 45'	639,4	1278,8	Argyrops spinifer	441,60	34,5
										Trichiurus lepturus	247,20	19,3
										Lethrinus nebulosus	44,00	3,4
										Pomadasys stridens	152,00	11,8
20.11	1705	152	BT	35	35	N21 49'	E059 38'	744,6	1489,2	Pomadasys stridens	377,40	25,3
										Arius thalassinus	832,00	55,8
										Trichiurus lepturus	87,00	5,8
										Argyrops spinifer	117,20	7,8

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
20.11	1940	153	PT	110	65	N21 43'	E059 41'	132,6	265,2	Decapterus russelli	265,20	100,0
21.11	0620	154	BT	61	61	N21 29'	E059 32'	757,1	1514,2	Argyrops spinifer	445,40	29,4
										Trachurus indicus	385,40	25,4
										Decapterus russelli	206,00	13,6
										Nemipterus japonicus	130,20	8,5
21.11	0845	155	BT	51	51	N21 24'	E059 26'	20,3	40,6	Argyrops spinifer	25,60	63,0
										Nemipterus japonicus	6,80	16,7
										Pomadasys stridens	4,00	9,8
										Pagellus affinis	2,70	6,6
21.11	1045	156	BT	53	53	N21 21'	E059 23'	33,4	66,8	Argyrops spinifer	31,00	46,4
										Trachurus indicus	11,20	16,7
										Carangoides chrysophrys	9,40	14,0
										Megalaspis cordyla	5,40	8,0
21.11	1325	157	BT	66	66	N21 14'	E059 25'	254,8	509,6	Argyrops spinifer	158,60	31,1
										Pagellus affinis	121,80	23,9
										Trachurus indicus	105,80	20,7
										Decapterus russelli	34,50	6,7
21.11	1545	158	BT	24	24	N21 16'	E059 13'	174,8	349,6	Arius tenuispinis	155,00	44,3
										Pomadasys opercularis	90,00	25,7
										Argyrops spinifer	35,20	10,0
										Lepidotrigla bentuviai	30,00	8,5
21.11	1725	159	BT	61	61	N21 09'	E059 19'	109,6	219,2	Trachurus indicus	118,80	54,1
										Pomadasys stridens	85,20	38,8
										Nemipterus japonicus	3,60	1,6
										Arius tenuispinis	9,60	4,3
21.11	2125	160	PT	72	62	N21 03'	E059 17'	1020,0	2040,0	Trachurus indicus	2040,00	100,0
22.11	0210	161	PT	65	40	N20 55'	E059 10'	1199,7	2399,4	Pomadasys stridens	1586,80	66,1
										Trachurus indicus	677,20	28,2
										Decapterus russelli	116,00	4,8
22.11	0615	162	BT	104	104	N20 49'	E059 21'	82,4	164,8	Decapterus russelli	84,60	51,3
										Saurida undosquamis	39,20	23,7
										Pagellus affinis	19,80	12,0
										Nemipterus japonicus	11,60	7,0
22.11	0855	163	PT	114	100	N20 40'	E059 16'	2,6	5,2	Trachurus indicus	5,20	100,0
22.11	1115	164	BT	70	70	N20 44'	E059 05'	454,3	908,6	Nemipterus japonicus	803,00	88,3
										Trachurus indicus	105,60	11,6

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
22.11	1420	165	BT	54	54	N20 38'	E059 01'	45,1	90,2	JELLYFISH	30,00	33,2
										Argyrops spinifer	31,60	35,0
										Arius thalassinus	14,20	15,7
										Pagellus affinis	8,80	9,7
22.11	1600	166	PT	82	58	N20 36'	E059 05'	1159,7	2319,4	Trachurus indicus	1657,80	71,4
										Decapterus russelli	594,00	25,6
										Nemipterus japonicus	64,80	2,7
22.11	1735	167	BT	98	98	N20 35'	E059 09'	151,2	302,4	Nemipterus japonicus	130,00	42,9
										Decapterus russelli	97,00	32,0
										Lepidotrigla omanensis	34,00	11,2
										Saurida undosquamis	19,00	6,2
23.11	0030	168	PT	>500	18	N20 23'	E059 08'	720,0	1440,0	MYCTOPHIDAE	1440,00	100,0
23.11	0445	169	PT	72	50	N20 15'	E058 50'	60,0	120,0	Nemipterus japonicus	120,00	100,0
23.11	0730	170	BT	78	78	N20 05'	E058 40'	91,7	366,8	Nemipterus japonicus	363,60	99,1
23.11	1240	171	BT	42	42	N20 02'	E058 30'	653,5	1307,0	Lepidotrigla bentuviai	708,40	54,2
										Cheimerius nufar	226,80	17,3
										Carangoides chrysophrys	60,40	4,6
										Epinephelus diacanthus	57,20	4,3
										RHINOBATIDAE	140,00	10,7
23.11	1610	172	BT	18	18	N20 03'	E058 21'	358,3	716,6	RHINOBATIDAE	560,00	78,1
										Scomberoides commersonianus	30,00	4,1
										Arius thalassinus	30,00	4,1
										Carangoides chrysophrys	28,40	3,9
23.11	1925	173	PT	24	1	N20 02'	E058 10'	323,0	646,0	Sardinella gibbosa	444,80	68,8
										Sardinella longiceps	104,00	16,0
										Megalaspis cordyla	45,20	6,9
										Alepes vari	16,20	2,5
24.11	0700	174	BT	17	17	N20 19'	E058 07'	4877,4	9754,8	Argyrosomus hololepidotus	9214,00	94,4
										Scomberoides commersonianus	284,20	2,9
										Arius thalassinus	144,60	1,4
24.11	0955	175	BT	15	15	N20 12'	E058 01'	349,3	698,6	Arius thalassinus	190,80	27,3
										CARCHARHINIDAE	185,00	26,4
										Triacanthus biaculeatus	69,60	9,9
										Trachurus indicus	60,00	8,5
24.11	1235	176	BT	20	20	N20 01'	E057 53'	2,4	70,5	Trachurus indicus	51,00	72,3
										Alepes vari	7,50	10,6
										Pomadasys maculatus	7,50	10,6
										Pomadasys stridens	4,50	6,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
24.11	1450	177	BT	21	21	N19 49'	E057 58'	722,6	1445,2	Arius thalassinus	951,60	65,8
										R A Y S	400,00	27,6
										Alepes vari	52,00	3,5
										Argyrops spinifer	30,80	2,1
24.11	2140	178	PT	40	30	N19 50'	E058 20'	505,6	1011,2	Trachurus indicus	672,20	66,4
										Decapterus russelli	169,00	16,7
										Carangoides malabaricus	49,40	4,8
										Lepidotrigla sp	48,20	4,7
25.11	0230	179	PT	40	22	N19 44'	E058 17'	3976,3	7952,6	Trachurus indicus	6852,60	86,1
										Sphyraena africana	1100,00	13,8
25.11	0705	180	BT	27	27	N19 41'	E058 08'	4,4	8,8	Arius tenuispinis	8,80	100,0
25.11	0920	181	BT	22	22	N19 43'	E027 27'	140,4	280,8	Arius tenuispinis	182,40	64,9
										Arius thalassinus	45,60	16,2
										Alepes vari	44,80	15,9
										MOBULIDAE	8,00	2,8
25.11	1220	182	BT	21	21	N19 37'	E057 51'	40,0	80,0	Sepia sp	40,00	50,0
										Arius sp	40,00	50,0
25.11	1455	183	BT	22	22	N19 34'	E058 03'	159,5	319,0	Diagramma picta	100,40	31,4
										Lethrinus nebulosus	60,00	18,8
										Argyrops spinifer	44,00	13,7
										Cheimerius nufar	26,00	8,1
25.11	2110	184	PT	26	1	N20 00'	E058 03'	304,5	608,9	Spyraena putnamiae	107,60	17,6
										Sardinella gibbosa	144,00	23,6
										Trachurus indicus	64,00	10,5
										CARCHARHINIDAE	247,80	40,6
26.11	0420	185	PT	113	60	N19 51'	E058 33'	,0	,0	N O C A T C H	,00	,0
26.11	1425	186	BT	55	55	N19 26'	E058 06'	,0	,0	N O C A T C H	,00	,0
26.11	1645	187	BT	20	20	N19 29'	E057 54'	919,1	1838,2	Lethrinus nebulosus	1046,60	56,9
										R A Y S	200,00	10,8
										Diagramma picta	147,60	8,0
										Scolopsis taeniatus	69,00	3,7
27.11	0725	188	BT	57	57	N19 19'	E057 59'	40,0	80,0	Sarda orientalis	31,00	38,7
										Sepia sp	16,80	21,0
										Carangoides chrysophrys	9,00	11,2
										Cookeolus boops	4,80	6,0

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
27.11	1155	189	BT	105	105	N19 12'	E058 08'	1447,3	2894,6	Trachurus indicus	2890,00	99,8
27.11	1605	190	BT	65	65	N19 07'	E057 57'	1820,7	3641,4	Trachurus indicus	3641,40	100,0
27.11	2115	191	PT	87	40	N18 58'	E057 57'	10000,0	20000,0	Trachurus indicus	20000,00	100,0
28.11	0755	192	BT	43	43	N18 50'	E057 31'	292,6	585,2	Cheimerius nufar	161,80	27,6
										Sepia sp	149,00	25,4
										Lethrinus nebulosus	129,60	22,1
										Argyrops filamentosus	39,60	6,7
28.11	1030	193	BT	87	87	N18 38'	E058 38'	1,6	3,2	Champsodon sp.	,80	25,0
										Pteridotrigla hemisticata	,80	25,0
										Cookeolus boops	,50	15,6
										SEPIIDAE	,40	12,5
										Sphyraena obtusata	,40	12,5
28.11	1600	194	PT	>500	35	N18 13'	E057 39'	3,0	6,0	CRABS	6,00	100,0
29.11	0425	195	PT	>500	50	N18 02'	E057 35'	3,3	6,6	MYCTOPHIDAE	3,00	45,4
										Etrumeus teres	1,00	15,1
										Sardinella longiceps	,80	12,1
										Synodus sp.	,80	12,1
29.11	0950	196	PT	>500	40	N17 54'	E057 31'	1,8	3,6	Etrumeus teres	1,40	38,8
										Trachurus indicus	,90	25,0
										Sardinella longiceps	,60	16,6
										Decapterus russelli	,60	16,6
29.11	1730	197	BT	84	84	N18 20'	E057 13'	3077,8	6155,6	Decapterus russelli	6000,00	97,4
										Saurida undosquamis	84,00	1,3
29.11	2335	198	PT	20	1	N18 27'	E056 56'	128,4	256,8	Sardinella longiceps	118,60	46,1
										Triacanthus biaculeatus	60,00	23,3
										R A Y S	40,00	15,5
										Arius thalassinus	18,50	7,2
30.11	0525	199	PT	245	45	N17 49'	E057 18'	209,1	836,4	APOGONIDAE	824,00	98,5
										Echeneis naucrates	9,60	1,1
30.11	0720	200	BT	356	356	N17 45'	E057 22'	283,4	566,8	Champsodon sp.	230,40	40,6
										OPHIDIIDAE	144,00	25,4
										Psenopsis cyanea	67,20	11,8
										Pteridotrigla hemisticata	56,00	9,8
30.11	1300	201	BT	74	74	N17 56'	E057 03'	123,9	247,8	Cheimerius nufar	82,60	33,3
										Argyrops filamentosus	46,00	18,5
										Epinephelus diacanthus	33,20	13,3
										Carangoides equula	24,00	9,6

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
30.11	1545	202	BT	32	32	N18 07'	E056 56'	113,4	453,6	Lethrinus nebulosus	72,00	15,8
										Cheimerius nufar	55,60	12,2
										Parascolopsis eriomma	46,80	10,3
										Epinephelus sp	40,00	8,8
01.12	2330	203	PT	48	10	N17 53'	E056 13'	46,7	93,4	R A Y S	40,00	42,8
										Sardinella longiceps	24,00	25,6
										Arius thalassinus	17,20	18,4
										Etrumeus teres	5,40	5,7
02.12	0625	204	BT	55	55	N17 44'	E056 03'	206,2	412,4	Lethrinus nebulosus	259,00	62,8
										Cheimerius nufar	90,20	21,8
										Lutjanus coccineus	16,00	3,8
										Epinephelus sp	14,00	3,3
02.12	0830	205	BT	63	63	N17 54'	E056 00'	,0	,0	N O C A T C H	,00	,0
02.12	1115	206	BT	54	54	N17 44'	E055 52'	168,9	1013,4	Lethrinus nebulosus	392,40	38,7
										Cheimerius nufar	300,60	29,6
										Epinephelus sp	125,40	12,3
										Epinephelus chlorostigma	74,40	7,3
02.12	1740	207	BT	49	49	N17 41'	E055 34'	181,8	363,6	Carangoides chrysophrys	132,00	36,3
										Lethrinus nebulosus	78,40	21,5
										Arius thalassinus	48,20	13,2
										Plectorhynchus schotaf	39,20	10,7
03.12	0005	208	PT	170	20	N17 24'	E055 19'	101,0	202,0	Sardinella longiceps	153,00	75,7
										Etrumeus teres	32,40	16,0
										Arius thalassinus	13,40	6,6
04.12	1615	209	BT	54	54	N17 00'	E054 35'	494,9	989,8	Cheimerius nufar	474,60	47,9
										Argyrops spinifer	121,40	12,2
										Epinephelus diacanthus	66,80	6,7
										Arius thalassinus	58,40	5,9
04.12	1835	210	PT	24	1	N17 00'	E054 22'	258,0	516,0	Sardinella gibbosa	310,00	60,0
										Sardinella longiceps	90,00	17,4
										Sphyraena obtusata	62,00	12,0
										Trachurus indicus	20,00	3,8
08.12	1150	211	PT	118	80	N19 07'	E058 06'	16,6	7,3	Scomber japonicus	4,88	66,8
										Trachurus indicus	2,42	33,1
08.12	1925	212	PT	137	120	N19 11'	E058 09'	608,0	2432,0	Trachurus indicus	2368,00	97,3
										Lepidotrigla bentuviai	25,60	1,0
										Pteridotrigla hemisticata	38,40	1,5

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
09.12	0855	213	PT	95	85	N19 19'	E058 10'	1063,0	1063,0	Trachurus indicus	1063,00	100,0
10.12	0000	214	PT	98	90	N19 43'	E058 25'	495,0	846,4	Trachurus indicus	846,45	100,0

THIRD SURVEY

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
30.04	0845	215	BT	40	40	N16 54'	E054 07'	223,5	447,0	Lethrinus nebulosus	271,00	60,6
										Cheimerius nufar	61,60	13,7
										SHARK	34,00	7,6
										Parupeneus fraterculus	17,30	3,8
01.05	0400	216	PT	>500	20	N17 26'	E053 35'	6015,5	12031,0	MYCTOPHIDAE	12000,00	99,7
01.05	1335	217	BT	57	57	N17 37'	E055 54'	37,4	74,8	Lutjanus coccineus	17,00	22,7
										Loxodon macrorhinus	16,00	21,3
										Lethrinus nebulosus	13,60	18,1
										Chelonodon sp.	13,20	17,6
										Cheimerius nufar	12,00	16,0
01.05	1615	218	BT	64	64	N17 54'	E056 02'	369,6	739,2	Saurida undosquamis	540,00	73,0
										Nemipterus japonicus	55,20	7,4
										Loligo sp	45,60	6,1
										Lutjanus sp	36,00	4,8
02.05	1315	219	BT	20	20	N18 18'	E056 49'	860,0	1720,0	Lethrinus nebulosus	360,00	20,9
										Cheimerius nufar	120,00	6,9
										Plectorhynchus pictus	240,00	13,9
										Plectorhynchus chubbi	120,00	6,9
										Epinephelus malabaricus	360,00	20,9
02.05	1540	220	BT	35	35	N18 06'	E056 57'	696,9	1393,8	Epinephelus sp	240,60	17,2
										Lethrinus nebulosus	228,00	16,3
										Cheimerius nufar	196,20	14,0
										Lethrinus opercularis	155,80	11,1
02.05	1825	221	PT	102	30	N17 53'	E057 06'	,0	,0	N O C A T C H	,00	,0
02.05	2125	222	BT	118	118	N17 47'	E057 06'	3599,7	7199,4	Trachurus indicus	5538,00	76,9
										Lepidotrigla bentuviai	1132,80	15,7
										Nemipterus japonicus	377,60	5,2
										Apogon sp	151,00	2,0
03.05	0545	223	BT	80	80	N18 11'	E057 04'	280,0	560,0	Saurida undosquamis	285,80	51,0
										Sepia sp	93,60	16,7
										Lepidotrigla bentuviai	49,78	8,8
										Nemipterus japonicus	39,40	7,0
03.05	0735	224	BT	50	50	N18 19'	E057 02'	17998,0	53994,0	Trachurus indicus	38265,00	70,8
										Sardinella longiceps	15729,00	29,1
03.05	1420	225	BT	19	19	N18 29'	E056 54'	37,9	75,8	Apogon sp	22,00	29,0
										Sufflamen fraenatus	16,00	21,1
										Arius thalassinus	8,00	10,5
										Sepia sp	4,00	5,2
										DASYATIDAE	18,00	23,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
04.05	0420	226	BT	95	95	N18 26'	E057 27'	2565,0	5130,0	Trachurus indicus	4250,00	82,8
										Nemipterus japonicus	410,00	7,9
										Lepidotrigla bentuviai	470,00	9,1
04.05	1030	227	BT	82	82	N18 35'	E057 25'	1128,6	2257,2	Trachurus indicus	1314,80	58,2
										Nemipterus japonicus	391,40	17,3
										Pagellus affinis	285,00	12,6
										Sepia sp	140,60	6,2
04.05	1350	228	PT	126	60	N18 29'	E057 31'	1,4	,9	Trachurus indicus	,92	102,2
04.05	2105	229	BT	79	79	N18 41'	E057 37'	1499,8	2999,6	Trachurus indicus	2869,40	95,6
										Pagellus sp.	104,20	3,4
05.05	0115	230	BT	80	80	N18 42'	E057 42'	10000,8	20001,6	Trachurus indicus	19846,00	99,2
05.05	0855	231	BT	17	17	N18 56'	E057 44'	224,6	449,2	Trichiurus lepturus	100,00	22,2
										Carangoides malabaricus	62,00	13,8
										Rhabdosargus haffara	45,00	10,0
										Trachurus indicus	38,00	8,4
06.05	0900	232	BT	111	111	N19 06'	E058 04'	1500,0	3000,0	Trachurus indicus	2892,80	96,4
										Nemipterus japonicus	89,20	2,9
06.05	1125	233	BT	32	32	N19 10'	E057 50'	34,8	69,6	Sepia sp	49,00	70,4
										Carangoides chrysophrys	10,00	14,3
										Arius thalassinus	5,40	7,7
										Loxodon sp.	2,00	2,8
06.05	1410	234	BT	61	61	N19 13'	E057 59'	305,4	610,8	Carangoides equula	193,20	31,6
										Cheimerius nufar	101,00	16,5
										CARCHARHINIDAE	93,20	15,2
										Sepia sp	86,60	14,1
06.05	1825	235	BT	72	72	N19 20'	E058 02'	1586,3	3172,6	Pomadasys stridens	1740,00	54,8
										Lepidotrigla bentuviai	319,00	10,0
										Trachurus indicus	290,00	9,1
										Arius thalassinus	203,00	6,3
06.05	2210	236	PT	24	10	N19 28'	E057 51'	83,8	167,6	Trachurus indicus	115,00	68,6
										Decapterus russelli	13,40	7,9
										Trachinotus blochii	7,20	4,2
										Plectorhynchus pictus	5,40	3,2
07.05	0700	237	BT	15	15	N19 45'	E057 49'	1639,3	4917,9	Ancharius brevibarbis	4500,00	91,5
										Argyrosomus hololepidotus	162,00	3,2
										Argyrops spinifer	130,50	2,6
										Plectorhynchus sp.	99,90	2,0

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
07.05	1040	238	BT	100	100	N19 38'	E058 19'	22748,2	45496,4	Trachurus indicus	40408,00	88,8
										Decapterus russelli	2843,40	6,2
										Nemipterus japonicus	2245,00	4,9
07.05	1540	239	BT	33	33	N19 49'	E058 40'	108,8	217,6	Pagellus natalensis	51,00	23,4
										Loligo sp	36,00	16,5
										Plectorhynchus pictus	25,00	11,4
										Lagocephalus spadiceus	15,60	7,1
07.05	2140	240	PT	25	10	N20 01'	E058 07'	575,1	1150,2	Trachurus indicus	924,00	80,3
										Alepes vari	105,00	9,1
										Sardinella longiceps	44,00	3,8
										Sardinella gibbosa	31,50	2,7
08.05	0050	241	PT	18	1	N20 11'	E058 02'	518,9	1037,8	Trachurus indicus	440,00	42,3
										R A Y S	150,00	14,4
										Arius thalassinus	130,00	12,5
										Sphyraena sp.	108,00	10,4
08.05	0445	242	BT	21	21	N20 12'	E058 06'	139,8	279,6	Trachurus indicus	190,00	67,9
										Arius thalassinus	38,00	13,5
										Carangoides ferdau	19,00	6,7
										Sardinella longiceps	13,00	4,6
08.05	1155	243	BT	52	52	N20 02'	E058 32'	199,1	597,3	Cheimerius nufar	391,50	65,5
										Argyrops spinifer	60,00	10,0
										Lethrinus nebülosus	54,00	9,0
										Arius thalassinus	15,60	2,6
09.05	0430	244	BT	114	114	N20 39'	E059 15'	1999,9	3999,8	Trachurus indicus	3604,20	90,1
										Nemipterus japonicus	141,40	3,5
										Scomber japonicus	141,40	3,5
										Pteridotrigla hemisticata	56,40	1,4
09.05	0950	245	BT	23	23	N21 02'	E059 01'	96,7	193,4	Argyrops spinifer	71,80	37,1
										Loligo sp	53,80	27,8
										Leiognathus berbis	23,60	12,2
										CARCHARHINIDAE	14,40	7,4
09.05	1315	246	BT	75	75	N21 03'	E059 19'	467,8	935,6	Selar crumenophthalmus	237,60	25,3
										Trachurus indicus	139,40	14,8
										Decapterus russelli	98,00	10,4
										Sepia sp	97,00	10,3
09.05	1645	247	BT	72	72	N21 09'	E059 24'	471,6	943,2	Pagellus affinis	175,20	18,5
										Selar crumenophthalmus	128,00	13,5
										Saurida undosquamis	102,40	10,8
										Nemipterus japonicus	88,00	9,3

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	%
10.05	0700	248	BT	41	41	N02 20'	E059 45'	702,5	1405,0	Argyrops spinifer	721,60	51,3
										Carangoides chrysophrys	233,40	16,6
										Pagellus affinis	145,00	10,3
										Lethrinus nebulosus	90,00	6,4
10.05	0855	249	BT	89	89	N22 03'	E059 48'	1499,8	4499,4	Decapterus russelli	1487,10	33,0
										Argyrops spinifer	1258,50	27,9
										Nemipterus japonicus	1220,10	27,1
										Saurida undosquamis	175,50	3,9
10.05	1140	250	BT	74	74	N22 15'	E059 51'	835,7	1671,4	Selar crumenophthalmus	560,00	33,5
										Argyrops spinifer	464,00	27,7
										Cheimerius nufar	319,00	19,0
										Pomadasys stridens	130,50	7,8
14.05	0315	251	PT	>500	250	N23 55'	E058 27'	10,9	21,8	Harpadon sp.	15,40	70,6
										MISCELLANEOUS	3,00	13,7
										Trachipterus sp.	2,20	10,0
										Cubiceps sp.	1,20	5,5
14.05	0440	252	PT	>500	40	N23 55'	E058 27'	13,1	26,2	MYCTOPHIDAE	21,00	80,1
										Cubiceps sp.	2,80	10,6
										Harpadon sp.	1,00	3,8
										Neoepinnula orientalis	,60	2,2
14.05	0805	253	BT	50	50	N23 49'	E058 12'	901,1	1802,2	Upeneus sulphureus	906,40	50,2
										Leiognathus fasciatus	330,00	18,3
										Nemipterus japonicus	239,80	13,3
										SHARK	149,60	8,3
14.05	1340	254	BT	30	30	N23 53'	E057 43'	110,1	220,2	Gnathanodon speciosus	140,00	63,5
										Nemipterus peroni	16,00	7,2
										Psettodes erumei	11,60	5,2
										Carangoides chrysophrys	10,00	4,5
14.05	1505	255	BT	20	20	N23 52'	E057 39'	150,4	330,9	Lutjanus malabaricus	60,60	18,3
										Lethrinus elongatus	37,20	11,2
										Lethrinus nebulosus	28,00	8,4
										Gnathanodon speciosus	24,80	7,4
15.05	0050	256	PT	305	245	N24 28'	E057 00'	22,5	45,0	MYCTOPHIDAE	40,00	88,8
										Trichiurus lepturus	3,00	6,6
										MURAENIDAE	2,00	4,4
15.05	0200	257	PT	320	40	N24 29'	E057 00'	105,0	210,0	MYCTOPHIDAE	210,00	100,0
15.05	0725	258	BT	60	60	N24 34'	E056 44'	218,4	436,8	Nemipterus japonicus	72,80	16,6
										Upeneus sulphureus	53,60	12,2
										Carangoides malabaricus	41,60	9,5
										CARCHARHINIDAE	38,40	8,7

DATE	TIME START	STN No.	GEAR TYPE	DEPTH (M) BOTTOM	DEPTH (M) GEAR	POSITION LATIT.	POSITION LONGIT.	CATCH (KG) TOTAL	CATCH (KG) PR HR	DOMINANT SPECIES	WEIGTH (KG) PR HR	WEIGTH (KG) %
15.05	1630	259	BT	64	64	N25 03'	E056 29'	82,5	198,0	Trichiurus lepturus	96,00	48,4
										Lethrinus opercularis	36,00	18,1
										Lutjanus bengalensis	8,64	4,3
										SHARK	8,16	4,1
16.05	0840	260	BT	81	81	N25 43'	E056 31'	170,1	340,2	Ariomma indica	69,60	20,4
										Promicrops lanceolatus	37,60	11,0
										Argyrops spinifer	31,20	9,1
										Carangoides malabaricus	29,60	8,7
16.05	1130	261	BT	61	61	N25 52'	E056 27'	63,2	189,6	Carangoides malabaricus	34,50	18,1
										CARCHARHINIDAE	22,50	11,8
										Lutjanus malabaricus	19,50	10,2
										Argyrops spinifer	19,20	10,1

ANNEX IV

Results from the length measurements.

FAMILY/SPECIES	STATION	LENGTHS IN SAMPLE LOWEST	HIGHEST	MEAN	ST. DEV.	N
ALBULIDAE						
Albula vulpes	66	71.0	80.0	75.3	1.9	44
ARIIDAE						
Arius tenuispinis	158	30.0	48.0	39.7	4.0	103
ARIOMMIDAE						
Ariomma indica	124	19.0	26.0	20.5	1.2	46
CARANGIDAE						
Carangoides sp.	61	41.0	56.0	47.2	3.3	34
Carangoides malabaricus	122	20.0	42.0	29.3	5.6	46
	123	24.0	34.0	29.3	2.7	21
Carangoides chrysophrys	62	23.0	52.0	41.1	8.9	30
	100	33.0	62.0	40.3	8.1	23
	171	38.0	66.0	45.3	7.1	28
	207	33.0	60.0	48.2	5.0	46
Carangoides caeruleopinnatus	61	29.0	39.0	34.2	2.7	20
Carangiodes equila	88	30.0	55.0	35.4	4.6	69
	201	30.0	41.0	37.7	2.9	17
	234	27.0	44.0	36.3	4.0	39
Decapterus russelli	62	7.5	13.5	9.7	1.0	101
	68	10.0	14.5	11.8	1.0	100
	72	13.0	23.5	16.5	1.7	123
	75	10.5	13.5	12.0	0.5	49
	78	11.0	12.5	11.9	0.4	100
	83	12.5	20.5	16.6	1.7	101
	89	17.0	21.5	19.0	1.0	71
	94	12.5	19.0	14.4	1.8	165
	95	11.5	13.5	12.6	0.4	100
	112	13.0	30.0	19.7	3.4	195
	117	15.0	21.0	17.9	1.2	112
	153	18.0	22.0	19.7	0.8	101
	154	15.0	20.0	16.4	1.1	102
	157	15.0	30.0	19.9	4.5	77
	161	17.0	21.0	19.2	1.1	17
	162	15.0	28.0	21.1	2.6	100
	166	18.0	29.0	22.2	3.5	49
	167	18.0	28.0	24.9	2.0	51
	178	17.0	31.0	20.2	2.3	110
	197	19.0	30.0	23.7	1.7	101
	235	19.0	23.0	20.9	0.9	33
	236	18.0	21.0	20.0	0.8	76
	239	6.5	13.5	10.3	2.2	63
	246	16.0	24.0	18.7	1.3	135
	247	16.0	21.0	18.6	1.0	68
	249	18.0	28.0	20.9	1.4	99
Decapterus tabl	149	24.0	40.0	33.9	4.4	15
Selar crumenophthalmus	116	19.5	23.5	21.0	0.9	17
	124	21.0	30.0	23.4	1.7	31
	138	21.0	26.0	22.9	1.3	29
	139	20.0	36.0	25.7	5.6	35
	246	22.0	26.0	23.9	0.8	101
	247	20.0	26.0	23.9	1.1	50
	250	22.0	28.0	24.1	1.2	102
Scomberoides commersonianus	174	89.0	101.0	94.1	3.3	21
Trachurus indicus	65	24.5	38.0	29.1	2.4	29
	74	12.5	18.5	14.2	1.1	97
	75	13.0	20.0	16.1	1.7	37
	76	12.5	19.5	15.1	1.4	90
	80	13.5	18.5	15.7	1.0	100
	81	14.0	19.0	16.9	1.2	99
	83	14.5	22.5	16.9	2.0	20
	85	12.0	21.0	15.2	1.4	98
	86	14.0	18.0	16.6	1.0	66
	87	13.0	17.0	14.9	0.8	142
	89	16.0	19.0	17.7	0.7	86
	115	14.0	19.5	16.2	1.1	119
	154	16.0	30.0	23.0	2.6	97
	157	21.0	33.0	25.3	2.3	118
	159	13.0	27.0	18.4	2.3	100
	160	16.0	21.0	18.5	0.8	96
	166	18.0	20.0	18.8	0.6	75
	173	8.5	17.5	10.8	1.3	60
	178	20.0	25.0	22.4	1.1	100
	179	20.0	31.0	24.2	1.8	83
	184	10.0	14.0	10.7	0.7	95
	189	19.0	24.0	22.3	1.0	77
	190	18.0	41.0	25.8	4.0	110
	191	20.0	33.0	24.5	2.7	100
	210	7.0	10.0	7.4	0.7	95
	211	20.0	36.0	24.4	3.4	36
	212	20.0	35.0	22.6	1.8	69
	213	21.0	34.0	25.5	3.2	80
	214	18.0	23.0	21.5	1.1	84
	216	22.0	36.0	28.5	3.0	64
	222	13.0	31.0	21.0	5.3	150
	224	21.0	26.0	23.8	1.2	94
	226	21.0	27.0	23.2	1.0	117
	227	20.0	25.0	23.4	0.9	106
	229	15.0	27.0	21.7	2.1	171
	230	21.0	26.0	23.5	1.0	103
	231	14.0	36.0	21.5	7.9	28
	232	13.0	15.0	13.7	0.6	100
Trachurus indicus	232	20.0	25.0	22.0	1.0	106
	235	23.0	37.0	26.1	2.5	30
	236	4.0	9.0	6.2	0.7	69
	236	21.0	27.0	23.8	1.1	104
	238	19.0	26.0	23.4	1.2	99
	240	14.0	18.0	15.5	0.9	99
	241	13.0	17.0	13.8	0.7	100
	244	20.0	28.0	23.2	1.4	100
	246	19.0	23.0	20.4	0.8	109
	247	18.0	23.0	20.3	1.0	49
	249	20.0	26.0	23.6	2.1	18
	250	20.0	24.0	21.3	1.0	33
Uraspis secunda	151	28.0	49.0	34.6	4.2	28
	161	14.0	22.0	18.9	1.1	54
CLUPEIDAE						
Dussumieria acuta	76	15.0	18.5	16.6	1.0	32
	78	15.0	17.0	15.7	0.6	28
	236	12.0	17.0	13.8	1.5	84
	240	11.0	17.0	14.2	1.9	21
	241	8.0	16.0	10.5	2.2	38
	247	18.0	23.0	19.9	1.2	38
Etrumeus teres	91	15.0	20.5	17.1	1.1	67
	203	7.0	14.0	10.0	1.6	109
	231	7.0	12.0	8.9	0.6	47
Sardinella sp.	78	4.0	7.5	6.1	0.6	100
Sardinella gibbosa	64	8.5	14.0	10.8	1.0	85
	75	12.5	16.0	13.8	0.7	65
	85	15.5	18.5	16.8	0.7	89
	173	10.5	19.0	16.3	1.4	97
	184	10.0	17.5	14.6	1.9	99
	210	13.0	16.0	14.1	0.6	98
	236	15.0	17.0	16.3	0.7	20
	240	13.0	17.0	14.5	0.8	52
	241	10.0	15.0	12.7	0.9	31
Sardinella longiceps	59	7.5	10.0	8.7	0.6	70
	81	15.5	21.5	16.6	0.8	100
	95	14.0	17.0	15.8	0.5	78
	116	20.0	24.0	21.6	1.1	17
	173	11.0	21.0	15.0	2.3	99
	184	10.5	17.5	13.1	0.9	105
	198	10.0	14.0	11.9	0.8	108
	203	9.0	12.0	10.5	0.7	105
	208	8.5	13.0	11.1	0.9	127
	210	8.0	20.0	13.7	3.1	125
	224	20.0	24.0	21.3	0.9	83
	240	18.0	22.0	19.1	1.4	26
	241	16.0	22.0	17.5	1.4	54
	242	15.0	22.0	16.7	1.3	29
	247	17.0	23.0	19.4	1.3	19
DREPANIDAE						
Drepane punctata	121	28.0	36.0	32.1	2.5	19
Drepane longimana	158	33.0	38.0	35.9	1.9	7
ENGRAULIDAE						
Stolephorus sp.	241	7.0	8.0	7.6	0.5	50
Stolephorus punctifier	64	5.5	9.0	7.5	0.8	99
Thryssa vitrirostris	241	10.0	14.0	11.4	0.7	100
HOLOCENTRIDAE	60	42.0	47.0	44.3	1.6	9
Adioryx hastatus						
LEIOGNATHIDAE						
Leiognathus elongatus	239	7.0	9.0	8.0	0.4	94
LETHRINIDAE						
Lethrinus lentjan	60	28.0	42.0	34.9	3.1	53
	61	32.0	42.0	37.2	2.4	87
Lethrinus nebulosus	61	47.0	61.0	53.0	4.0	31
	97	38.0	53.0	44.3	3.8	114
	98	38.0	58.0	43.7	3.8	27
	100	33.0	58.0	42.9	5.4	28
	149	43.0	60.0	53.0	4.0	24
	151	40.0	51.0	48.2	3.5	16
	192	30.0	53.0	40.1	6.0	66
	204	30.0	62.0	47.8	7.7	89
	206	39.0	59.0	46.7	4.2	52
	207	31.0	51.0	38.2	4.3	46
	215	38.0	59.0	46.0	5.4	97
Lethrinus elongatus	60	32.0	47.0	38.3	4.6	18
	61	33.0	56.0	45.1	5.1	55
Lethrinus mahsena	104	20.0	33.0	24.8	2.7	80
	149	33.0	52.0	43.4	4.5	113
LUTJANIDAE						
Lutjanus lutjanus	59	15.0	24.5	21.0	1.9	87
Lutjanus erythropterus	59	29.0	34.0	31.3	1.1	58
Lutjanus bengalensis	120	14.0	24.0	17.8	1.5	127

FAMILY/SPECIES	STATION	LENGTHS IN SAMPLE				
		LOWEST	HIGHEST	MEAN	ST. DEV.	N
MYCTOPHIDAE						
Benthozema pterotum (millimeters)	127	10.0	36.0	24.2	4.6	131
	128	18.0	46.0	31.0	4.9	120
	129	16.0	54.0	30.5	6.8	130
	130	26.0	42.0	30.7	2.6	117
	131	10.0	46.0	26.3	5.7	103
	132	14.0	40.0	26.5	5.8	125
	133	12.0	46.0	28.0	6.1	121
	134	16.0	44.0	26.8	5.8	161
	135	24.0	38.0	30.1	2.7	109
	136	16.0	38.0	28.8	4.2	125
	137	12.0	46.0	31.0	4.5	121
	138	16.0	36.0	27.3	5.2	107
	140	16.0	46.0	28.4	7.0	144
	143	16.0	50.0	29.7	5.5	143
	144	14.0	34.0	25.3	3.4	115
	145	14.0	40.0	27.1	4.5	107
	146	16.0	42.0	26.6	5.2	107
	147	20.0	36.0	29.3	3.3	102
	148	20.0	42.0	27.4	3.9	121
NEMIPTERIDAE						
Nemipterus sp.	119	21.0	35.0	26.4	2.6	46
Nemipterus japonicus						
	76	12.0	32.0	18.7	4.3	61
	92	14.5	24.5	19.7	1.9	191
	126	8.0	34.0	19.2	5.3	96
	167	14.0	23.0	18.3	1.8	100
	170	13.0	22.0	16.5	1.8	101
Nemipterus peroni						
	164	9.0	21.0	12.4	2.4	116
Parascolopsis eriomma						
	202	22.0	31.0	25.2	2.1	46
NOMEIDAE						
Cubiceps sp.						
	139	10.0	14.0	11.5	0.9	60
	148	9.0	14.0	11.3	1.3	84
POMADASYIDAE, HAEMULIDAE						
Diagramma pictum						
	59	40.0	67.0	54.8	8.0	17
	183	36.0	58.0	47.3	6.2	29
Plectorhynchus flavomaculatus						
	61	35.0	53.0	44.9	4.9	24
Pomadasys opercularis						
	158	53.0	61.0	56.9	2.6	22
Pomadasys stridens						
	83	17.0	22.0	20.0	1.0	60
	151	18.0	25.0	20.0	1.2	66
	152	15.0	23.0	19.6	1.5	101
	159	16.0	22.0	19.0	1.1	100
	161	17.0	23.0	19.7	1.3	53
SCIAENIDAE						
Argyrosomus hololepidotus						
	174	82.0	120.0	99.9	8.8	52
SCOMBRIDAE						
Rastrelliger kanagurta	124	23.0	31.0	28.6	1.6	27
	149	32.0	34.0	33.2	0.7	14
	211	32.0	39.0	35.0	2.0	24
Scomber japonicus						
	59	49.0	109.0	60.9	18.3	54
FAMILY/SPECIES	STATION	LOWEST	HIGHEST	MEAN	ST. DEV.	N
SPARIDAE						
Argyrops sp.						
	62	27.0	45.0	33.3	4.7	68
Argyrops spinifer						
	60	28.0	47.0	38.0	3.5	124
	149	22.0	64.0	39.5	10.7	92
	150	30.0	52.0	38.9	4.9	85
	151	26.0	52.0	38.9	6.6	61
	154	32.0	54.0	40.9	6.2	30
	157	32.0	54.0	42.5	4.9	35
	158	29.0	49.0	37.1	5.9	17
Argyrops filamentosus						
	192	23.0	37.0	30.4	3.4	34
	201	26.0	38.0	32.1	2.9	35
Cheimerius nufar						
	63	22.0	48.0	30.0	5.5	128
	98	36.0	59.0	45.0	6.2	28
	100	12.0	40.0	31.1	5.6	117
	171	34.0	64.0	45.3	7.3	72
	192	26.0	54.0	35.4	6.4	78
	201	20.0	60.0	35.1	6.7	65
	202	25.0	42.0	33.0	5.2	26
	204	28.0	58.0	36.9	5.5	65
	206	26.0	50.0	36.9	4.7	79
	209	20.0	44.0	29.4	6.1	78
	215	17.0	39.0	26.3	4.1	100
	234	30.0	57.0	42.0	6.9	46
Pagellus affinis						
	92	15.5	27.0	21.8	2.4	108
	112	18.0	28.0	23.1	2.2	75
	154	15.0	35.0	27.4	4.6	27
	157	20.0	33.0	26.6	3.0	93
	162	21.0	32.0	26.8	3.4	33
Polysteganus coeruleopunctatus						
	94	14.5	27.5	20.4	2.4	79
SPHYRAENIDAE						
Sphyraena sp.						
	59	45.0	125.0	71.9	22.6	13
Sphyraena obtusata						
	89	23.5	28.0	25.7	1.5	10
Sphyraena africana						
	149	42.0	65.0	50.7	4.2	107
Sphyraena putnamiae						
	68	68.0	90.0	79.5	5.1	26
	117	51.0	62.0	55.4	2.5	36
	122	30.0	75.0	53.1	11.8	18
	149	50.0	92.0	57.6	9.9	40
SYNODONTIDAE						
Saurida tumbil						
	118	22.0	51.0	35.1	5.9	57
	119	26.0	45.0	33.7	3.7	96

ANNEX V

Length frequency distributions (raw data).

FAMILY/SPECIES	STATION	Lowest length	Step length	FREQUENCY IN LENGTH GROUP																													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30.
ARIIDAE																																	
Arius tenuispinis	158	30.0	1.0	3	3	3	0	1	2	8	8	5	6	19	14	9	1	5	13	1	1	1	0	0	0	0	0	0	0	0	0	0	0
ARIOMMIDAE																																	
Ariomma indica	124	15.0	1.0	0	0	0	0	8	18	16	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARANGIDAE																																	
Carangoides sp	61	41.0	1.0	2	0	3	3	3	4	0	9	2	3	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carangoides malabaricus	122	20.0	1.0	3	2	3	2	1	3	2	4	0	0	0	4	5	10	3	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0
	123	20.0	1.0	0	0	0	0	1	0	2	3	4	2	0	3	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carangoides chrysophrys	62	23.0	1.0	1	0	1	0	3	0	0	1	0	0	0	0	1	2	0	2	0	2	0	1	0	2	3	1	3	0	0	2	2	3
	100	33.0	1.0	1	1	3	7	2	0	3	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	1
	171	38.0	1.0	1	4	2	4	2	2	3	1	0	1	1	0	2	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	1	0
	207	32.0	1.0	0	1	0	0	0	0	0	1	0	0	3	1	2	6	4	4	3	1	5	4	2	3	2	0	2	1	0	0	1	0
Carangoides caeruleopinnatus	61	29.0	1.0	1	1	1	1	5	2	2	4	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carangoides equula	88	30.0	1.0	1	1	6	15	12	14	5	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
	201	20.0	1.0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	2	3	2	5	1	0	0	0	0	0	0	0	0
	234	20.0	1.0	0	0	0	0	0	0	0	3	1	1	0	1	0	0	1	4	2	9	7	5	3	1	0	0	1	0	0	0	0	0
Decapterus russelli	62	7.5	.5	3	3	6	20	22	29	9	5	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	68	10.0	.5	1	9	36	5	8	19	15	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	72	13.0	.5	1	3	7	7	6	14	19	21	14	10	7	4	3	2	3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
	75	10.5	.5	1	1	10	25	10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	78	11.0	.5	3	33	47	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	83	12.5	.5	1	4	6	2	1	2	4	10	19	19	11	8	5	4	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	89	17.0	.5	2	4	10	18	7	13	6	6	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	94	12.5	.5	9	36	49	23	5	2	0	3	6	6	9	10	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	95	11.5	.5	1	12	47	38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	112	13.0	1.0	1	1	12	7	30	39	20	18	13	16	13	9	2	5	2	2	2	3	0	0	0	0	0	0	0	0	0	0	0	0
	117	15.0	1.0	2	15	17	40	34	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	153	15.0	1.0	0	0	0	7	35	46	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	154	15.0	1.0	22	43	24	6	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	157	15.0	1.0	3	13	24	8	1	2	1	1	2	4	4	1	6	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	161	15.0	1.0	0	0	1	3	6	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	162	15.0	1.0	1	0	4	5	12	27	19	10	6	4	2	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	166	15.0	1.0	0	0	0	7	7	8	4	3	5	0	1	7	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	167	15.0	1.0	0	0	0	1	1	2	0	0	1	10	16	12	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	178	15.0	1.0	0	0	2	14	32	29	15	6	3	2	1	2	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	197	15.0	1.0	0	0	0	0	1	1	8	15	19	25	19	10	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	235	15.0	1.0	0	0	0	0	1	10	14	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	236	15.0	1.0	0	0	0	2	14	39	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	239	5.0	.5	0	0	0	5	5	4	2	3	1	1	1	2	7	12	10	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0
	246	15.0	1.0	0	8	14	32	45	30	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	247	15.0	1.0	0	3	1	27	26	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	249	15.0	1.0	0	0	0	1	13	26	26	23	7	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapterus tabl	149	20.0	1.0	0	0	0	0	1	0	1	.0	0	0	0	1	2	0	2	1	4	0	2	0	1	0	0	0	0	0	0	0	0	0
Selar crumenophthalmus	116	19.5	.5	2	1	7	10	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	124	20.0	1.0	0	1	9	9	6	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	138	10.0	1.0	0	0	0	0	0	0	0	0	0	0	0	3	10	10	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	139	20.0	1.0	2	4	12	3	2	1	0	0	0	0	0	0	3	2	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	246	20.0	1.0	0	0	4	26	50	19	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	247	20.0	1.0	1	0	4	9	22	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	250	20.0	1.0	0	0	5	31	28	29	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scomberoides commersonianus	174	80.0	1.0	0	0	0	0	0	0	0	0	0	1	1	4	2	3	0	3	2	3	0	0	0	2	0	0	0	0	0	0	0	0
Trachurus indicus	65	24.5	.5	1	0	0	1	0	1	4	3	5	3	4	2	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	74	12.5	.5	6	15	14	19	16	16	5	1	1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	75	13.0	.5	1	0	3	8	23	3	4	3	2	4	3	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	76	12.5	.5	1	1	5	11	26	20	9	5	0	3	1	3	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	80	13.5	.5	2	2	14	20	17	21	10	7	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	81	14.0	.5	1	1	6	10	17	11	11	20	8	9	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	83	14.5	.5	1	4	1	2	2	5	0	1	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	85	12.0	.5	1	3	3	4	13	11	20	17	10	5	6	1	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	86	14.0	.5	1	2	5	6	6	14	13	16	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	87	13.0	.5	3	8	11	38	37	27	14	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	89	16.0	.5	2	4	17	19	20	18	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	115	14.0	.5	2	7	17	18	26	14	13	14	4	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	154	15.0	1.0	0	1	0	0	6	11	9	16	16	14	8	9	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	157	15.0	1.0	0	0	0	0	0	0	2	8	13	25	24	18	10	7	4	4	0	2	1	0	0	0	0	0	0	0	0	0	0	0
	159	10.0	1.0	0	0	0	2	1	3	10	5	43	21	5	3	1	2	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0
	160	15.0	1.0	0	1	1	51	34	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	166	15.0	1.0	0	0	0	23	47	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	173	5.0	.5	0	0	0	0	0	0	0	1	3	3	11	13	13	9	3	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0
	178	15-0	1.0	0	0	0	0	0	5	12	37	35	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	179	15.0	1.0	0	0	0	0	0	1	0	9	22	24	16	4	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	184	10.0	.5	27	31	25	7	1	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	189	15.0	1.0	0	0	0	0	2	1	9	30	30	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	190	15.0	1.0	0	0	0	1	0	1	8	15	15	13	11	4	6	8	7	3	7	5	4	1	0	0	0	0	0	0	1	0	0	0
	191	15.0	1.0	0	0	0	0	0	2	4	15	18	27	8	9	3	1	6	0	5	1	1	0	0	0	0	0	0	0	0	0	0	0
	210	.0	1.0	0	0	0	0	0	0	0	66	21	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	211	20.0	1.0	1	4	6	10	4	0	1	5	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	212	20.0	1.0	1	6	33	19	8	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	213	20.0	1.0	0	2	12	31	21	13	7	8	2	0	2	3	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	214	15.0	1.0	0	0	0	2	2	8	30	25	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	216	20.0	1.0	0	0	1	0	3	8	8	7	3	8	7	9	5	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	222	10.0	1.0	0	0	0	1	35	20	1	0	0	0	0	0	0	2	18	48	19	5	0	0	0	1	0	0	0	0	0	0	0	0
	224	20.0	1.0	0	3	11	24	28	24	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	226	20.0	1.0	0	1	28	45	34	7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	227	20.0	1.0	1	2	11	43	42	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	229	15.0	1.0	2	2	0	0	2	13	21	28	37	30	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	230	20.0	1.0	0	1	12	40	33	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FAMILY/SPECIES	STATION	Lowest	Step	FREQUENCY IN LENGTH GROUP																													
		length	length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	231	10.0	1.0	0	0	0	0	3	9	3	0	0	0	0	0	0	1	3	1	1	0	0	2	0	0	0	1	1	1	2	0	0	0
	232	10.0	1.0	0	0	0	37	58	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	232	20.0	1.0	7	25	50	16	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	235	20.0	1.0	0	0	0	4	0	7	11	4	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	236	.0	.5	0	0	0	0	0	0	0	0	1	2	3	8	19	28	7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	236	20.0	1.0	0	1	10	32	37	15	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	238	15.0	1.0	0	0	0	0	1	0	3	14	36	31	9	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	240	10.0	1.0	0	0	0	0	11	45	32	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	241	10.0	1.0	0	0	0	30	58	10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	244	20.0	1.0	3	9	17	25	29	15	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	246	15.0	1.0	0	0	0	0	8	54	40	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	247	15.0	1.0	0	0	0	1	5	26	13	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	249	20.0	1.0	3	1	1	1	4	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	250	20.0	1.0	5	17	7	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uraspis secunda	151	20.0	1.0	0	0	0	0	0	0	0	0	1	1	3	1	2	3	4	2	4	2	2	0	2	0	0	0	0	0	0	0	0	1
	161	10.0	1.0	0	0	0	0	1	0	0	1	14	26	9	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLUPEIDAE																																	
Dussumieria acuta	64	7.5	.5	1	2	25	45	19	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	76	15.0	.5	4	2	6	7	5	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	78	15.0	.5	7	8	8	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	236	10.0	1.0	0	0	2	20	14	16	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	240	10.0	1.0	0	2	2	4	4	2	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	241	5.0	1.0	0	0	0	9	3	7	13	1	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	247	15.0	1.0	0	0	0	2	14	13	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Etrumeus teres	91	15.0	.5	2	4	7	16	11	9	7	7	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	203	5.0	.5	0	0	0	0	2	4	14	5	19	7	13	6	11	5	16	4	0	0	3	0	0	0	0	0	0	0	0	0	0	0
	231	.0	1.0	0	0	0	0	0	0	0	1	7	38	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sardinella sp.	78	4.0	.5	1	1	5	13	45	23	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sardinella gibbosa	64	8.5	.5	2	2	9	11	8	27	18	4	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	75	12.5	.5	1	10	30	11	5	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	85	15.5	.5	6	14	24	25	13	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	173	10.0	.5	0	1	0	0	0	1	1	2	2	8	4	5	19	15	21	7	7	1	3	0	0	0	0	0	0	0	0	0	0	0
	184	10.0	.5	1	1	5	1	8	2	5	8	7	7	11	7	15	13	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	210	.0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	13	64	20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	236	10.0	1.0	0	0	0	0	0	2	10	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	240	10.0	1.0	0	0	0	4	22	21	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	241	10.0	1.0	1	0	12	15	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sardinella longiceps	59	7.5	.5	3	17	13	24	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	81	15.5	.5	4	20	42	24	8	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	95	14.0	.5	1	0	5	24	37	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	116	20.0	.5	1	3	2	5	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	173	10.0	.5	0	0	1	4	6	8	5	11	9	5	6	6	9	9	7	3	0	2	3	1	3	0	1	0	0	0	0	0	0	0
	184	10.0	.5	0	2	0	1	12	13	27	30	16	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	198	.0	1.0	0	0	0	0	0	0	0	0	0	0	3	33	50	19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	203	5.0	.5	0	0	0	0	0	0	0	0	5	7	28	27	25	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	208	5.0	.5	0	0	0	0	0	0	0	1	1	3	18	19	35	20	18	7	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	210	.0	1.0	0	0	0	0	0	0	0	0	13	12	1	0	2	20	21	6	30	17	0	1	2	0	0	0	0	0	0	0	0	0
	224	20.0	1.0	16	35	25	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	240	15.0	1.0	0	0	0	13	5	1	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	241	15.0	1.0	0	8	32	7	2	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	242	10.0	1.0	0	0	0	0	0	1	16	8	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	247	15.0	1.0	0	0	1	3	8	4	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DREPANIDAE																																	
Drepane punctata	121	25.0	1.0	0	0	0	1	1	4	4	1	3	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepane longmana	158	30.0	1.0	0	0	0	1	1	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENGRAULIDAE																																	
Stolephorus sp	241	.0	1.0	0	0	0	0	0	0	0	19	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stolephorus punctifier	64	5.5	.5	2	0	15	21	15	28	16	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thryssa vitrirostris	241	10.0	1.0	2	64	29	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOLOCENTRIDAE																																	
Adioryx hastatus	60	42.0	1.0	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEIOGNATHIDAE																																	
Leiognathus elongatus	239	5.0	.5	0	0	0	0	3	16	48	26	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LETHRINIDAE																																	
Lethrinus lentjan	60	28.0	1.0	1	0	0	6	5	11	5	4	4	4	5	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	61	32.0	1.0	3	3	3	11	16	17	9	8	5	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lethrinus nebulosus	61	47.0	1.0	2	2	3	4	2	4	1	1	2	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	97	38.0	1.0	2	7	11	7	15	15	9	9	11	5	4	3	5	3	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	98	38.0	1.0	1	0	2	5	3	4	4	2	2	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	100	33.0	1.0	1	0	2	1	1	1	0	2	1	5	2	2	3	2	1	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0
	149	40.0	1.0	0	0	0	1	0	0	1	1	1	1	1	1	0	2	6	4	1	2	1	0	1	0	0	0	0	0	0	0	0	0
	151	40.0	1.0	1	1	0	0	0	1	1	0	2	0	6	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	192	30.0	1.0	2	2	1	2	1	7	8	5	4	3	4	3	1	3	3	2	4	3	0	1	3	1	2	1	0	0	0	0	0	0
	204	20.0	2.0	0	0	0	0	0	4	0	2	1	2	6	9	7	12	6	7	7	9	9	1	4	3	0	0	0	0	0	0	0	0
	206	35.0	1.0	0	0	0	0	2	2	1	3	4	6	4	3	6	4	4	4	3	1	3	0	1	0	0	0	1	0	0	0	0	0
	207	30.0	1.0	0	2	0	2	2	7	3	9	4	3	5	2	1	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0
	215	35.0	1.0	0	0	0	2	7	6	13	5	8	3	5	6	4	5	7	6	4	5	1	4	0	1	1	1	3	0	0	0	0	0
Lethrinus elongatus	60	32.0	1.0	1	1	2	2	2	2	2	0	0	1	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	61	33.0	1.0	1	0	1	1	0	2	4	0	4	8	0	2	3	8	3	5	0	4	3	2	2	0	1	1	0	0	0	0	0	0
Lethrinus mahsena	104	20.0	1.0	1	8	8	11	9	16	8	6	5	4	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	149	30.0	1.0	0	0	0	1	2	1	4	2	4	9	8	10	7	10	8	7	14	6	3	3	7	4	3	0	0	0	0	0	0	0
LUTJANIDAE																																	
Lutjanus lutjanus	59	15.0	.5	1	1	0	0	1	2	2	1	3	8	11	9	13	9	4	4	4	5	7	2	0	0	0	0	0	0	0	0	0	0
Lutjanus erythropterus	59	29.0	1.0	4	8	21	16	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lutjanus bengalensis	120	10.0	1.0	0	0	0	0	1	2	17	34	44	14	9	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FAMILY/SPECIES	STATION	Lowest length	Step length	FREQUENCY IN LENGTH GROUP																													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
MYCTOPHIDAE	127	.0	2.0	0	0	0	0	0	2	1	0	6	6	16	18	16	34	12	15	4	0	1	0	0	0	0	0	0	0	0	0	0	0
	128	.0	2.0	0	0	0	0	0	0	0	0	0	2	1	3	2	9	21	35	15	10	8	4	6	3	0	1	0	0	0	0	0	0
	129	.0	2.0	0	0	0	0	0	0	0	0	1	3	2	11	7	15	17	23	16	8	5	2	9	4	3	3	0	0	0	1	0	0
	130	.0	2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	16	52	31	5	3	2	1	1	0	0	0	0	0	0	0	0
	131	.0	2.0	0	0	0	0	0	1	0	5	1	3	6	7	13	22	12	15	9	5	2	1	0	0	0	1	0	0	0	0	0	0
	132	.0	2.0	0	0	0	0	0	0	0	5	9	2	8	10	1	23	14	33	9	6	3	0	2	0	0	0	0	0	0	0	0	0
	133	.0	2.0	0	0	0	0	0	0	1	1	0	1	3	17	21	20	5	19	14	6	2	2	5	1	1	2	0	0	0	0	0	0
	134	.0	2.0	0	0	0	0	0	0	0	0	1	8	16	21	24	25	15	12	16	8	5	4	3	2	1	0	0	0	0	0	0	0
	135	.0	2.0	0	0	0	0	0	0	0	0	0	0	0	0	1	13	25	32	26	6	5	1	0	0	0	0	0	0	0	0	0	0
	136	.0	2.0	0	0	0	0	0	0	0	0	4	3	1	1	7	16	22	36	24	6	3	2	0	0	0	0	0	0	0	0	0	0
	137	.0	2.0	0	0	0	0	0	0	1	0	0	0	1	2	2	8	22	28	28	14	5	4	2	2	1	1	0	0	0	0	0	0
	138	.0	2.0	0	0	0	0	0	0	0	0	4	4	11	10	3	8	12	26	20	7	2	0	0	0	0	0	0	0	0	0	0	0
	140	.0	2.0	0	0	0	0	0	0	0	0	1	9	15	13	14	13	8	18	24	10	3	4	2	2	6	2	0	0	0	0	0	0
	143	.0	2.0	0	0	0	0	0	0	0	0	2	4	3	5	9	12	22	34	24	13	6	4	0	2	1	0	0	2	0	0	0	0
	144	.0	2.0	0	0	0	0	0	0	0	1	0	0	11	15	31	26	12	13	5	1	0	0	0	0	0	0	0	0	0	0	0	0
	145	.0	2.0	0	0	0	0	0	0	0	1	0	2	6	7	21	15	19	19	10	1	3	2	1	0	0	0	0	0	0	0	0	0
	146	.0	2.0	0	0	0	0	0	0	0	0	1	2	10	18	10	24	10	15	8	1	2	2	2	2	0	0	0	0	0	0	0	0
	147	.0	2.0	0	0	0	0	0	0	0	0	0	0	1	4	7	12	16	27	26	8	1	0	0	0	0	0	0	0	0	0	0	0
	148	.0	2.0	0	0	0	0	0	0	0	0	0	0	3	10	15	39	16	23	7	2	2	2	1	1	0	0	0	0	0	0	0	0
NEMIPTERIDAE																																	
Nemipterus sp.	119	20.0	1.0	0	2	1	0	0	12	19	5	0	1	1	3	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemipterus japonicus	76	12.0	1.0	1	1	3	7	9	7	6	6	9	4	1	1	0	1	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0
	92	14.5	.5	3	2	5	2	3	11	9	8	6	10	5	5	9	7	3	2	3	3	3	2	1	0	0	0	0	0	0	0	0	0
	126	5.0	1.0	0	0	0	4	2	1	1	1	4	3	5	7	7	6	10	9	5	3	5	7	3	7	3	1	1	0	0	0	0	1
	167	10.0	1.0	0	0	0	0	2	6	12	7	21	24	19	7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	170	10.0	1.0	0	0	0	4	5	24	25	15	15	7	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemipterus peroni	164	.0	1.0	0	0	0	0	0	0	0	0	0	1	19	33	29	2	6	10	9	1	4	0	1	1	0	0	0	0	0	0	0	0
Parascolopsis eriomma	202	20.0	1.0	0	0	2	7	14	3	7	8	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOMEIDAE																																	
Cubiceps sp.	139	.0	1.0	0	0	0	0	0	0	0	0	0	0	7	26	22	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	148	.0	1.0	0	0	0	0	0	0	0	0	0	8	17	20	22	15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POMADASYIDAE,HAEMULIDAE																																	
Diagramma picta	183	35.0	1.0	0	1	1	0	3	1	0	1	2	0	1	2	3	1	0	4	1	2	0	2	1	2	0	1	0	0	0	0	0	0
	59	40.0	1.0	1	0	1	0	1	0	1	0	0	0	1	1	0	0	1	1	0	0	2	1	2	0	2	1	0	0	0	1	0	0
	61	35.0	1.0	1	0	0	1	2	0	2	3	2	1	1	1	2	1	2	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0
Pomadasys opercularis	158	50.0	1.0	0	0	0	3	0	4	5	2	0	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pomadasys stridens	151	10.0	1.0	0	0	0	0	0	0	0	0	3	23	25	7	7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	152	10.0	1.0	0	0	0	0	0	1	1	7	12	22	31	17	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	159	10.0	1.0	0	0	0	0	0	0	1	6	22	45	15	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	83	17.0	.5	1	0	1	3	7	12	12	13	5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	161	10.0	1.0	0	0	0	0	0	0	0	2	6	14	23	3	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCIAENIDAE																																	
Argyrosomus hololepidotus	174	80.0	2.0	0	1	0	0	2	2	5	8	9	4	1	2	4	2	2	3	1	3	0	2	1	0	0	0	0	0	0	0	0	0
SCOMBRIDAE																																	
Rastrelliger kanagurta	124	20.0	1.0	0	0	0	1	0	0	0	2	10	7	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scomber japonicus	149	30.0	1.0	0	0	2	7	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	211	30.0	1.0	0	0	4	2	3	5	5	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scomberomorus commersoni	59	49.0	5.0	14	26	5	0	0	0	0	0	1	0	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SPARIDAE																																	
Argyrops sp.	62	27.0	1.0	2	4	8	10	8	9	2	3	3	6	0	0	2	1	1	6	2	0	1	0	0	0	0	0	0	0	0	0	0	0
Argyrops spinifer	60	28.0	1.0	1	1	0	1	3	3	6	18	9	16	12	14	12	12	2	3	5	3	2	1	0	0	0	0	0	0	0	0	0	0
	149	20.0	2.0	0	3	0	4	8	12	8	9	6	2	1	0	1	8	4	7	10	2	3	2	1	0	1	0	0	0	0	0	0	0
	150	20.0	2.0	0	0	0	0	0	1	8	12	12	13	13	8	7	7	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	151	20.0	2.0	0	0	0	3	4	5	2	2	4	4	11	8	11	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	154	20.0	2.0	0	0	0	0	0	0	2	1	8	3	5	1	2	3	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	157	20.0	2.0	0	0	0	0	0	0	1	3	2	1	2	9	8	4	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	158	25.0	1.0	0	0	0	0	1	0	0	1	4	1	2	1	1	2	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0
Argyrops filamentosus	192	20.0	1.0	0	0	0	1	1	0	0	6	3	2	5	4	2	3	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
	201	20.0	1.0	0	0	0	0	0	0	2	1	1	2	2	8	4	2	5	4	3	0	1	0	0	0	0	0	0	0	0	0	0	0
Cheimerius nufar	63	22.0	1.0	2	3	15	16	10	4	1	7	15	11	11	10	7	3	1	0	3	1	0	0	1	2	1	0	2	0	2	0	0	0
	98	36.0	1.0	1	0	0	3	3	5	3	1	0	1	1	0	2	1	1	2	1	0	0	0	1	0	1	1	0	0	0	0	0	0
	100	12.0	1.0	2	1	4	1	0	0	0	0	0	0	0	0	0	1	0	2	2	16	17	6	8	17	15	9	5	9	0	0	2	0
	171	20.0	2.0	0	0	0	0	0	0	0	2	5	9	10	7	6	8	5	1	3	8	3	3	0	1	1	0	0	0	0	0	0	0
	192	20.0	2.0	0	0	0	4	3	9	16	12	15	4	4	1	1	1	3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
	201	20.0	2.0	1	1	0	1	3	12	11	11	7	2	2	5	4	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	202	20.0	1.0	0	0	0	0	0	3	3	1	0	1	0	1	1	1	2	4	0	4	2	2	0	0	1	0	0	0	0	0	0	0
	204	20.0	2.0	0	0	0	0	1	7	9	8	12	9	7	4	1	5	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	206	20.0	2.0	0	0	0	1	2	5	8	8	16	17	9	5	5	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	209	20.0	2.0	1	14	9	5	9	14	4	6	6	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	215	15.0	1.0	0	0	1	0	2	0	1	2	12	17	23	12	11	1	2	0	0	0	4	7	1	1	2	0	1	0	0	0	0	0
	234	30.0	1.0	1	1	2	2	0	2	3	3	2	1	2	4	4	1	3	2	3	0	1	0	2	2	0	1	2	1	0	1	0	0
Pagellus affinis	92	15.5	.5	1	0	0	0	3	4	4	4	7	7	8	6	12	5	8	2	12	9	4	4	3	2	1	2	0	0	0	0	0	0
	112	18.0	1.0	2	2	7	6	8	15	14	13	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	154	15.0	1.0	1	0	1	0	0	0	1	1	0	1	1	2	3	4	3	3	3	0	2	0	1	0	0	0	0	0	0	0	0	0
	157	15.0	1.0	0	0	0	0	0	1	2	6	5	8	13	10	13	12	6	6	5	3	3	0	0	0	0	0	0	0	0	0	0	0
	162	15.0	1.0	0	0	0	0	0	0	1	1	3	6	4	3	2	2	2	1	4	4	0	0	0	0	0	0	0	0	0	0	0	0
Polysteganus coeruleopunctatus	94	14.5	.5	1	0	0	0	0	1	0	4	17	8	10	10	5	3	0	1	3	1	4	4	1	3	1	1	0	0	1	0	0	0
SPHYRAENIDAE																																	
Sphyraena sp.	59	45.0	5.0	1	1	0	4	2	0	2	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphyraena obtusata	89	23.5	.5	1	0	2	2	0	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphyraena africana	149	40.0	1.0	0	0	1	1	0	2	5	16	12	15	9	10	8	7	3	3	3	3	0	5	1	1	1	0	0	1	0	0	0	0
Spyraena putnamiae	68	68.0	1.0	1	0	0	0	0	1	2	1	1	4	1	3	2	3	1	1	1	0	2	0	0	0	2	0	0	0	0	0	0	0
	117	50.0	1.0	0	1	5	0	7	7	6	5	1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	122	30.0	5.0	1	2	1	0	3	4	4	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	149	40.0	2.0	0	0	0	0	0	2	6	15	9	4	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	1	0	0	0
SYNODONTIDAE																																	
Saurida sp.	69	29.0	1.0	1	1	2	5	7	20	18	17	12	10	7	1	5	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Saurida tumbil	118	22.0	1.0	1	0	0	1	1	1	3	2	2	5	2	5	7	5	2	2	5	2	1	2	1	0	2	1	2	1	0	0	0	1
	119	25.0	1.0	0	1	3	2	2	7	14	8	13	12	9	7	6	2	2	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0

ANNEX VI

List of species caught in shelf waters off Oman 1983-84, with reference to station numbers where caught and to catch/hour (in brackets). When catch is given as 0.0, species is present but with less than 0.1 kg/hour in catch.

ACANTHURIDAE
Ctenochaetus strigosus 61(7.0), 63(6.8),

ALBULIDAE
Albula sp. 59(12.6),248(51.6),
Albula vulpes 63(25.8), 66(300.0), 88(50.2),192(5.6),

ANGUILLIFORMES 76(6.8), 80(4.0),109(3.7),
Leptocephalus 195(.1),

APOGONIDAE 61(.1), 66(12.0), 70(.6), 75(2.6), 77(.1), 93(2.6),
106(3.6),107(.0),108(.8),109(.0),110(1.6),111(120.0),
146(.0),199(824.0),200(8.0),
Apogon sp 126(.6),193(.2),222(151.0),225(22.0),249(152.4),

ARIIDAE
Ancharius brevibarbis 231(14.5),237(4500.0),
Arius sp 59(22.8), 62(35.4), 62(40.2), 63(9.6), 65(2.7), 66(36.4),
67(872.0), 71(1.0), 72(24.5), 73(4.9), 75(35.4), 76(17.1),
77(4.9), 79(.1), 80(30.0), 82(5.4), 83(45.6), 84(98.0),
86(2.4), 88(5.9), 95(18.0),100(3.5),111(20.0),126(4.8),
182(40.0),
Arius thalassinus 61(50.0),149(13.0),150(22.4),151(5.6),152(832.0),162(4.4),
165(14.2),171(8.0),172(30.0),173(6.4),174(144.6),175(190.8),
177(951.6),181(45.6),183(11.0),188(4.6),198(18.5),203(17.2),
207(48.2);208(13.4),209(58.4),225(8.0),233(5.4),235(203.0),
239(13.8),241(130.0),242(38.0),243(15.6),245(3.1),254(8.0),
255(13.4),261(8.4),
Arius maculatus 142(35.8),
Arius tenuispinis 158(155.0),159(9.6),180(8.8),181(182.4),

ARIOMMIDAE 126(1.0),
Ariomma indica 119(7.0),124(24.0),258(19.6),260(69.6),

BALISTIDAE
Sufflamen fraenatus 104(5.3),183(5.8),187(30.6),202(19.2),209(1.9),215(14.2),
219(.0),220(39.8),225(16.0),
Sufflamen capistratus 93(1.3), 97(1.3),

BOTHIDAE 118(9.8),119(2.8),124(.2),
Pseudorhombus arsius 218(12.0),234(1.4),

CAESIONIDAE
Caesio sp. 206(10.2),

CALLIONYMIDAE 60(.1),

CARANGIDAE
Alectis indicus 72(1.0), 82(28.0), 90(10.8),123(27.0),198(6.0),201(16.2),
258(16.0),
Alectis ciliaris 104(1.4),142(2.2),149(.2),150(15.6),183(1.6),192(.4),
234(11.4),
Alepes sp. 59(11.2),
Alepes djeddaba 77(1.4), 82(1.4), 85(57.4), 90(1.3),
Alepes vari 123(9.6),172(18.0),173(16.2),174(6.2),175(18.6),176(7.5),
177(52.0),181(44.8),187(2.7),219(4.0),231(6.4),236(1.6),
240(105.0),241(11.0),253(22.0),258(8.0),
Atule mate 59(59.8),
Carangoides sp 60(9.0), 61(134.0), 65(4.2), 68(5.3), 70(2.4), 72(10.9),
77(.2), 78(.3), 82(4.2),108(.0),125(9.8),
Carangoides ferdau 63(5.4),241(10.4),242(19.0),254(9.2),
Carangoides malabaricus 83(38.0), 88(3.0), 94(9.1), 95(24.2),119(22.4),120(5.8),
121(4.0),122(123.6),123(37.8),124(23.2),125(23.5),142(10.4),
151(4.8),171(2.6),172(9.2),174(.2),178(49.4),183(2.4),
187(4.8),231(62.0),239(4.8),254(6.2),255(9.4),258(41.6),
259(7.7),260(29.6),261(34.5),
Carangoides fulvoguttatus 88(2.1),104(5.0),123(13.8),
Carangoides chrysophrys 61(4.4), 62(88.0), 63(41.1), 66(29.4), 72(72.0), 76(5.5),
82(14.6), 83(10.2), 88(3.0), 90(23.6), 97(12.2), 98(26.0),
99(19.0),100(62.7),101(4.8),103(76.8),104(18.8),108(6.4),
142(4.6),150(55.6),151(12.8),156(9.4),171(60.4),172(28.4),
173(7.6),174(2.4),175(7.0),183(10.8),187(6.6),188(9.0),
192(3.8),204(6.4),206(39.0),207(132.0),209(9.2),218(14.6),
219(.0),233(10.0),243(6.0),245(2.4),248(233.4),254(10.0),
255(5.6),

Carangoides armatus 59(19.4),175(58.0),
Carangoides caeruleopinnatus 61(40.0),255(5.6),
Carangoides equula 86(2.0), 88(77.0),151(35.2),154(19.2),171(2.4),187(1.2),
188(1.0),201(24.0),202(3.0),234(193.2),247(33.6),
Carangoides dinema 234(28.0),
Decapterus russelli 61(.1), 62(36.0), 64(19.6), 65(128.7), 66(37.8), 68(19.5),
70(1.2), 72(529.2), 75(530.4), 77(1.5), 78(256.0), 81(8.1),
83(357.2), 85(5.4), 86(1.5), 89(102.7), 94(885.6), 95(36.8),
112(3728.0),115(.9),117(1936.0),118(15.8),119(.8),120(1.0),
124(1.4),126(5.2),128(.6),138(.2),146(.4),151(2.8),
153(265.2),154(206.0),157(34.5),159(1.3),161(116.0),162(84.6),
166(594.0),167(97.0),174(5.6),175(1.1),178(169.0),184(2.0),
188(1.0),196(.6),197(6000.0),199(1.0),203(1.0),207(.2),
210(12.0),218(14.4),225(2.8),231(2.0),235(174.0),236(13.4),
238(2843.4),239(5.4),240(1.1),245(.3),246(98.0),247(75.2),
249(1487.1),250(9.6),253(2.6),
Decapterus tabl 149(11.0),
Gnathanodon speciosus 59(10.8), 61(15.0), 62(6.2), 82(10.5), 88(10.6), 96(4.6),
123(36.0),142(37.8),150(27.0),192(33.4),207(9.4),219(20.0),
254(140.0),255(24.8),
Megalaspis cordyla 96(14.5),121(2.0),124(2.4),156(5.4),173(45.2),192(6.1),
209(4.2),231(14.0),236(4.6),240(23.6),
Naucrates sp. 239(4.2),
Naucrates ductor 115(1.0),217(3.0),
Parastromateus niger 123(18.6),
Pseudocaranx sp. 255(5.6),
Selar crumenophthalmus 70(1.8), 72(1.1), 75(10.4), 81(6.3), 85(5.4),115(1.7),
116(4.9),120(3.0),124(17.2),138(7.6),139(9.8),140(2.4),
147(3.8),246(237.6),247(128.0),250(560.0),258(2.8),260(5.6),
Scomberoides tol 59(8.8),
Scomberoides commersonianus 62(6.6), 83(19.8),172(30.0),174(284.2),175(25.6),210(12.0),
Seriola sp. 62(2.5), 63(4.2), 93(.3), 97(3.1),104(1.2),
Seriola rivoliana 61(57.0),
Seriolina nigrofasciata 94(3.8), 99(7.7),101(2.8),104(.8),151(2.0),
Selaroides leptolepis 75(15.6),
Trachinotus blochii 82(4.8), 98(7.1),100(5.0),104(4.8),236(7.2),

Trachurus sp. 152(19.4),
Trachurus indicus 65(36.0), 69(70.0), 72(6.5), 74(1000.0), 75(286.0), 76(66.4),
78(16.3), 80(4050.0), 81(90.0), 83(72.2), 84(2.2), 85(358.6),
86(183.0), 87(12480.0), 89(145.0), 92(3.5),115(11.2),116(.3),
154(385.4),156(11.2),157(105.8),159(118.8),160(2040.0),161(677.2),
163(5.2),164(105.6),165(.1),166(1657.8),173(12.0),174(.6),
175(60.0),176(51.0),178(672.2),179(6852.6),184(64.0),189(2890.0),
190(3641.4),191(20000.0),196(.9),198(1.0),203(2.2),208(1.8),
210(20.0),211(2.4),212(2368.0),213(1063.0),214(846.4),216(31.0),
218(2.4),222(5538.0),223(9.8),224(38265.0),226(4250.0),227(1314.8),
228(.9),229(2869.4),230(19846.0),231(38.0),232(2892.8),233(1.6),
235(290.0),236(.5),236(115.0),238(40408.0),239(7.2),240(924.0),
241(440.0),242(190.0),244(3604.2),246(139.4),247(80.0),249(152.4),
250(59.8),
Uraspis sp. 260(4.4),
Uraspis secunda 59(1.2), 66(7.0),119(8.4),122(2.6),151(112.0),158(3.2),
165(1.2),188(3.4),258(8.0),

CENTROLOPHIDAE
Psenopsis cyanea 195(.2),200(67.2),

CHAETODONTIDAE 63(3.0),187(1.2),202(6.8),204(1.0),
Chaetodon sp. 60(.4), 93(5.5), 98(.5),215(1.6),219(.0),220(7.0),
Chaetodon leucopleura 104(.2),
Heniochus acuminatus 61(32.0),149(.2),255(5.6),

CHAMPSODONTIDAE
Champsodon sp. 115(10.0),138(.4),146(.1),148(.1),193(.8),197(.1),
200(230.4),252(.0),

CHIROCENTRIDAE
Chirocentrus dorab 67(39.6),142(2.0),

CITHARIDAE 77(.6),

CLUPEIDAE
Dussumiera sp. 64(485.4),184(4.5),
Dussumieria acuta 65(126.3), 76(6.6), 78(46.6), 83(15.2), 85(4.2),173(1.6),
231(9.0),236(4.0),240(12.6),241(11.0),247(45.6),
Etrumeus teres 65(189.6), 76(.3), 91(5.3), 95(121.2),115(.1),195(1.0),
196(1.4),198(6.0),203(5.4),208(32.4),231(4.0),
Herklosichthys quadrimaculatus210(1.0),
Hilsa kelee 138(.4),
Sardinella sp. 72(8.2), 83(9.1),
Sardinella gibbosa 64(140.6), 65(369.6), 75(150.8), 76(.7), 78(422.0), 85(153.4),
157(2.8),173(444.8),174(.6),175(6.6),177(3.9),184(144.0),
198(.4),210(310.0),231(.5),236(2.0),240(31.5),241(15.4),
242(1.0),246(8.2),

Sardinella longiceps	59(114.4), 65(114.0), 68(.2), 75(5.2), 80(2.0), 81(453.6),
	85(13.4), 94(5.4), 95(31.2),115(.8),116(3.4),138(.8),
	139(4.0),140(.6),157(.5),161(6.4),166(2.7),173(104.0),
	184(22.0),195(.8),196(.6),198(118.6),203(24.0),208(153.0),
	210(90.0),218(1.2),220(1.9),224(15729.0),240(44.0),241(68.2),
	242(13.0),247(24.0),
CRABS	194(6.0),195(.6),
PORTUNIDAE	71(.2), 80(6.0),
Charybdis edwardsi	92(1392.0),113(7.0),114(1.7),116(1.2),
CYNOGLOSSIDAE	
Cynoglossus carpenteri	200(4.8),
DACTYLOPTERIDAE	149(2.6),
Dactyloptena sp	102(3.6),
Dactylopterus orientalis	60(1.8), 61(2.6),
DIODONTIDAE	61(3.4),
Chilomycterus affinis	149(4.0),
Chilomycterus echinatus	149(1.4),
Chilomycterus orbicularis	149(.4),
Diodon sp.	60(.2),
DREPANIDAE	
Drepane punctata	59(4.0),121(44.2),150(2.8),
Drepane longmana	123(54.6),124(.8),142(9.8),151(6.4),156(2.4),158(19.4),
	245(2.6),248(60.0),
ECHENEIDAE	
Echeneis sp.	178(15.6),
Echeneis naucrates	59(3.5), 63(7.1), 93(4.4),199(9.6),
ENGRAULIDAE	
Stolephorus sp	65(11.7),241(24.2),
Stolephorus indicus	59(255.2),210(.2),
Stolephorus punctifier	64(225.2),255(2.8),
Thryssa sp	84(.1),241(66.0),
Thryssa vitrirostris	236(.4),
FISTULARIIDAE	
Fistularia sp	98(6.6),215(8.0),246(3.1),247(16.0),254(2.2),255(2.8),
	259(1.0),261(1.8),
Fistularia petimba	60(15.0), 63(.6), 68(2.4), 72(1.2), 80(4.0), 86(13.2),
	90(3.2), 96(10.8), 97(1.3),101(4.1),104(.7),106(7.2),
	117(18.0),118(4.5),119(2.8),120(6.0),122(1.6),124(.4),
	142(.6),149(.2),151(1.6),157(3.6),188(.4),192(4.4),
	201(2.6),202(2.0),
FISH LARVAE	91(.0),105(59.0),
GEMPYLIDAE	
Neoepinnula orientalis	133(.0),138(.4),200(1.1),252(.6),
GERREIDAE	231(2.4),
Gerres filamentosus	59(19.4), 66(152.6), 67(36.0), 68(7.8), 70(36.0), 83(60.8),
	119(2.1),120(.6),123(1.8),124(9.6),125(1.0),142(49.8),
	151(5.6),174(.6),175(12.6),253(22.0),
Pentaprion longimanus	59(52.8),
HARPADONTIDAE	
Harpadon sp.	251(15.4),252(1.0),
HOLOCENTRIDAE	61(17.2),
Adioryx hastatus	60(12.9),118(1.1),
JUVENILE FISHES indet.	98(1.0),
LEIOGNATHIDAE	
Leiognathus sp	59(19.4),142(12.0),231(.1),239(.6),255(.5),
Leiognathus elongatus	239(7.2),255(.0),
Leiognathus fasciatus	59(228.8),119(25.9),120(33.0),253(330.0),258(29.6),
Leiognathus bindus	142(1.0),
Leiognathus berbis	245(23.6),255(.0),
LETHRINIDAE	
Lethrinus sp.	93(.5), 95(1.2),110(1.7),123(38.4),
Lethrinus lentjan	59(24.0), 60(67.4), 61(884.0), 66(6.0), 75(1.9), 79(.0),
	82(9.8), 93(20.4), 95(1.2),109(6.3),110(8.3),111(120.0),
	117(28.0),118(7.8),123(37.8),125(5.0),126(1.2),187(13.8),
	202(36.0),

Lethrinus nebulosus	59(17.2), 61(113.0), 63(45.3), 66(22.6), 71(2.2), 71(15.6),
	72(5.2), 73(3.7), 75(30.0), 79(.8), 82(44.8), 90(10.0),
	93(8.5), 95(73.0), 96(289.3), 97(510.0), 98(62.0), 99(7.0),
	100(66.4),101(344.4),104(98.0),106(381.6),107(15.6),108(100.8),
	109(6.6),110(5.5),111(52.0),125(7.9),149(94.2),151(44.0),
	152(5.6),154(58.4),171(52.8),183(60.0),187(1046.6),192(129.6),
	202(72.0),204(259.0),206(392.4),207(78.4),209(16.4),215(271.0),
	217(13.6),218(2.2),219(360.0),220(228.0),234(17.4),239(5.0),
	243(54.0),248(90.0),255(28.0),260(6.4),261(14.7),
Lethrinus miniatus	59(3.4),125(25.7),
Lethrinus opercularis	219(.0),220(155.8),239(1.6),243(4.9),255(17.7),259(36.0),
	260(20.8),261(3.9),
Lethrinus elongatus	60(24.4), 61(285.0), 63(152.1),149(448.6),255(37.2),259(2.9),
Lethrinus mahsena	79(.1),104(41.7),
L O B S T E R S	123(3.0),142(.4),
SCYLLARIDAE	125(4.8),
Thenus orientalis	59(2.2), 78(.4),
LUTJANIDAE	
Lutjanus sp	96(9.0),218(36.0),219(.0),220(6.3),
Lutjanus johnii	125(1.0),
Lutjanus coccineus	101(16.2),204(16.0),206(23.4),217(17.0),
Lutjanus lutjanus	59(438.2),117(2.0),118(9.8),120(18.0),125(76.1),126(.6),
	202(29.2),209(10.2),255(5.6),
Lutjanus malabaricus	125(43.2),255(60.6),260(19.0),261(19.5),
Lutjanus fulviflammus	63(6.1), 93(2.4),
Lutjanus erythropterus	59(65.0),
Lutjanus kasmira	61(1.5),
Lutjanus coeruleolineatus	102(1.2),106(4.8),202(5.6),204(.4),206(3.3),209(4.6),
	220(6.3),
Lutjanus russelli	106(10.8),111(3.0),
Lutjanus bengalensis	118(15.8),119(7.0),120(16.8),121(.8),125(43.2),255(4.6),
	259(8.6),
Pristipomoides multidens	63(12.5),
	252(.6),
MONACANTHIDAE	60(.1), 83(15.2),122(4.8),187(33.0),188(.4),236(1.0),
Alutera monoceros	61(450.0),106(9.0),125(17.0),149(33.2),192(16.8),206(12.3),
	261(8.4),
Paramonacanthus sp.	259(2.4),
Stephanolepis sp.	120(8.2),121(.0),255(1.4),
Stephanolepis auratus	111(7.2),
Stephanolepis rectifrons	93(39.6),
Stephanolepis diaspros	219(.0),220(6.3),239(3.0),
Thamnaconus sp.	192(3.0),202(14.8),
MULLIDAE	142(5.2),
Mulloides sp.	106(.9),
Parupeneus sp.	61(5.0), 61(1.2), 63(4.1), 72(.6), 96(12.3),102(4.3),
	106(5.4),117(10.0),120(2.4),126(16.8),
Parupeneus chryserydros	124(.8),
Parupeneus fraterculus	104(3.8),107(.0),215(17.3),219(.0),220(82.4),243(4.4),
	255(.9),
Parupeneus rubescens	202(4.2),
Parupeneus biauritus	209(18.6),
Upeneus sp	77(.1), 93(.3),120(.6),178(2.6),218(1.2),
Upeneus sulphureus	117(10.0),119(36.4),253(906.4),258(53.6),
Upeneus tragula	93(.8),111(4.2),
MURAENIDAE	70(3.6), 73(7.0),178(7.8),256(2.0),
MURAENESOCIDAE	118(18.8),119(32.9),
MYCTOPHIDAE	127(151.2),128(40.0),129(36.0),130(120.0),131(250.0),132(720.0),
	133(660.0),134(82.0),135(1800.0),136(132.0),137(110.0),138(12.6),
	140(16.4),143(38.0),144(409.6),145(50.0),146(1.4),147(44.0),
	148(12.4),168(1440.0),195(3.0),200(3.2),216(12000.0),252(21.0),
	256(40.0),257(210.0),
NEMIPTERIDAE	
Nemipterus sp.	119(147.0),122(11.0),134(.0),
Nemipterus metopias	261(1.8),
Nemipterus japonicus	66(.1), 67(108.0), 69(107.6), 70(3.6), 70(5.0), 72(5.8),
	76(36.3), 77(2.5), 82(7.0), 84(3.8), 92(83.6), 92(2360.0),
	101(9.0),112(3.0),112(142.0),117(10.0),118(87.4),121(2.4),
	124(8.0),126(66.0),154(130.2),155(6.8),156(2.6),157(18.4),
	159(3.6),161(13.0),162(11.6),164(803.0),165(.2),166(64.8),
	167(130.0),169(120.0),170(363.6),174(17.0),175(6.0),178(11.8),
	197(13.2),218(55.2),222(377.6),223(39.4),226(410.0),227(391.4),
	232(89.2),235(17.4),238(2245.0),239(.6),244(141.4),246(10.4),
	247(88.0),249(1220.1),250(40.6),253(239.8),258(72.8),259(5.3),
	260(10.4),

Nemipterus bleekeri	118(43.5),	119(16.1),	258(16.8),				
Nemipterus peroni	119(9.8),	120(17.4),	124(12.0),	142(.6),	254(16.0),	261(15.0),	
Parascolopsis sp.	126(10.8),	259(3.1),					
Parascolopsis eriomma	60(9.0),	61(20.2),	96(12.3),	97(2.3),	102(6.4),	117(12.0),	
	189(1.0),	197(1.2),	200(.8),	202(46.8),	220(43.0),		
Parascolopsis aspinosa	162(.2),						
Scolopsis bimaculatus	75(65.0),	83(30.4),	93(.3),	93(5.6),	151(8.0),		
Scolopsis vosmeri	61(.6),						
Scolopsis taeniatus	59(7.5),	60(2.0),	63(42.9),	72(1.7),	75(31.2),	77(2.0),	
	95(.7),	96(4.1),	97(4.5),	104(.2),	108(11.6),	111(7.6),	
	187(69.0),	202(5.2),	219(.0),	220(19.6),	239(6.0),	243(2.7),	
Scolopsis bilineatus	61(.2),						
NEMICHTHYIDAE	146(.0),						
NOMEIDAE							
Cubiceps sp.	138(1.4),	139(15.8),	144(56.4),	146(.8),	146(.2),	147(9.6),	
	148(4.0),	251(1.2),	252(2.8),				
OPHIDIIDAE	200(144.0),						
OSTRACIONTIDAE	75(10.4),	187(3.6),	236(.8),				
Lactoria cornuta	61(.2),						
Tetrosomus gibbosus	60(.1),	77(3.7),	82(5.0),	83(34.2),	149(.6),	171(7.7),	
	202(1.0),	215(.2),	219(.0),	239(12.0),			
PARALEPIDIDAE							
Lestidium sp.	138(.2),	140(.5),	146(.0),	148(.4),	252(.2),		
PLATYCEPHALIDAE	70(1.2),	72(1.2),	77(1.4),	111(2.4),	178(2.6),		
Platycephalus sp.	66(1.4),	94(.1),	117(2.0),	118(30.0),	119(36.4),	120(2.8),	
	121(.8),	122(1.2),	126(8.4),	142(.2),	167(2.0),	197(2.1),	
	218(1.2),	223(2.0),					
Platycephalus scaber	83(15.2),						
PLEURONECTIFORMES	88(.8),						
POLYNEMIDAE							
Polynemus sextarius	67(46.8),	231(5.0),					
PLOTOSIDAE	72(.5),	75(2.4),	77(1.0),	83(26.6),	93(40.0),	111(7.0),	
Plotosus limbatus	187(24.0),						
POMADASYIDAE,HAEMULIDAE	75(31.2),						
Diagramma picta	59(77.0),	61(42.0),	82(12.4),	93(18.7),	96(4.6),	102(2.2),	
	111(20.2),	123(44.4),	125(56.2),	149(17.6),	183(100.4),	187(147.6),	
	220(24.6),	243(10.5),	255(5.6),				
Plectorhynchus sp.	75(8.5),	121(8.0),	237(99.9),				
Plectorhynchus flavomaculatus	61(65.2),	63(21.9),	106(3.0),				
Plectorhynchus schotaf	71(.5),	82(5.6),	93(25.0),	106(18.9),	108(4.6),	111(5.8),	
Plectorhynchus gaterinus	82(3.8),	151(16.0),	202(2.9),	215(2.6),	220(12.6),		
Plectorhynchus fangi	100(2.0),	101(2.2),	111(7.1),	187(3.0),	202(9.2),	207(39.2),	
	209(21.8),	215(11.2),	219(.0),	220(7.6),			
Plectorhynchus chubbi	111(9.1),	219(120.0),					
Plectorhynchus pictus	209(42.0),	219(240.0),	236(5.4),	239(25.0),			
Pomadasys sp.	123(35.4),	142(13.2),	215(1.6),	231(25.0),	242(1.6),		
Pomadasys maculatus	83(13.7),	175(.5),	176(7.5),	236(1.8),			
Pomadasys hasta	219(.0),	241(3.6),	260(9.6),				
Pomadasys opercularis	59(3.3),	123(28.2),	142(.6),	152(31.4),	158(90.0),	177(6.8),	
Pomadasys incisus	83(41.8),						
Pomadasys stridens	59(63.4),	66(25.4),	67(306.0),	69(113.8),	70(480.0),	73(2.1),	
	76(6.2),	83(1193.2),	117(30.0),	151(152.0),	152(377.4),	154(45.2),	
	155(4.0),	156(1.3),	157(10.6),	159(85.2),	161(1586.8),	165(.2),	
	176(4.5),	178(2.6),	184(16.0),	188(.5),	231(2.0),	235(1740.0),	
	250(130.5),	253(28.6),	254(1.0),	258(36.8),			
PRIACANTHIDAE							
Cookeolus boops	171(1.4),	188(4.8),	193(.5),	197(1.8),	201(3.0),	223(5.8),	
Priacanthus sp.	102(3.2),						
Priacanthus hamrur	60(.6),	167(1.5),	189(3.6),				
Priacanthus blochii	259(7.2),	260(4.0),					
PSETTODIDAE							
Psettodes erumei	59(17.0),	84(11.2),	119(22.4),	120(4.0),	121(24.0),	124(4.2),	
	142(14.2),	151(7.2),	174(8.6),	233(1.6),	237(8.1),	243(4.2),	
	245(3.4),	253(30.8),	254(11.6),	255(20.0),	258(5.6),		
RACHYCENTRIDAE							
Rachycentron canadus	62(6.6),	99(29.2),	101(4.8),	103(11.5),	172(.4),	174(30.0),	
	198(6.0),	209(11.2),	231(12.0),	243(4.8),			

R A Y S	67(36.0),142(36.0),177(400.0),187(200.0),198(40.0),203(40.0),
	241(150.0),242(8.0),
DASYATIDAE	225(18.0),
Dasyatis jenkinsii	83(17.0), 84(26.8),
Dasyatis uarnak	101(60.0),
GYMNURIDAE	174(19.2),
Gymnura sp.	123(15.0),175(35.4),
MOBULIDAE	181(8.0),
Mobula diabolus	93(16.7),
MYLIOBATIDAE	121(4.2),123(57.6),
RHINOBATIDAE	171(140.0),172(560.0),
Rhynchobatus djeddensis	61(40.0),
Rhinobatus sp.	60(4.0),
Torpedo marmorata	218(7.0),
SCARIDAE	61(9.6),104(2.6),108(21.8),
Scarus arabicus	187(17.4),215(2.9),219(.0?1%???t? 25.4),
SCIAENIDAE	61(55.0), 65(6.3), 70(9.6), 75(16.4),106(85.8),126(35.0),
Argyrosomus sp.	237(17.4),
Argyrosomus hololepidotus	174(9214.0),237(162.0),
Argyrosomus heinii	183(10.4),236(4.2),
Atractoscion aequidens	243(13.5),
Otolithes ruber	152(1.8),231(13.0),
Umbrina sinuata	151(12.4),209(3.2),
SCOMBRIDAE	139(.6),
Rastrelliger sp.	122(1.0),
Rastrelliger kanagurta	124(28.0),
Sarda orientalis	188(31.0),
Scomber japonicus	112(20.0),149(11.2),173(3.2),178(2.0),184(1.0),198(.2),
	203(.6),210(3.0),211(4.9),223(5.0),244(141.4),
Scomberomorus commerson	59(264.0), 65(7.8), 93(4.7),150(3.0),152(10.8),174(1.9),
	175(6.0),187(6.6),192(2.5),215(3.3),231(29.0),255(7.0),
Scomberomorus guttatus	142(6.6),
Thunnus obesus	135(4.0),
SCORPAENIDAE	231(5.0),
Pterois sp	75(5.2), 95(.8),231(14.0),
SERRANIDAE	
Epinephelus sp	61(22.0), 61(31.6), 66(18.8), 73(.5), 79(.2), 82(6.6),
	93(9.0), 94(5.4), 96(48.0),101(8.7),102(25.2),106(43.2),
	107(11.3),108(76.8),108(29.6),121(2.7),183(8.6),202(40.0),
	202(18.0),204(14.0),204(13.0),206(125.4),207(4.4),209(28.0),
	209(9.2),209(9.2),215(15.0),219(.0),220(240.6),239(10.0),
	259(6.2),260(22.4),
Epinephelus fasciatus	66(1.4),
Epinephelus tauvina	61(11.6),126(1.8),
Epinephelus areolatus	60(8.8), 96(9.0), 97(23.1),101(3.1),102(25.2),104(5.3),
	106(106.2),107(2.0),108(14.4),109(2.0),110(9.0),
Epinephelus malabaricus	219(360.0),
Epinephelus areolatus	59(7.8), 63(41.7),
Epinephelus diacanthus	157(19.8),170(2.4),171(57.2),188(2.1),197(16.2),201(33.2),
	204(2.8),209(66.8),223(13.4),230(3.0),231(15.0),247(15.2),
Epinephelus summana	149(24.6),151(10.8),152(6.6),167(4.8),
Epinephelus chlorostigma	151(6.0),183(13.8),202(37.2),206(74.4),220(107.6),243(15.0),
Epinephelus radiatus	171(6.0),
Epinephelus latifasciatus	209(9.2),
Promicrops lanceolatus	260(37.6),
SHARK	62(31.6), 67(54.0),134(.0),215(34.0),236(1.6),253(149.6),
	259(8.2),
CARCHARHINIDAE	59(10.6), 61(61.8), 63(25.8), 99(2.3),118(38.3),122(3.6),
	124(.4),126(14.8),142(1.0),175(185.0),184(247.8),203(3.0),
	223(30.6),234(93.2),245(14.4),258(38.4),260(28.0),261(22.5),
Carcharhinus obscurus	102(11.2),
Loxodon sp.	233(2.0),
Rhizoprionodon acutus	65(75.0), 68(27.3), 72(19.0), 76(146.2), 80(60.0), 86(44.4),
	88(8.2), 90(16.8), 95(54.4),102(4.6),103(6.8),104(3.8),
	106(13.2),158(16.8),209(4.6),210(3.0),
Loxodon macrorhinus	149(29.6),171(6.0),187(24.0),192(6.6),204(7.0),207(6.0),
	217(16.0),218(3.0),
Rhizoprionodon oligolin	209(4.6),
Galeocerdo cuvier	90(3.7),
Heterodontus sp.	111(.9),
Eridacnis radcliffei	200(9.6),
Sphyrna lewini	76(20.5),175(10.2),
Mustelus sp	86(14.8), 88(1.4), 90(1.4),102(4.4),104(2.2),
Mustelus mosis	192(2.6),

SHRIMPS	118(1.5),
Shrimps. small. non comm.	95(2.4),111(.6),
Parapenaeus sp.	200(33.6),
SIGANIDAE	
Siganus sp	60(1.2), 75(28.0), 82(4.0), 93(11.3),100(2.9),104(7.1),
	106(7.8),111(40.0),
Siganus sutor	192(2.4),202(32.0),207(2.2),219(.0),220(9.5),243(3.0),
SPARIDAE	75(10.4),
Acanthopagrus bifasciatus	106(7.2),187(28.8),202(3.0),
Argyrops sp.	62(332.0),
Argyrops spinifer	60(104.4), 61(70.0), 61(172.0), 63(47.4), 66(432.0), 68(67.2),
	72(12.0), 72(30.7), 73(.4), 82(14.2), 82(4.8), 83(41.8),
	90(8.2), 95(51.5), 95(14.8), 97(3.6),100(1.1),101(3.3),
	102(25.2),103(2.4),104(22.1),106(6.0),109(.5),111(4.0),
	117(70.0),118(16.5),120(6.0),122(10.2),125(60.5),126(6.6),
	149(229.8),150(1440.0),151(441.6),152(117.2),154(445.4),155(25.6),
	156(31.0),157(158.6),158(35.2),165(31.6),171(8.4),174(6.6),
	177(30.8),183(44.0),187(36.0),192(11.8),201(12.0),207(2.6),
	209(121.4),220(50.6),231(21.0),234(8.6),237(130.5),239(2.6),
	243(60.0),245(71.8),246(70.2),247(70.4),248(721.6),249(1258.5),
	250(464.0),255(18.6),258(13.6),259(6.7),260(31.2),261(19.2),
Argyrops filamentosus	119(4.2),120(.1),121(8.7),142(.8),192(39.6),201(46.0),
	202(10.0),206(31.2),207(12.8),209(38.8),
Cheimerius nufar	61(42.0), 63(153.0), 66(20.4), 68(21.5), 69(3.5), 72(76.3),
	73(.4), 82(70.2), 90(2.2), 94(11.6), 95(160.8), 96(80.0),
	97(169.8), 98(35.4),100(106.2),101(80.8),102(11.2),104(84.6),
	106(65.4),108(38.4),109(1.5),110(.2),111(28.0),151(48.8),
	154(57.2),157(29.8),165(3.4),171(226.8),172(6.2),183(26.0),
	192(161.8),201(82.6),202(55.6),204(90.2),206(300.6),207(6.8),
	209(474.6),215(61.6),217(12.0),218(2.0),219(120.0),220(196.2),
	234(101.0),239(2.3),243(391.5),245(4.8),246(59.8),247(35.2),
	250(319.0),
Diplodus cervinus	207(3.2),
Sparida omanensis	219(.0),
Pagellus sp.	229(104.2),230(152.6),236(2.8),239(1.2),
Pagellus natalensis	239(51.0),
Pagellus affinis	60(11.0), 66(34.0), 68(123.9), 69(68.8), 70(2.4), 80(20.0),
	83(19.0), 86(61.0), 90(8.2), 92(1092.0), 93(8.9), 94(198.0),
	111(2.0),112(910.0),151(56.8),154(130.0),155(2.7),156(1.3),
	157(121.8),162(19.8),165(8.8),167(4.0),178(27.4),187(46.8),
	197(.9),201(2.1),206(1.2),209(3.2),223(14.8),227(285.0),
	2????t? 8.6),246(88.8),247(175.2),248(145.0),
Rhabdosargus sarba	66(15.4),111(1.0),125(1.0),151(12.0),187(15.3),
Rhabdosargus haffara	231(45.0),
SPHYRAENIDAE	
Sphyraena sp.	59(31.7), 61(.6), 95(13.5),125(16.8),147(.6),241(108.0),
Sphyraena forsteri	234(44.0),254(6.0),255(17.2),258(24.0),259(6.7),
Sphyraena barracuda	78(18.3),242(9.0),
Sphyraena obtusata	65(.6), 75(13.0), 76(5.4), 83(19.0), 89(10.1),148(.6),
	159(.6),167(4.0),173(4.8),193(.4),199(1.8),210(62.0),
	231(8.0),235(8.6),240(8.4),
Sphyraena jello	61(9.6), 83(10.9),
Sphyraena africana	60(3.4), 61(1.0), 72(2.3),103(3.3),111(1.4),149(151.8),
	150(57.2),154(6.6),179(1100.0),188(2.8),192(5.8),204(2.6),
	248(78.4),
Spyraena putnamiae	59(59.0), 61(50.4), 68(128.1), 72(2.8), 90(24.2),104(1.3),
	111(5.5),117(452.0),118(7.5),119(23.8),120(6.0),121(4.8),
	122(40.0),123(7.8),124(39.6),125(28.3),126(1.4),142(24.0),
	149(73.8),150(23.0),184(107.6),210(2.2),
C E P H A L O P O D A	62(5.2),148(1.2),
LOLIGINIDAE	65(31.2), 72(70.2), 76(13.2), 80(4.0), 83(22.8), 86(19.5),
	95(13.2),100(11.8),101(2.0),103(.3),117(2.0),119(.1),
	121(1.0),125(13.4),128(3.0),129(.5),133(.0),138(1.0),
	143(2.8),165(.5),174(1.0),
Loligo sp	66(69.4), 67(79.2), 77(2.7), 78(20.9), 82(2.6), 88(1.5),
	94(21.6), 98(.5),105(1.0),106(.9),108(.8),123(.3),
	124(1.6),148(.4),175(3.6),201(6.0),218(45.6),223(9.8),
	225(1.6),231(4.0),234(14.0),236(.8),239(36.0),245(53.8),
	246(36.2),247(38.4),249(53.4),254(1.2),258(4.4),261(16.5),

SEPIIDAE 72(.2), 76(4.3), 80(4.0), 88(1.2), 95(3.5),100(1.7),
101(1.3),111(2.0),117(6.0),118(52.5),119(53.9),120(39.0),
121(.9),122(13.8),125(11.8),126(15.0),193(.4),

Sepia sp 59(69.2), 60(1.6), 77(8.8), 94(8.7),123(9.6),124(12.2),
142(8.8),162(.4),182(40.0),187(45.6),188(16.8),192(149.0),
201(2.6),209(13.0),215(3.2),220(122.8),223(93.6),225(4.0),
227(140.6),233(49.0),234(86.6),235(11.6),239(10.8),246(97.0),
247(6.4),250(58.0),254(3.0),255(9.4),258(8.4),

SYNODONTIDAE

Saurida sp. 59(1.8), 69(1088.0), 72(13.2), 76(31.4), 77(5.6), 82(.4),
92(27.8), 93(1.1),100(1.4),112(1124.0),151(27.2),

Saurida tumbil 66(19.6), 67(81.2), 70(32.4),118(176.3),119(812.0),120(59.4),
121(52.0),122(2.8),123(9.0),124(7.2),125(2.6),126(9.0),
142(81.2),147(9.6),174(3.4),175(1.5),183(1.0),187(9.0),
243(2.7),253(70.4),254(4.6),255(7.8),258(13.6),260(8.0),

Saurida undosquamis 117(106.0),126(10.2),154(29.2),155(1.4),157(2.3),162(39.2),
167(19.0),171(.6),172(6.4),188(2.2),197(84.0),201(17.4),
218(540.0),223(285.8),227(83.6),234(3.4),235(98.6),239(7.8),
245(6.6),246(61.0),247(102.4),249(175.5),250(29.0),261(.2),

Saurida micropectoralis 103(4.5),111(2.0),

Synodus sp. 195(.8),

Trachinocephalus sp. 146(11.9),

Trachinocephalus myops 95(.6),

TETRAODONTIDAE 61(3.6), 63(11.4), 72(4.3), 75(65.0), 77(6.5), 82(5.2),
104(7.0),

Chelonodon sp. 217(13.2),

Lagocephalus sp 96(7.8),187(2.4),231(.5),245(4.0),254(.4),255(8.4),
261(6.6),

Lagocephalus sceleratus 103(6.6),

Lagocephalus spadiceus 156(2.2),171(18.4),172(28.0),183(23.2),187(18.6),207(2.3),
219(.0),235(5.8),239(15.6),243(4.4),246(2.1),248(25.0),

THERAPONIDAE

Pelates quadrilineatus 124(.4),

Therapon jarbua 62(11.2), 63(.8), 65(8.4), 72(.7),142(4.0),207(.8),
208(1.4),210(.5),225(1.2),245(1.6),254(2.2),

TRIGLIDAE

Lepidotrigla sp 67(3.6), 68(.4), 70(67.2), 72(1.1), 77(14.6), 80(18.0),
83(30.4), 86(3.0), 88(3.0), 92(41.8),112(73.0),118(11.6),
149(.4),154(1.4),178(48.2),227(41.8),229(26.0),232(17.8),
236(.6),244(56.4),254(.2),

Lepidotrigla bentuviai 119(2.8),157(.7),158(30.0),162(4.5),167(6.0),171(708.4),
188(.1),201(.0),207(.2),209(.9),212(25.6),218(1.2),
222(1132.8),223(49.8),226(470.0),235(319.0),245(.3),246(22.8),
247(9.6),

Lepidotrigla omanensis 157(.5),167(34.0),197(12.6),

Pteridotrigla hemisticata 170(.8),193(.8),197(23.4),200(56.0),212(38.4),244(56.4),
245(.5),246(.5),

TRICHIURIDAE

Trichiurus sp. 195(.1),

Trichiurus lepturus 65(139.5), 66(40.6), 67(169.2), 69(17.5), 70(8.4), 76(33.7),
91(1.7), 95(16.8),100(16.4),118(5.3),120(2.0),121(2.4),
121(.3),122(1.2),124(.8),126(1.6),127(8.8),128(.8),
129(4.0),133(.0),134(.0),138(2.0),139(.5),140(1.6),
143(1.8),146(23.4),147(.4),151(247.2),152(87.0),231(100.0),
235(188.4),256(3.0),258(23.2),259(96.0),260(20.0),261(16.5),

Trichiurus auriga 200(8.0),

TRIACANTHIDAE

Pseudotriacanthus strigilifer 254(.4),255(.5),

Triacanthus biaculeatus 175(69.6),198(60.0),

TRIACANTHODIDAE 84(14.8),

URANOSCOPIDAE 118(12.0),119(2.8),

VELIFERIDAE

Velifer africanus 90(.6),

Annex VII Processed catch data by regions and by gear, species and bottom depth zones.

Table A 1a. Summary of catches in bottom trawl from all work north of Ras al Hadd.

FAMILY GEAR:DEMERSAL	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	4	4	2	0	1	100	218.3	32	41.8	689.1	.0	.0
Synodontidae	5	3	1	1	0	91	115.1	16	127.9	42.7	.0	.0
Sphyraenidae	6	3	1	1	0	100	79.1	12	47.1	164.5	.0	.0
Lethrinidae	2	2	0	1	0	46	137.4	9	82.2	9.7	.0	.0
Sparidae	5	2	1	0	0	73	49.6	5	38.8	28.9	.0	.0
Nemipteridae	5	1	1	0	0	64	46.1	4	26.6	36.6	.0	.0
Lutjanidae	2	1	1	0	0	36	51.8	3	25.7	.7	.0	.0
Pomadasyidae	3	2	1	0	0	55	38.9	3	25.4	10.0	.0	.0
Squids	8	2	0	0	0	91	18.9	3	19.1	12.3	.0	.0
Drepanidae	1	2	0	0	0	27	36.2	2	13.6	.0	.0	.0
Rays	1	2	0	0	0	27	37.6	2	14.1	.0	.0	.0
Ariidae	2	1	0	0	0	27	17.9	1	6.1	1.6	.0	.0
Gerridae	3	1	0	0	0	36	15.8	1	7.9	.0	.0	.0
Leiognathidae	2	1	0	0	0	27	24.0	1	9.0	.0	.0	.0
Monacanthidae	3	1	0	0	0	36	15.8	1	7.3	1.6	.0	.0
Mullidae	4	1	0	0	0	46	16.3	1	5.6	12.3	.0	.0
Plathyceph.	4	1	0	0	0	46	10.2	1	4.9	3.9	.0	.0
Psettodidae	5	0	0	0	0	46	13.8	1	8.6	.0	.0	.0
Sciaenidae	0	1	0	0	0	9	35.0	1	.0	11.7	.0	.0
Scombridae	4	0	0	0	0	36	11.7	1	5.7	.3	.0	.0
Sharks	4	0	0	0	0	36	12.7	1	3.8	6.7	.0	.0
Other fish							16.2	2				
MEAN OF TOTAL CATCHES							676.8		539.4	1043.1	.0	.0
NO OF HAULS: 11 TOTAL									8	3	0	0

Table A 1b Summary of catches in pelagic trawl from all work north of Ras al Hadd.

GEAR:PELAGIC FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Myctophidae	4	6	5	3	1	91	246.6	96	.0	.0	.0	234.3
Nomeidae	5	1	0	0	0	29	14.7	2	.0	.0	.0	4.4
Carangidae	4	0	0	0	0	19	5.9	1	.0	.0	.0	1.2
Trichiuridae	6	0	0	0	0	29	6.9	1	.0	.0	.0	2.1
Other fish							2.7	1				
MEAN OF TOTAL CATCHES							233.2		2.0	.0	.0	244.7
NO OF HAULS: 21 TOTAL									1	0	0	20

Table A 2a. Summary of all catches in bottom trawl between Ras al Hadd and Masirah Island.

GEAR:DEMERSAL

FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	7	7	5	4	2	96	342.3	31	46.4	269.6	3604.2	.0
Sparidae	4	5	5	6	2	85	325.5	26	288.0	285.7	.0	.0
Nemipteridae	8	3	5	1	1	69	160.1	10	14.8	154.2	141.4	.0
Ariidae	7	2	1	2	0	46	170.0	7	238.0	8.0	.0	.0
Pomadasyidae	5	3	3	3	0	54	135.0	7	121.8	53.9	.0	.0
Synodontidae	8	4	2	0	1	58	114.3	6	14.4	94.1	.0	.0
Squids	1	6	1	0	0	31	62.1	2	16.6	21.4	.0	.0
Trichiuridae	2	2	2	0	0	23	95.0	2	62.9	3.9	.0	.0
Albulidae	1	0	0	1	0	8	162.9	1	.0	19.2	.0	.0
Apogonidae	1	0	1	0	0	8	82.2	1	.0	9.7	.0	.0
Gerridae	2	2	1	0	0	19	47.6	1	5.2	11.6	.0	.0
Lethrinidae	2	2	1	0	0	19	66.8	1	6.2	16.7	.0	.0
Scombridae	2	0	1	0	0	12	51.7	1	1.7	.0	141.4	.0
Serranidae	6	1	0	0	0	27	17.9	1	2.9	6.0	.0	.0
Sharks	4	2	0	0	0	23	28.3	1	10.6	5.0	.0	.0
Sphyraenidae	2	1	1	0	0	15	54.7	1	10.0	8.2	.0	.0
Triglidae	6	3	1	0	0	39	29.4	1	4.2	8.7	112.8	.0
Other fish							16.9	1				
MEAN OF TOTAL CATCHES							1068.4		874.8	987.1	3999.8	.0
NO OF HAULS: 26 TOTAL									8	17	1	0

Table A 2b. Summary of all catches in pelagic trawl between Ras al Hadd and Masirah Island.

GEAR:PELAGIC

FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	2	0	2	1	2	78	792.0	52	94.3	1271.2	135.2	.0
Pomadasyidae	0	0	0	0	1	11	1586.8	15	.0	396.7	.0	.0
Clupeidae	2	0	0	2	0	44	358.6	13	712.7	2.3	.0	.0
Myctophidae	0	0	0	0	1	11	1440.0	13	.0	.0	.0	1440.0
Engraulidae	1	0	1	0	0	22	118.5	2	118.5	.0	.0	.0
Nemipteridae	1	1	1	0	0	33	65.9	2	.0	49.4	.0	.0
Sharks	0	1	0	0	0	11	75.0	1	37.5	.0	.0	.0
Trichiuridae	0	0	1	0	0	11	139.5	1	69.8	.0	.0	.0
Other fish							6.4	0				
MEAN OF TOTAL CATCHES							1190.2		1061.3	1719.7	135.2	1440.0
NO OF HAULS: 9 TOTAL									2	4	2	1

Table A 3a. Summary on all catches in bottom trawl from the Masira Bank.

GEAR:DEMERSAL

FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	8	7	5	3	5	85	2142.4	66	109.5	5190.4	2891.4	.0
Sciaenidae	2	0	1	0	1	12	2354.3	10	447.8	1.3	.0	.0
Ariidae	13	6	3	1	1	73	266.6	7	291.9	26.8	.0	.0
Pomadasyidae	7	1	2	0	2	36	285.3	4	79.4	175.7	.0	.0
Nemipteridae	10	4	0	1	1	49	181.7	3	7.2	266.5	45.1	.0
Lethrinidae	3	4	0	0	1	24	164.5	2	59.0	7.6	.0	.0
Rays	4	1	2	2	0	27	156.3	2	67.0	.0	.0	.0
Sparidae	3	6	5	1	0	46	105.5	2	44.4	65.1	.0	.0
Sharks	5	3	2	0	0	30	63.5	1	12.2	37.9	.0	.0
Squids	11	5	1	0	0	52	27.6	1	14.9	15.7	.0	.0
Triglidae	6	1	0	2	0	27	123.9	1	36.1	34.0	8.9	.0
Other fish							49.9	1				
MEAN OF TOTAL CATCHES							2736.5		1218.0	5883.2	2947.3	.0
NO OF HAULS: 33 TOTAL									21	10	2	0

Table A 3b. Summary on all catches in pelagic trawl from the Masirah Bank.

GEAR:PELAGIC

FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	1	2	3	5	6	94	1703.2	86	523.7	6479.0	856.0	.0
Clupeidae	1	2	3	3	0	50	239.9	6	170.5	151.2	.0	.0
Sphyraenidae	4	0	2	0	1	39	194.3	4	26.0	366.7	.0	.0
Ariidae	1	1	1	0	0	17	57.3	1	17.2	.0	.0	.0
Rays	0	0	1	0	0	6	150.0	1	15.0	.0	.0	.0
Sharks	1	0	1	0	0	11	124.7	1	24.9	.0	.0	.0
Other fish							36.3	1				
MEAN OF TOTAL CATCHES							1872.1		835.8	6996.9	869.7	.0
NO OF HAULS: 18 TOTAL									10	3	5	0

Figure A 4a. Summary of all catches in bottom trawl between Ras al Madraka and Ras Marbat.

GEAR:DEMERSAL

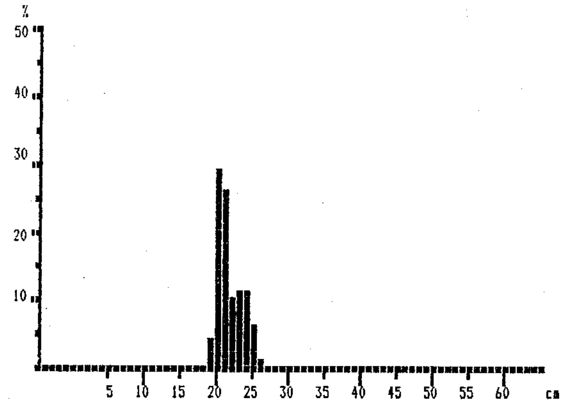
FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	12	8	2	1	8	84	2692.0	68	40.5	3207.8	3089.8	.0
Clupeidae	4	0	1	0	1	16	2650.6	13	1.5	690.8	.0	.0
Sparidae	6	9	11	2	1	78	170.1	4	89.1	88.7	667.3	.0
Lethrinidae	5	4	6	5	0	54	169.7	3	132.8	89.8	.0	.0
Nemipteridae	8	4	1	3	1	46	238.5	3	12.8	41.8	988.7	.0
Synodontidae	5	2	1	1	1	27	216.7	2	.4	43.9	383.9	.0
Triglidae	2	6	0	1	1	27	192.8	2	.0	27.2	415.9	56.0
Crabs	0	0	0	0	1	3	1392.0	1	.0	.0	464.0	.0
Pomadasyidae	7	4	0	1	0	32	48.7	1	57.1	.6	.0	.0
Serranidae	10	4	2	2	0	49	77.5	1	83.2	24.5	.0	.0
Squids	7	2	4	0	0	35	49.6	1	29.7	15.2	.0	.0
Other fish							89.8	2				
MEAN OF TOTAL CATCHES							3329.0		602.5	4277.4	6066.5	566.8
NO OF HAULS: 37 TOTAL									10	23	3	1

Table A 4b. Summary on all catches in pelagic trawl between Ras al Madraka and Ras Marbat.

GEAR:PELAGIC

FAMILY	CATCH GROUPS (kg/h) 1-29	30-99	100-299	300-999	>1000	% incidence in tot.no. of hauls	Mean c. of c. >1kg	% of total catch	MEAN CATCH IN BOTTOM DEPTH STRATA <50m	50-100m	100-180m	>180m
Carangidae	7	0	1	0	1	53	2253.6	93	3.4	10123.8	.4	2.8
Apogonidae	0	0	0	1	0	6	824.0	4	.0	.0	.0	103.0
Clupeidae	5	0	2	0	0	41	50.3	2	51.5	.0	47.7	.9
Other fish							20.0	1				
MEAN OF TOTAL CATCHES							1282.3		136.7	10128.8	52.4	115.1
NO OF HAULS: 17 TOTAL									3	2	4	8

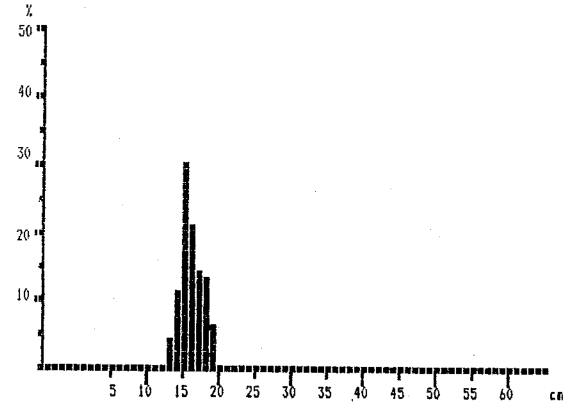
Annex VIII Histograms of pooled length distributions of the most common pelagic fishes.



Trachurus indicus (pooled data)

Ras al Hadd - Masira Isl. Surv.I
MEAN LENGTH = 21,6cm N= 309
Modes : , 20cm, 24cm
NUMBER OF SUBSAMPLES : 5
SAMPLES FROM ST.NO.: 244 UNTIL ST.NO.: 250

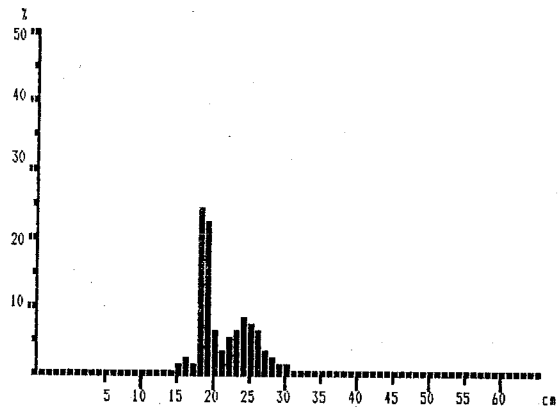
LOWEST STATION : 215 HIGHEST STATION : 250



Trachurus indicus (pooled data)

Masira Bank, Survey I
MEAN LENGTH = 15,9cm N= 835
Modes : , 15cm
NUMBER OF SUBSAMPLES : 10
SAMPLES FROM ST.NO.: 71 UNTIL ST.NO.: 89

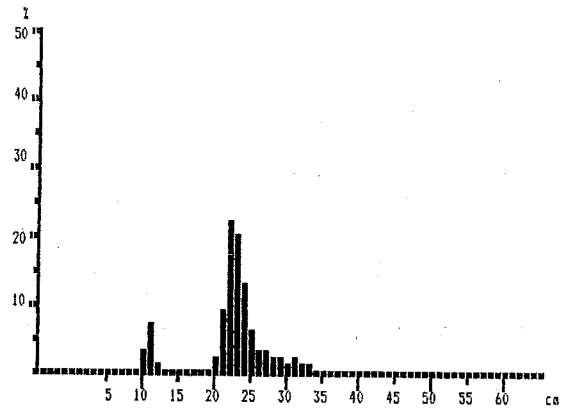
LOWEST STATION : 13 HIGHEST STATION : 116



Trachurus indicus (pooled data)

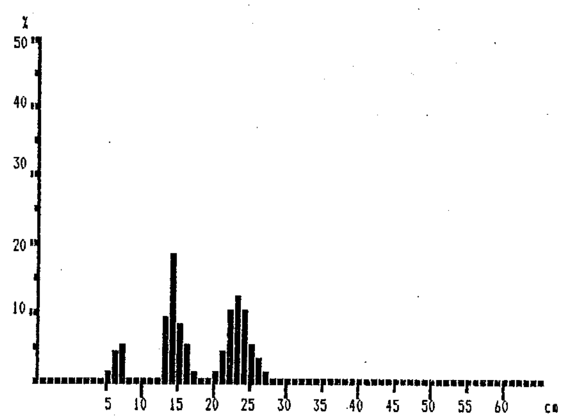
Ras al Hadd - Masira Isl. Surv.II
MEAN LENGTH = 21,0cm N= 486
Modes : , 16cm, 18cm, 24cm
NUMBER OF SUBSAMPLES : 5
SAMPLES FROM ST.NO.: 154 UNTIL ST.NO.: 168

LOWEST STATION : 117 HIGHEST STATION : 214



Trachurus indicus (pooled data)

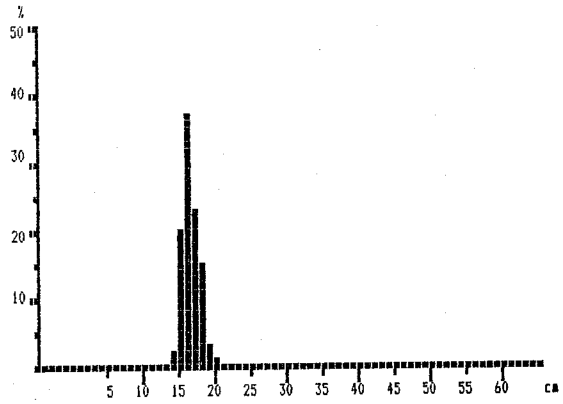
Masira Bank, Survey II
MEAN LENGTH = 22,2cm N= 1668
Modes : , 11cm, 22cm, 31cm
NUMBER OF SUBSAMPLES : 10
SAMPLES FROM ST.NO.: 174 UNTIL ST.NO.: 214
EXCLUDING FROM ST.NO. : 192 UNTIL ST.NO. : 210
LOWEST STATION : 117 HIGHEST STATION : 214



T. indicus (pooled data)

Masira Bank, Survey III
MEAN LENGTH = 17,8cm N= 707
Modes : , 7cm, 14cm, 23cm
NUMBER OF SUBSAMPLES : 8
SAMPLES FROM ST.NO.: 232 UNTIL ST.NO.: 242

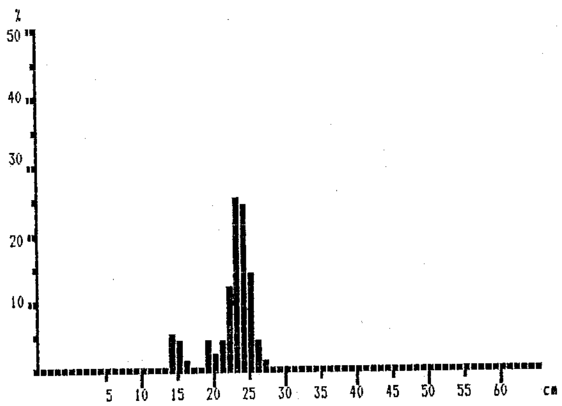
LOWEST STATION : 215 HIGHEST STATION : 250



T. indicus (pooled data)

Sauquara Bank, Survey I
MEAN LENGTH = 16,4cm N= 119
Modes : , 16cm
NUMBER OF SUBSAMPLES : 1
SAMPLES FROM ST.NO.: 91 UNTIL ST.NO.: 116

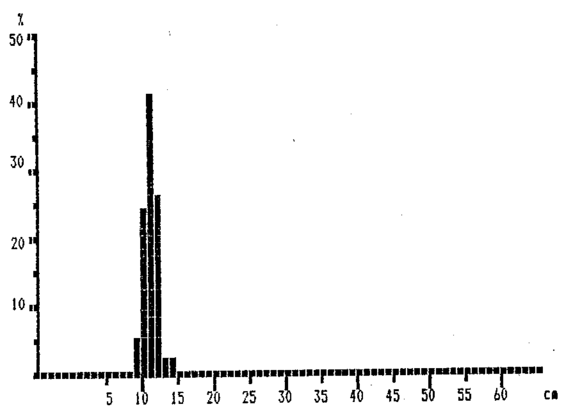
LOWEST STATION : 13 HIGHEST STATION : 116



T. indicus (pooled data)

Sauquara Bank, Survey III
MEAN LENGTH = 22,5cm N= 769
Modes : , 14cm, 19cm, 23cm
NUMBER OF SUBSAMPLES : 7
SAMPLES FROM ST.NO.: 219 UNTIL ST.NO.: 231

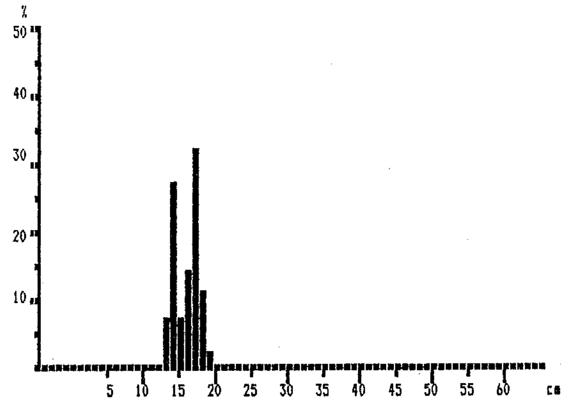
LOWEST STATION : 215 HIGHEST STATION : 250



S. gibbosa (pooled data)

Ras al Hadd - Masira Isl. Surv.I
MEAN LENGTH = 11,0cm N= 85
Modes : , 11cm
NUMBER OF SUBSAMPLES : 1
SAMPLES FROM ST.NO.: 62 UNTIL ST.NO.: 70

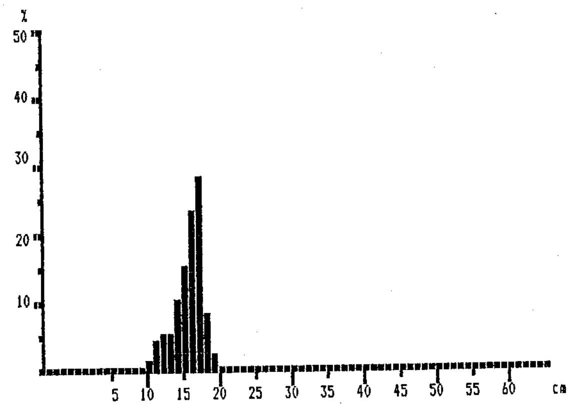
LOWEST STATION : 13 HIGHEST STATION : 116



S. gibbosa OM I (pooled data)

Ras al Hadd - Masira Isl. Surv.I
MEAN LENGTH = 15,7cm N= 154
Modes : , 14cm, 17cm
NUMBER OF SUBSAMPLES : 2
SAMPLES FROM ST.NO.: 71 UNTIL ST.NO.: 89

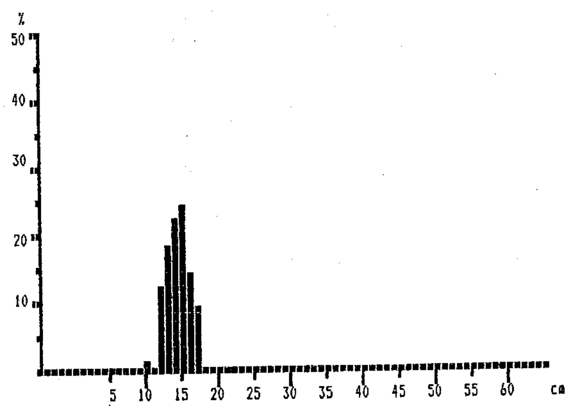
LOWEST STATION : 13 HIGHEST STATION : 116



S. gibbosa (pooled data)

Ras al Hadd - Masira Isl. Surv.II
MEAN LENGTH = 15,6cm N= 196
Modes : , 17cm
NUMBER OF SUBSAMPLES : 2
SAMPLES FROM ST.NO.: 170 UNTIL ST.NO.: 191

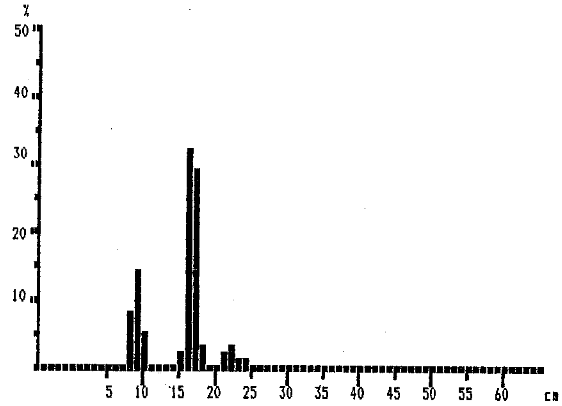
LOWEST STATION : 117 HIGHEST STATION : 214



S. gibbosa (pooled data)

Ras al Hadd - Masira Isl. Surv.III
MEAN LENGTH = 14,3cm N= 103
Modes : , 10cm, 15cm
NUMBER OF SUBSAMPLES : 3
SAMPLES FROM ST.NO.: 232 UNTIL ST.NO.: 243

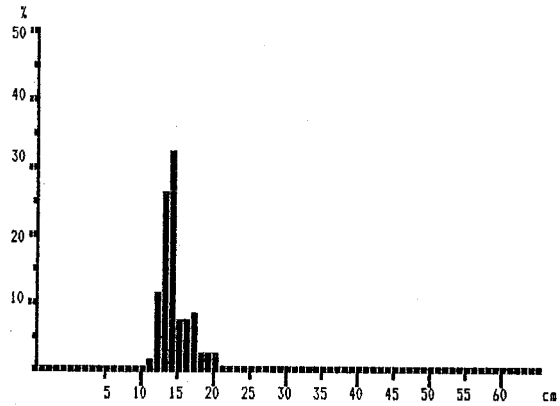
LOWEST STATION : 215 HIGHEST STATION : 250



S. longiceps (pooled data)

All Oman Coast, Survey I
MEAN LENGTH = 14,8cm N= 265
Modes : , 9cm, 16cm, 22cm
NUMBER OF SUBSAMPLES : 4

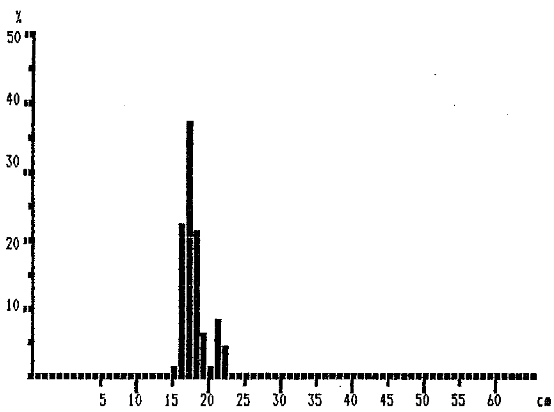
LOWEST STATION : 13 HIGHEST STATION : 116



S. longiceps (pooled data)

Masira Bank, Survey II
MEAN LENGTH = 14,2cm N= 204
Modes : , 14cm, 17cm
NUMBER OF SUBSAMPLES : 2
SAMPLES FROM ST.NO.: 169 UNTIL ST.NO.: 191

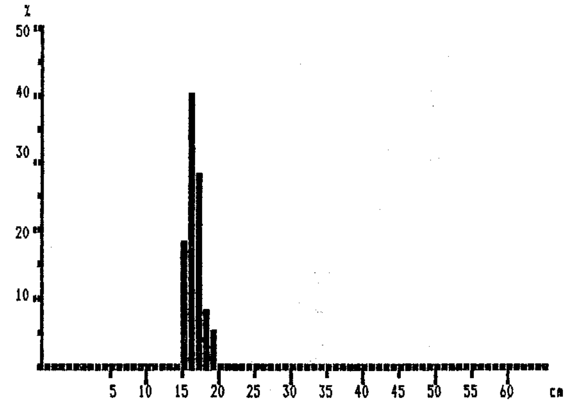
LOWEST STATION : 13 HIGHEST STATION : 214



S. longiceps OM III (pooled data)

Masira Bank, Survey III
MEAN LENGTH = 17,6cm N= 109
Modes : , 17cm, 21cm
NUMBER OF SUBSAMPLES : 3
SAMPLES FROM ST.NO.: 232 UNTIL ST.NO.: 243

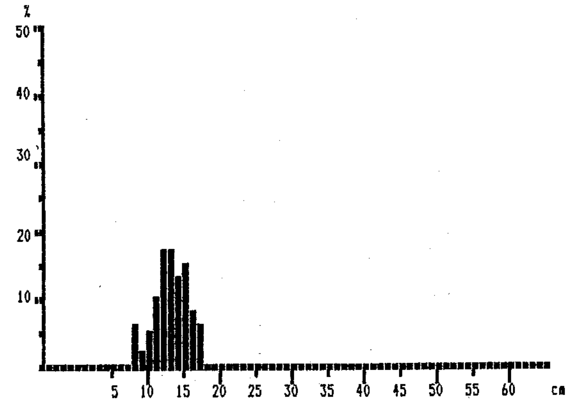
LOWEST STATION : 215 HIGHEST STATION : 250



Dussumieria acuta (pooled data)

Masira Bank, Survey I
MEAN LENGTH = 16,4cm N= 60
Modes : , 16cm
NUMBER OF SUBSAMPLES : 2
SAMPLES FROM ST.NO.: 71 UNTIL ST.NO.: 89

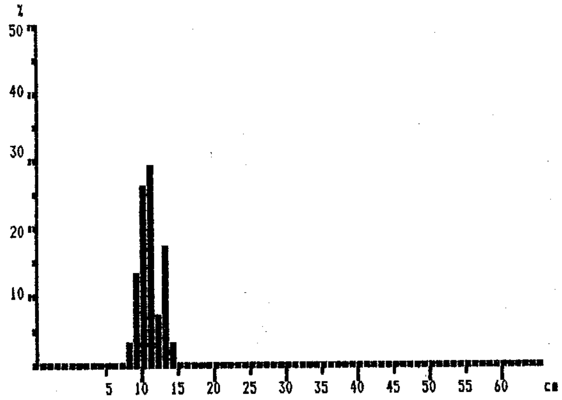
LOWEST STATION : 13 HIGHEST STATION : 116



Duss. acuta (pooled data)

Masira Bank, Survey III
MEAN LENGTH = 12,9cm N= 143
Modes : , 8cm, 13cm, 15cm
NUMBER OF SUBSAMPLES : 3
SAMPLES FROM ST.NO.: 232 UNTIL ST.NO.: 244

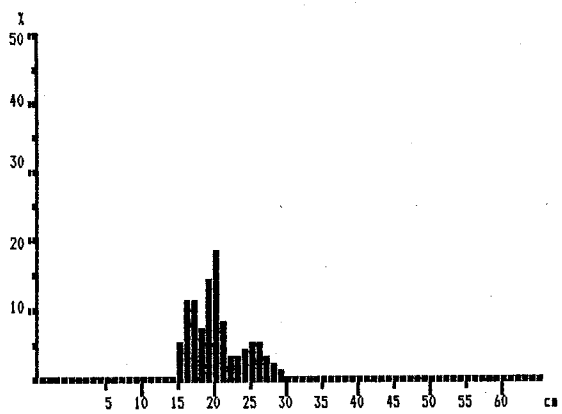
LOWEST STATION : 215 HIGHEST STATION : 250



D. russelli (pooled data)

Ras al Hadd - Masira Isl. Surv.I
MEAN LENGTH = 10,9cm N= 201
Modes : , 11cm, 13cm
NUMBER OF SUBSAMPLES : 2
SAMPLES FROM ST.NO.: 61 UNTIL ST.NO.: 70

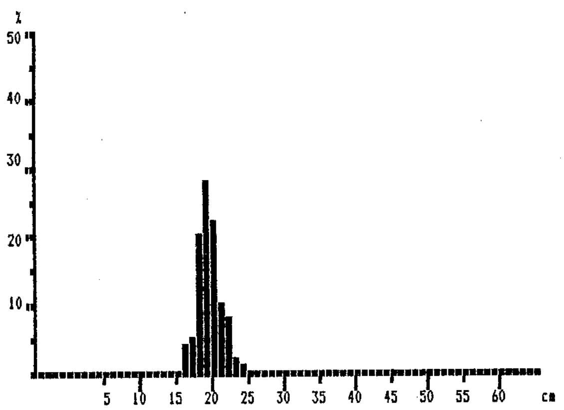
LOWEST STATION : 13 HIGHEST STATION : 116



D. russelli (pooled data)

Ras al Hadd - Masira Isl. Surv.II
MEAN LENGTH = 20,0cm N= 497
Modes : , 17cm, 20cm, 26cm
NUMBER OF SUBSAMPLES : 7
SAMPLES FROM ST.NO.: 150 UNTIL ST.NO.: 168

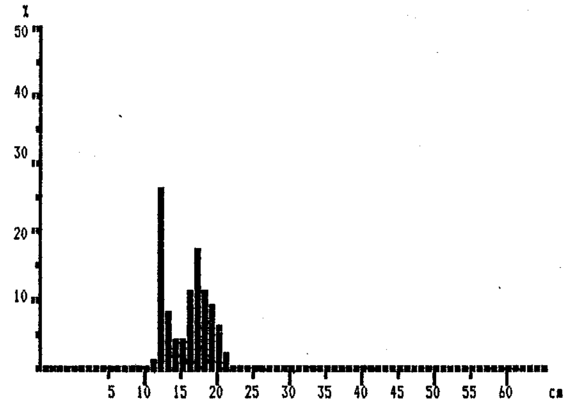
LOWEST STATION : 117 HIGHEST STATION : 214



D. russelli (pooled data)

Ras al Hadd - Masira Isl. Surv.III
MEAN LENGTH = 19,4cm N= 302
Modes : , 19cm
NUMBER OF SUBSAMPLES : 3
SAMPLES FROM ST.NO.: 244 UNTIL ST.NO.: 250

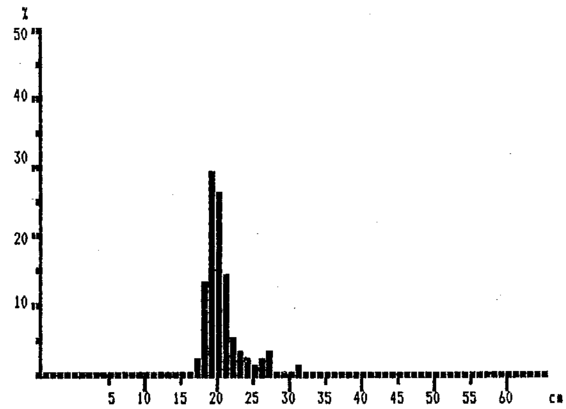
LOWEST STATION : 215 HIGHEST STATION : 250



D. russelli (pooled data)

Masira Bank, Survey I
MEAN LENGTH = 15,6cm N= 444
Modes : , 12cm, 17cm
NUMBER OF SUBSAMPLES : 5
SAMPLES FROM ST.NO.: 71 UNTIL ST.NO.: 89

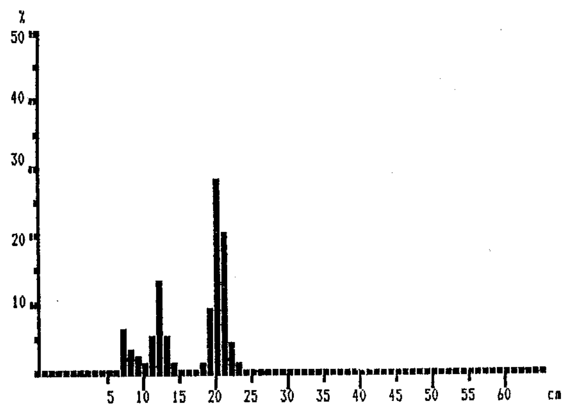
LOWEST STATION : 13 HIGHEST STATION : 116



D. russelli (pooled data)

Masira Bank, Survey II
MEAN LENGTH = 20,2cm N= 110
Modes : , 19cm, 27cm, 31cm
NUMBER OF SUBSAMPLES : 1
SAMPLES FROM ST.NO.: 169 UNTIL ST.NO.: 191

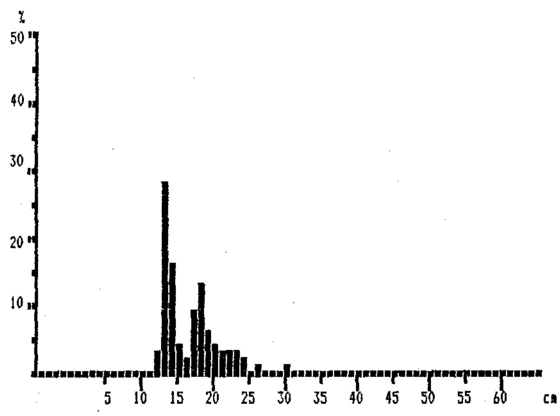
LOWEST STATION : 117 HIGHEST STATION : 214



D. russelli (pooled data)

Masira Bank, Survey III
MEAN LENGTH = 16,7cm N= 172
Modes : , 7cm, 12cm, 20cm
NUMBER OF SUBSAMPLES : 3
SAMPLES FROM ST.NO.: 232 UNTIL ST.NO.: 243

LOWEST STATION : 215 HIGHEST STATION : 250

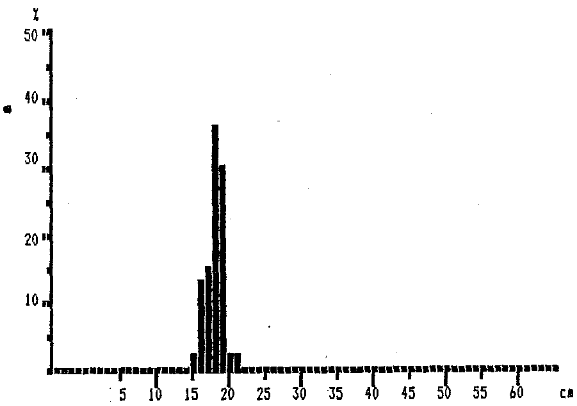


D. russelli (pooled data)

Sauquara Bank, Survey I

MEAN LENGTH = 16,4cm N= 460
Modes : , 13cm, 18cm, 26cm, 30cm
NUMBER OF SUBSAMPLES : 3
SAMPLES FROM ST.NO.: 90 UNTIL ST.NO.: 115

LOWEST STATION : 13 HIGHEST STATION : 116

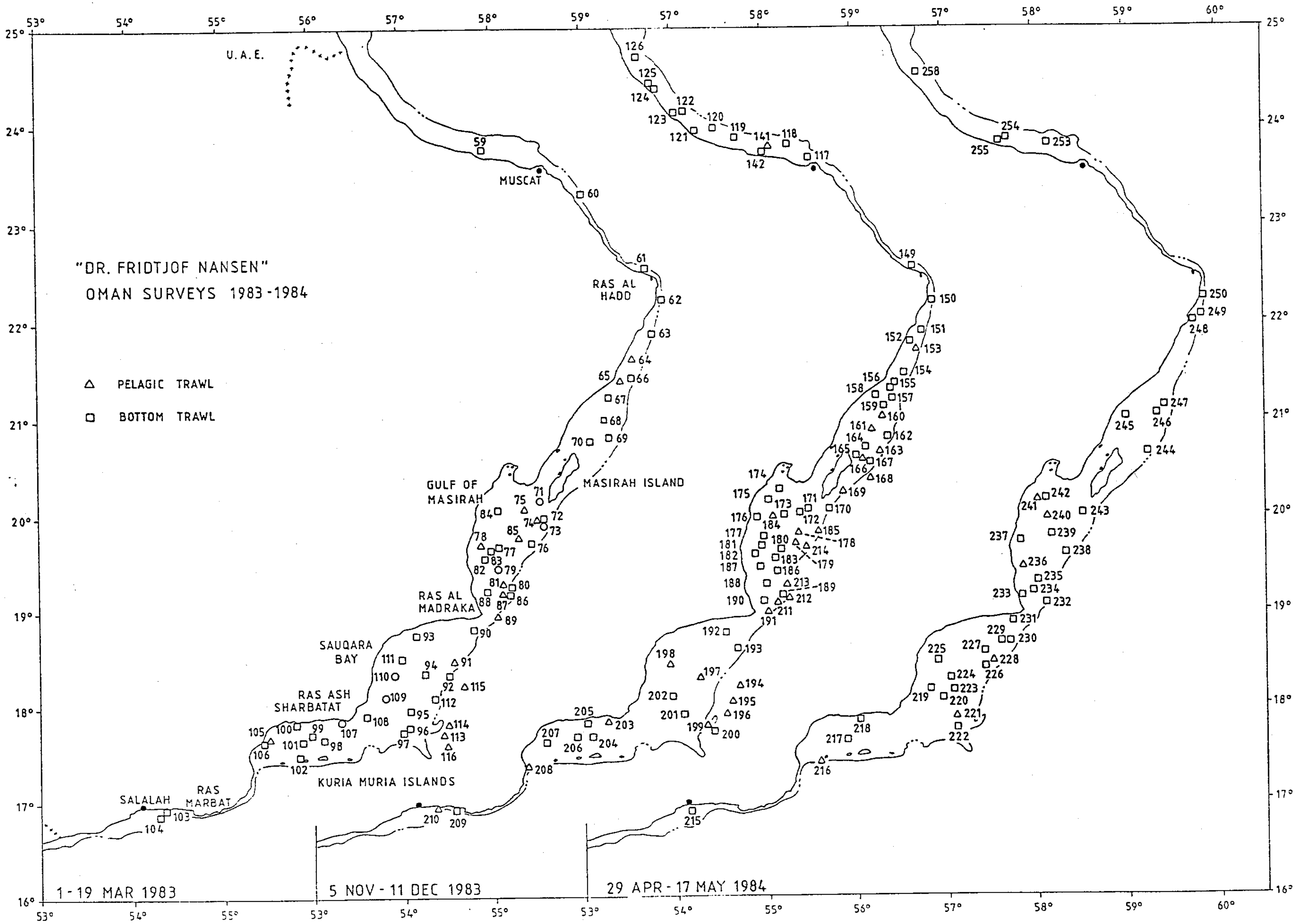


D. russelli (pooled data)

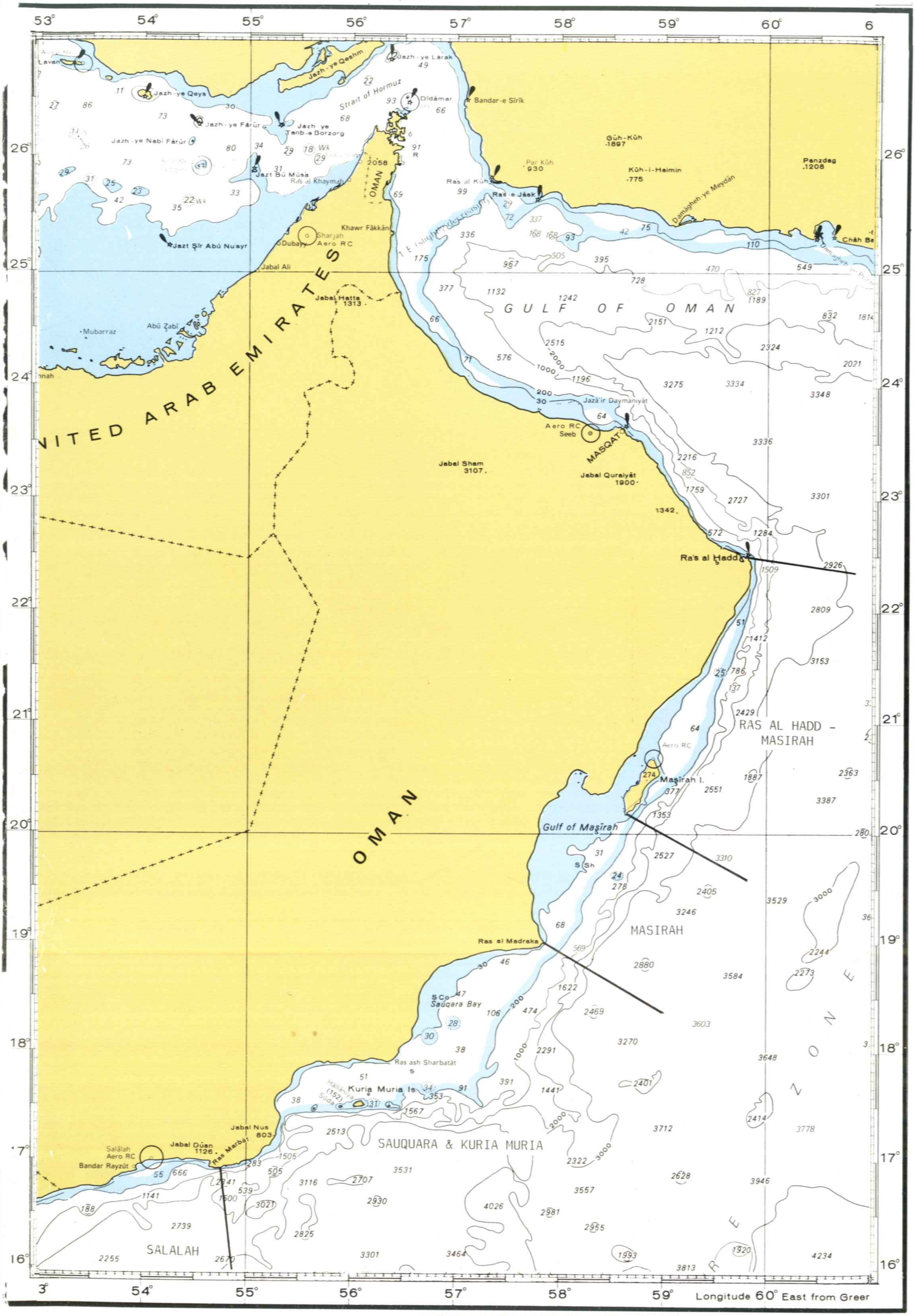
North of Ras al Hadd, Survey II

MEAN LENGTH = 17,9cm N= 112
Modes : , 18cm
NUMBER OF SUBSAMPLES : 1
SAMPLES FROM ST.NO.: 117 UNTIL ST.NO.: 149

LOWEST STATION : 117 HIGHEST STATION : 214



Worksheet with positions of all trawl hauls during the Oman 1983-84 surveys.



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