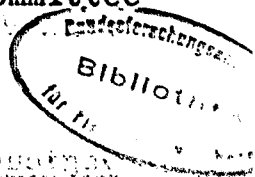


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Catches, length and sex compositions of trawl and tangle nets landings of norway lobster, Nephrops norvegicus (L.) from the central portuguese coast



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SUMMARY

Catch composition of Nephrops norvegicus (L.) caught by trawl and tangle-nets are reported in this paper. The modal classes of carapace length are much higher in captures made with tangle net gear, than with the trawl, because of the much larger size of the mesh of the nets of the former gear. Consequently females are poorly represented in tangle net catches, whereas they can attain percentages higher than 50% in trawl catches. The sex-ratio was found to vary seasonally in relation with spawning and hatching behaviours of females.

The recruitment to the trawl fishery (mesh size 60-65mm) seems to occur every month but mostly at the begining and at the end of the year.

The average size of Nephrops seems to increase during last years in Portuguese waters while the opposite is found in most contries from the northern Europe.

It is suggested that increasing average size is possible due to a underexploitation of Nephrops stocks from the portuguese waters.

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INTRODUCTION

Studies on length and catch composition of Nephrops norvegicus in portuguese waters were firstly carried out by FIGUEIREDO and BARRACA (1963). Since then no significative sampling has been performed and very little information was obtained on the evolution of the Nephrops fishery.

Under these circumstances it has been decided that a sampling program should be started in order to obtain further data on the catch composition of this species.

As the fishing grounds of Nephrops are mainly situated off the central zone of the portuguese coast, as shown in the annex Map, and landings from this zone mostly take place at the harbours of Lisboa and Cascais, this last harbour was chosen for starting the mentioned program in 1973.

MATERIAL AND METHODS

RESUMEN

The trawlers from which the samples were taken covered the area limited by a full line shown in the Annex Map and were using nets with the legal mesh size of 60-65 mm. Further samples were taken from smaller boats provided with tangle-nets, mesh size 110 mm, which were fishing within the area limited by a broken line in the same Map. The depths of the fishing grounds ranged about between 300 and 750 meters and the bottom consisted mainly of mud.

Stratified or simple random sampling were taken from the captures according the Nephrops were already sorted by sizes at the moment of landing or not. 39 samples were taken from the trawlers (21 in 1973 and 18 in 1974) and only 10 from the tangle-net boats (6 in 1973 and 4 in 1974). As the Nephrops fishery in the portuguese waters is only a by-catch in the trawl fishery, and the landings of small boats using tangle-nets are very irregular, the data of sampling for some months are missing.

Measurements of the cephalotorax to the nearest millimeter below, sex and ovigerous condition of the females were announced out.

ted, together with the total weight of the sample and the total weight of the capture. The data were then magnified according to a raising factor and assembled by months.

RESULTS

Annual catches

Statistical data from 1959 to 1974 concerning the annual landings of Nephrops in the ports of three zones of the portuguese coast (north, central and south) are shown in Fig 1 a. As the fishery with tangle-nets began only as late as 1970, the captures with both gears were since then considered together. A considerable increase in landings of about 250 metric tons of fresh whole Norway lobster occurred from 1963 to 1967. The landings decreased afterwards, reading in 1972 the same low level of 1960-1963. These changes in the landings are mainly due to those of the central zone, Fig. 1 a. since the annual landings from the remainder areas (respectively about 3% of the total in the 1959-1974 period from the north area and about 14% from the south area) did not show significative differences. Captures from the central zone are mostly landed at the harbours of Lisboa and Cascais, as also shown in Fig. 1 a.

Monthly fluctuations in the Nephrops trawl fishery

Fig. 1 B shows the monthly fluctuations in the years 1972-1974 of the captures from the central area, represented by the landings at the harbours of Lisboa and Cascais, which are both frequented by the same trawlers. The main season for this fishery extends from June to September. However, in 1974 the landings were particularly low during the season, what was supposed to be due to a decreasing interest in the market for this species.

Length distribution in the trawl fishery

Length distribution of females, males, and males and females taken together are shown in the graphics of Figs. 2, 3 and 4

for 1973 and 1974:

The males have a much wider range than females, presenting often two modes by month. The females present a length distribution with only one mode by month (except in December 1973) and very seldom reach 61 mm, while the males above this size are well represented in all months sometimes in a large percentage.

The monthly length distribution of males and females (Fig. 4) is highly influenced by the bulk of females concentrated in the lower classes (Fig. 2). This can be due to a slower growth rate of females as reported by FIGUEIREDO and THOMAS (1967). Also according to these authors the seasonal variation in the percentage of females related with spawning and hatching behaviours may influence the length distribution. Under these circumstances, monthly length distribution for males (Fig. 3) were considered in order to judge the recruitment in this particular trawl fishery, where a mesh size net of 60-65 mm is used. The smallest males seems to occur every month but mostly at the end and beginning of the year. In spite of what has been said about the females distribution, the same trend is found when the length distribution of males and females are considered together.

Length distribution in the tangle net fishery

As pointed above the data corresponding to tangle net sampling are scarce in 1973 as well as in 1974 due to rather irregular landings. The length distributions of Nephrops in this fishery was found to range between 43 and 85 mm, the catches consisting mainly on individuals of large sizes. The lowest mode (61 mm) was obtained in February 1973 and the highest one (79 mm) was recorded in April 1974.

Comparison between catch composition in the two fisheries.

Fig. 5 shows the comparison between the length distribution of Nephrops in trawland tangle net fisheries in February and June of 1973 and April, May and June 1974. Great numbers of large

sized individuals were obtained with tangle nets although the upper limits of both distributions were found to be rather similar. In most cases the distributions overlap in a considerable extension but modal classes in the trawl fishery are much lower (ranging between 43 and 55 mm) than in the tangle net fishery where they vary between 61 and 79 mm.

Sex ratio is shown in Fig. 6 for 1973 and 1974 in both fisheries. Tangle net samples consisted mainly on males, the females being poorly represented due to their small size. The highest percentage of females was found in June 1974, 8%. Berried females were captured only in August and represented 1% of the total catch.

In the trawl fishery both males and females were well represented in all months although in rather different proportions according to the seasons. Female are normally better represented from June to December in 1973 and April to November in 1974. In both years data from August are missing, but in view of the great percentage of females found both in July and September it is supposed that the percentage in August would also be high. From December to March the percentage females decreased. The monthly percentage of berried females is also shown in Fig. 6. From September to December most females carry external eggs. They become scanty in January, February and March, as eclosion of larvae approaches, and almost disappear from April to June. July is supposed to be the month when the spawn begins.

DISCUSSION

The decreasing average size of Nephrops in some countries of the northern Europe was quite evident during last years and is supposed to have been mostly caused by overfishing. According to FIGUEIREDO and THOMAS (1967) the large average size of Nephrops caught off the portuguese coast could mainly be due to the light intensity of fishing. In addition other factors, as for instance the high depths of the fishing grounds possibly make Nephrops on

Portuguese coast less accessible to fishing than in northern Europe. In this way they also could contribute to the conservation of the stocks. Recent data (1973-1974) for the portuguese catches shows an bigger average carapace length than those given by FIGUEIREDO and BARRACA (1963) as reported in Tables I and II. On the other hand total landings of Nephrops in last seven years (1968-1974) have decreased considerable (Fig. 1 a) reaching the same low level of 1959-1963. As there is no data on fishing effort it could not be ascertained whether this fact is due to a decreasing fishing effort or to any other reason.

However it can be admitted that decreasing catches were probably caused by a lack of interest on this fishery, especially after 1969. This reduced fishing effort would have resulted in an increase on the average size of Nephrops.

In what concerns the sex-ratio there is an evident higher percentage of females in all months of 1973-1974 than in 1959-1964, as shown in Fig. 7. Also the seasonal variation is more defined in 1973-1974. From June to November the females represent generally more than 50% of the catches, where as from December to May they never reach that level. In 1959-1964 the percentage of females remains (with only one exception always below the 50% level.

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FIGUEIREDO, M.J., and THOMAS, H.J., 1967 - On the biology of the Norway lobster, Nephrops norvegicus (L.) Extrait du Journal du Conseil International pour l'Exploration de la Mer, Vol. 31. N°1.

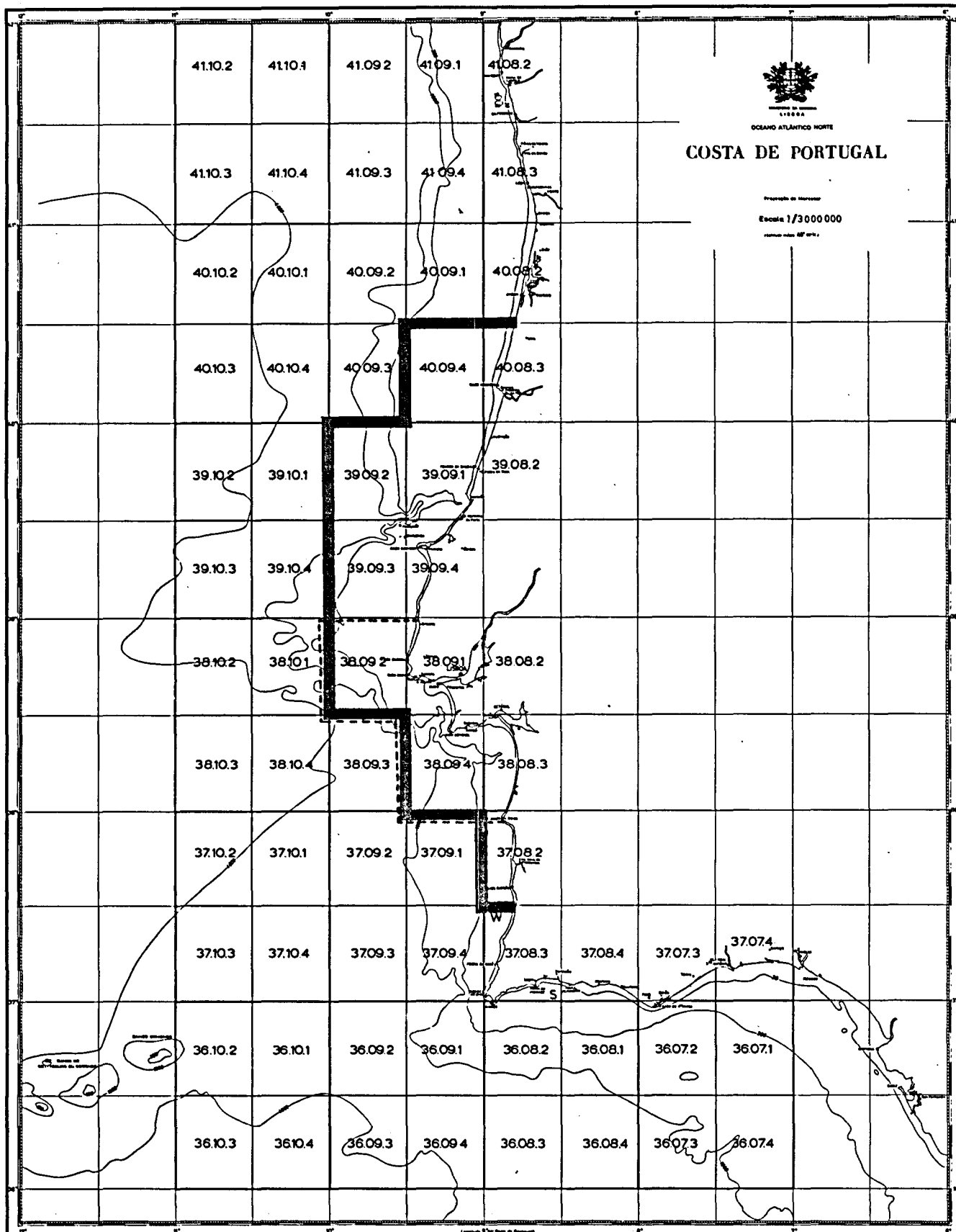


TABLE I - Average carapace length (mm) of males Nephrops caught by trawlers during stated years

JANUARY							FEBRUARY							MARCH						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
-	51,2	-	55,9	49,2	53,9	45,9	-	-	-	-	53,7	53,3	57,7	-	49,1	-	-	44,0	60,5	55,6
APRIL							MAY							JUNE						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
-	-	50,6	-	41,1	60,6	52,4	-	54,7	-	58,3	47,0	60,9	60,1	-	-	55,6	50,5	47,0	60,8	49,7
JULY							AUGUST							SEPTEMBER						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
-	-	54,0	47,1	48,8	54,2	47,6	54,2	-	-	51,7	-	-	-	50,1	-	49,1	46,7	48,4	53,0	55,0
OCTOBER							NOVEMBER							DECEMBER						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
43,8	-	40,5	49,4	48,8	50,4	51,8	47,5	-	31,3	46,8	-	51,9	47,6	43,8	40,3	-	41,0	-	48,4	46,9

TABLE II - Average carapace length (mm) of females Nephrops caught by trawlers during stated years

JANUARY							FEBRUARY							MARCH						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
-	38,8	-	38,0	42,6	40,7	40,2	-	-	-	-	41,5	47,6	42,8	-	39,4	-	-	36,2	43,9	42,8
APRIL							MAY							JUNE						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
-	-	45,4	-	32,0	44,7	44,3	-	44,8	-	39,1	32,7	49,2	45,6	-	-	39,9	34,7	31,0	49,1	45,8
JULY							AUGUST							SEPTEMBER						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
-	-	39,6	41,1	36,0	45,1	45,6	39,7	-	-	37,5	-	-	-	41,5	-	40,3	36,4	39,3	46,8	45,4
OCTOBER							NOVEMBER							DECEMBER						
1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974	1959	1960	1961	1962	1963	1973	1974
35,8	-	34,4	43,3	40,4	45,0	45,7	33,7	-	30,6	37,9	-	44,6	38,9	37,1	34,5	-	32,5	-	43,4	37,0

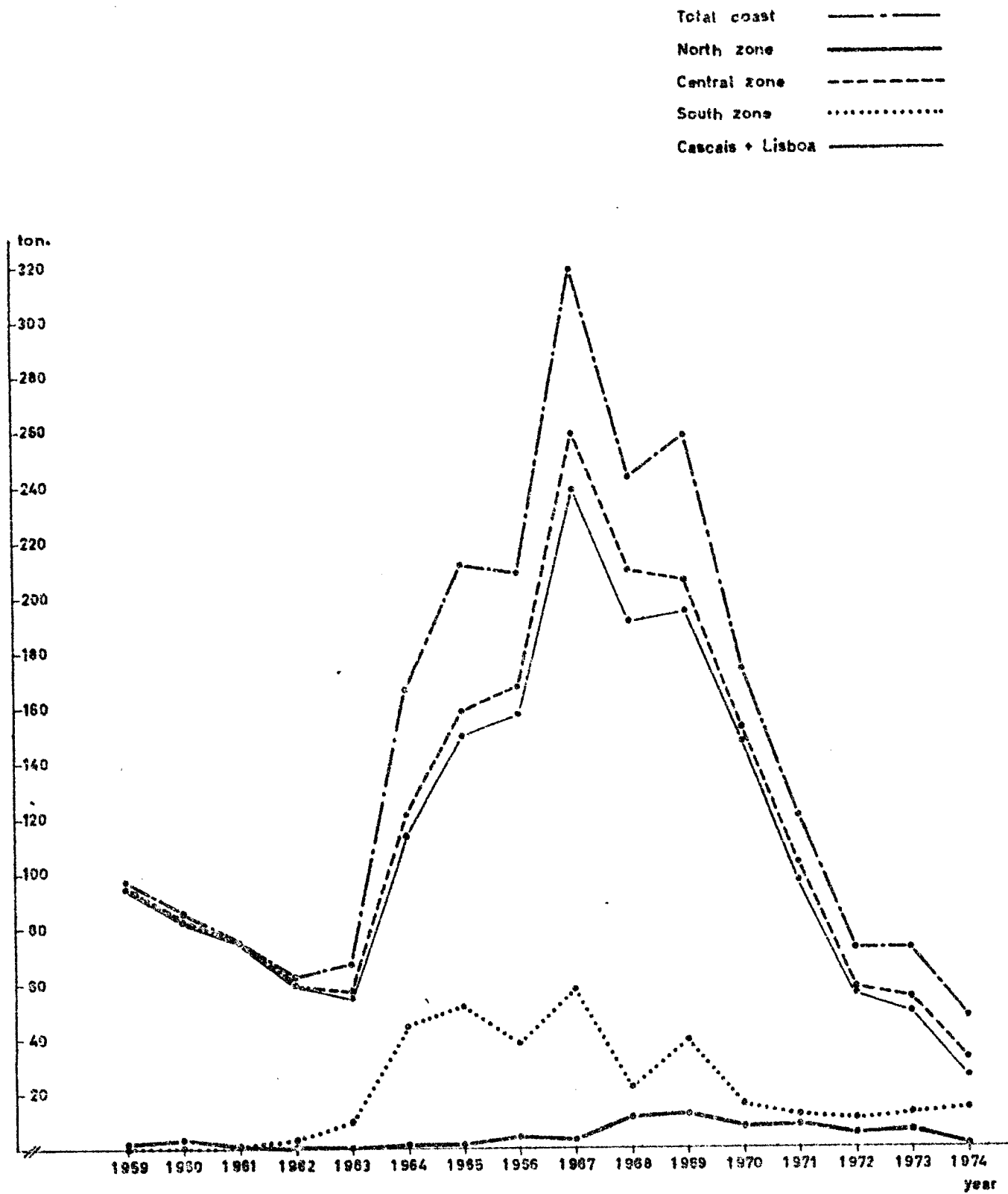


Fig. 1a - Nephrops landings (ton.) of the portuguese coast during 1959-1974 caught by trawl and tangle net

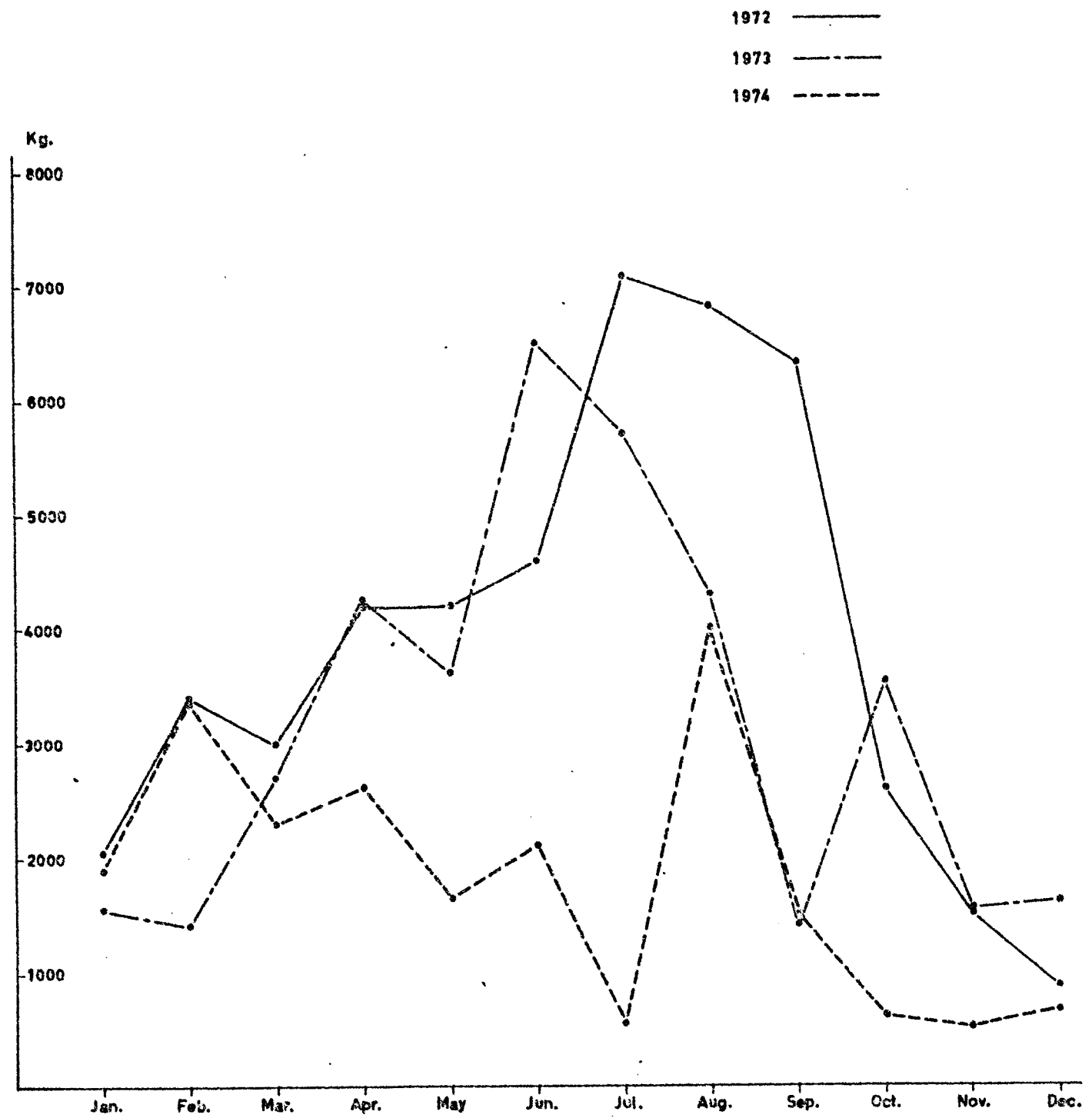


Fig. 1b - Monthly fluctuations of jointed Nephrops landings of Cascais and Lisboa during 1972, 1973 and 1974

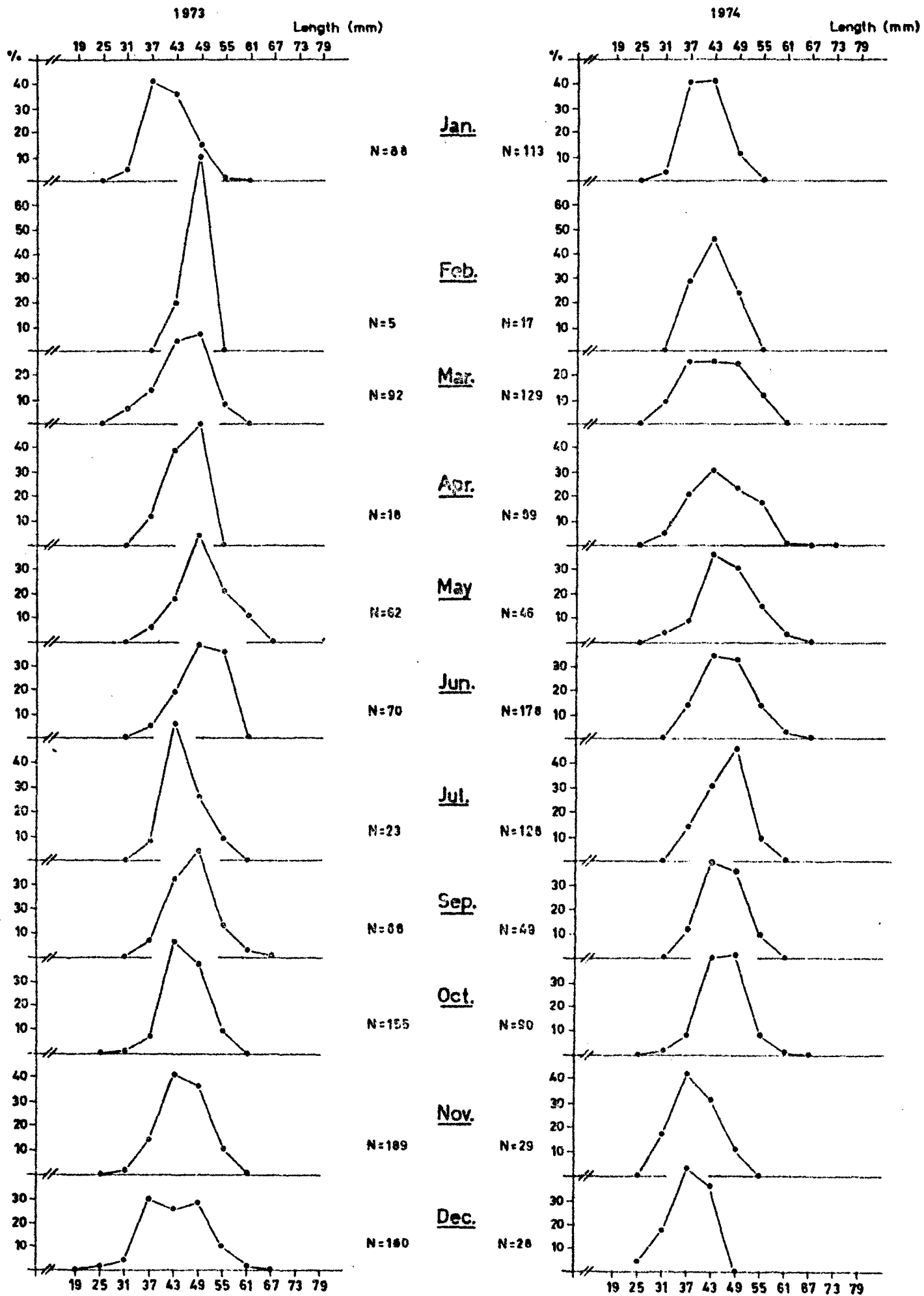


Fig. 2 - Monthly length composition of females Norway lobster caught by trawl during 1973 and 1974

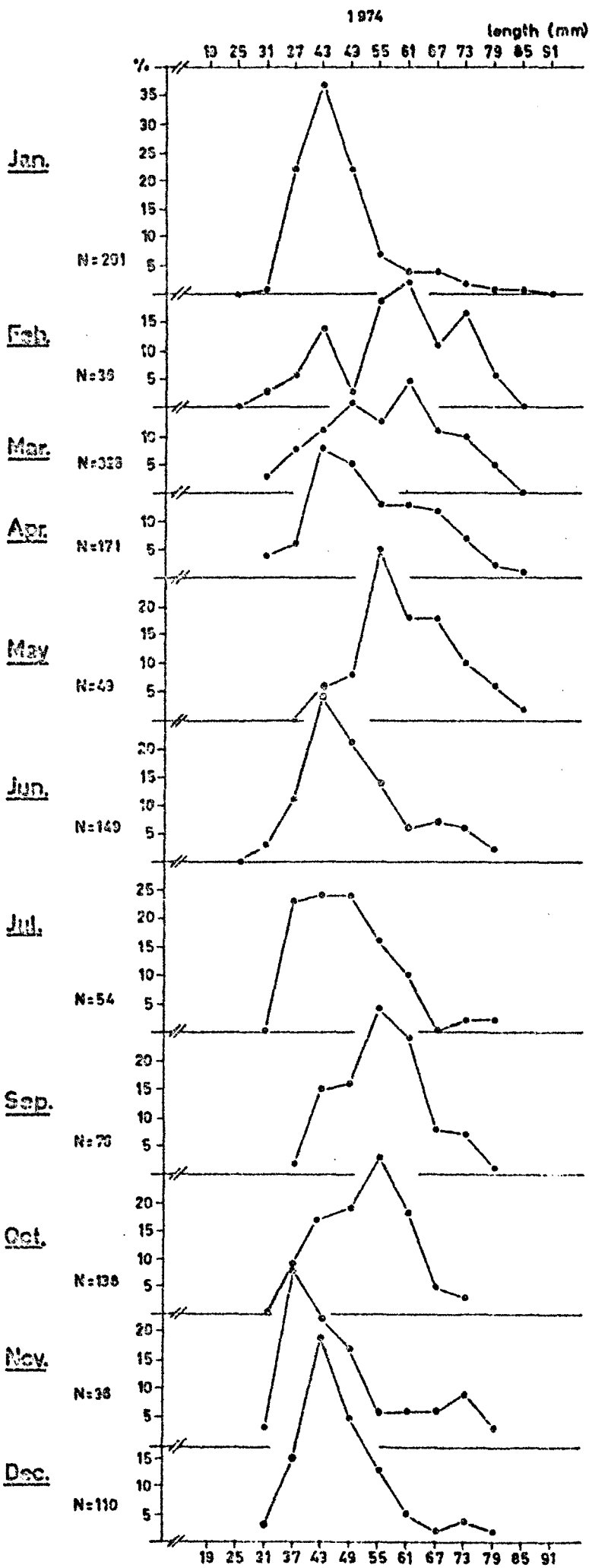
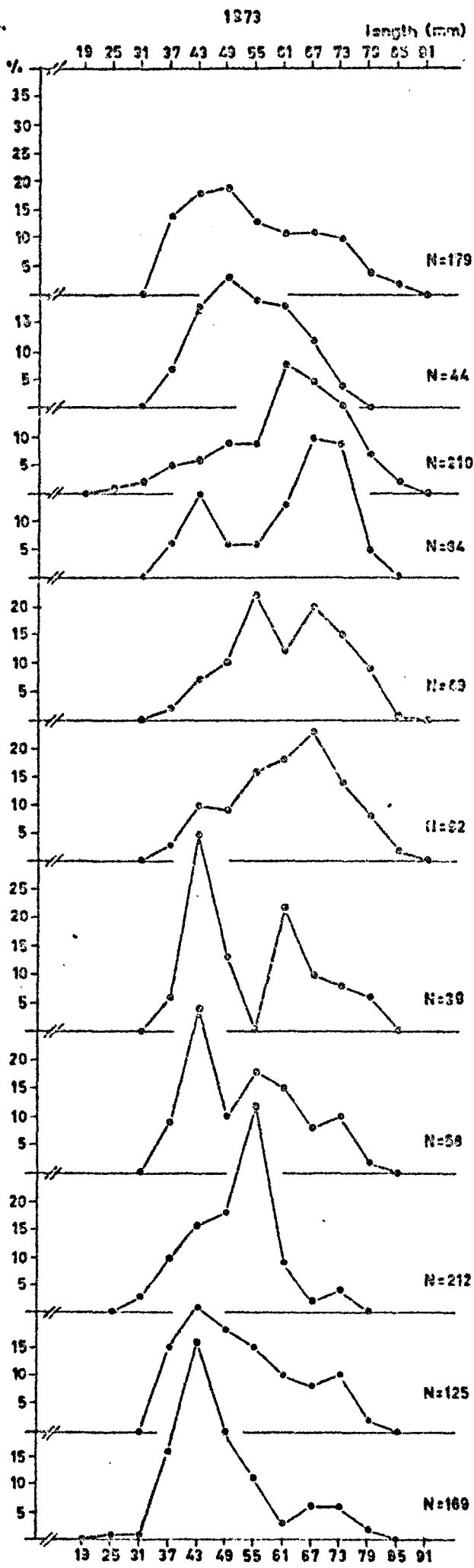


Fig. 3 - Monthly length composition of males Norway lobster caught by trawl during 1973 and 1974

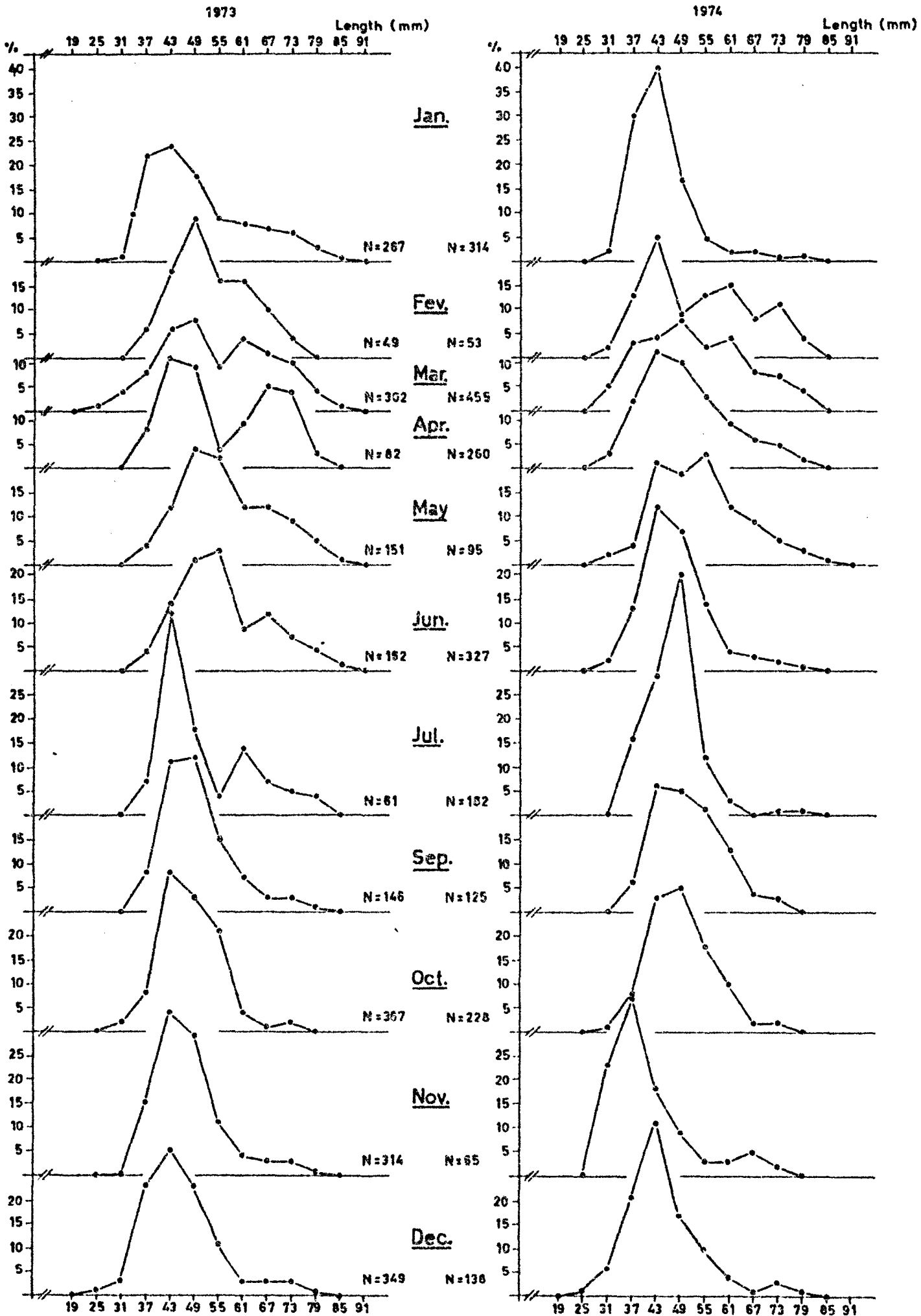


Fig. 4 - Monthly length composition of males and females Norway lobster caught by trawl during 1973 and 1974

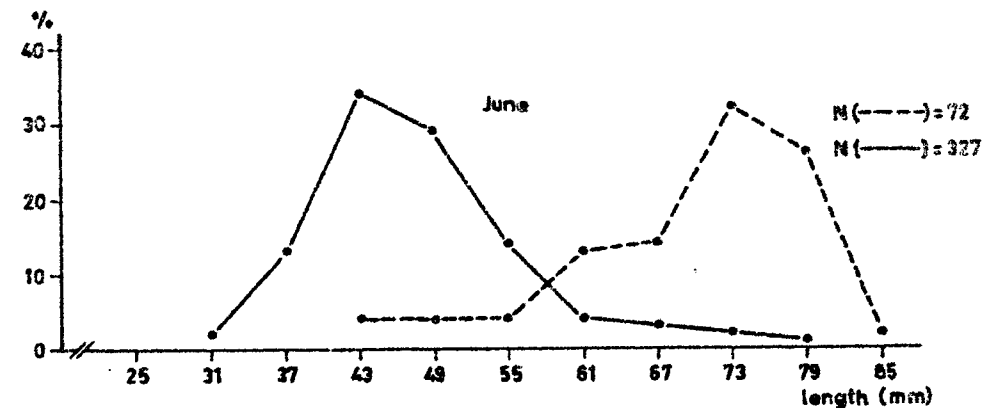
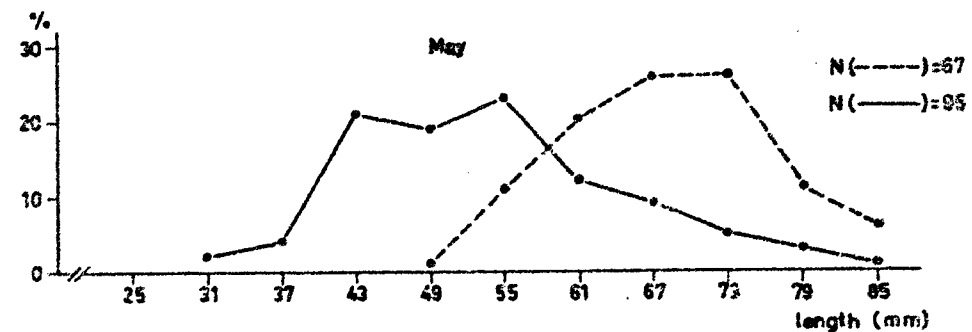
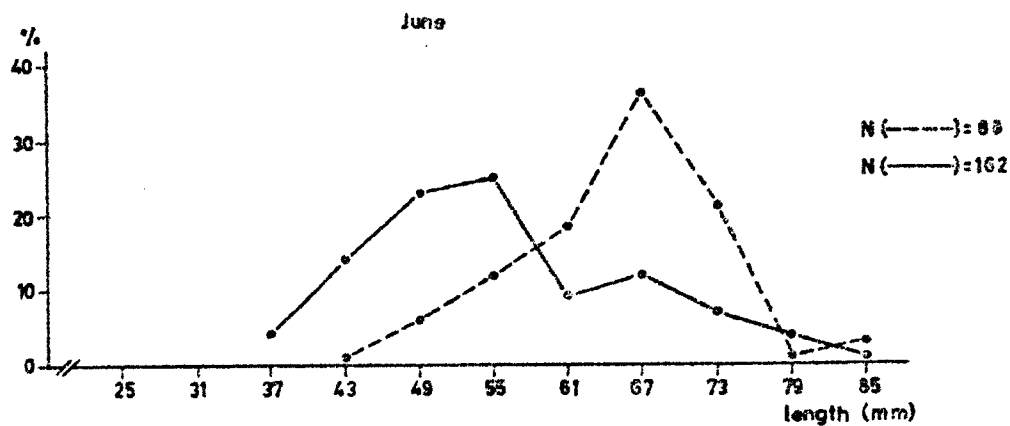
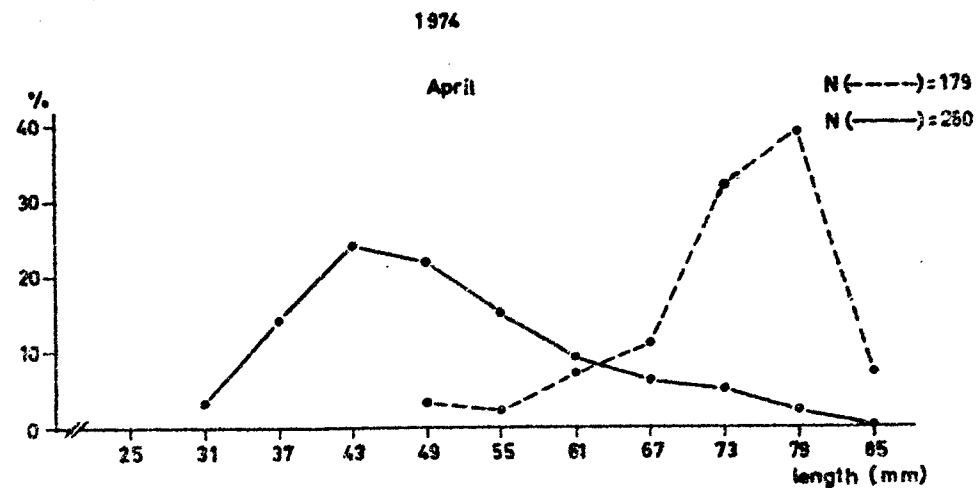
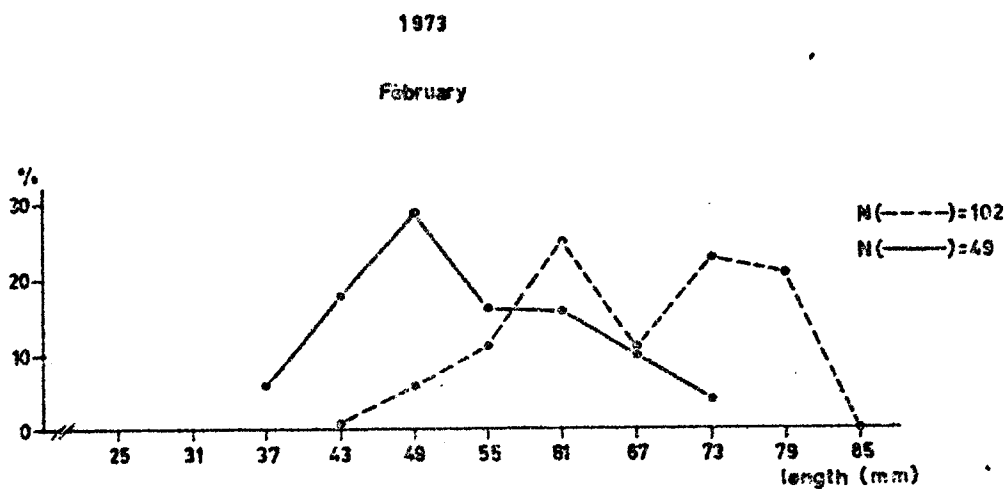
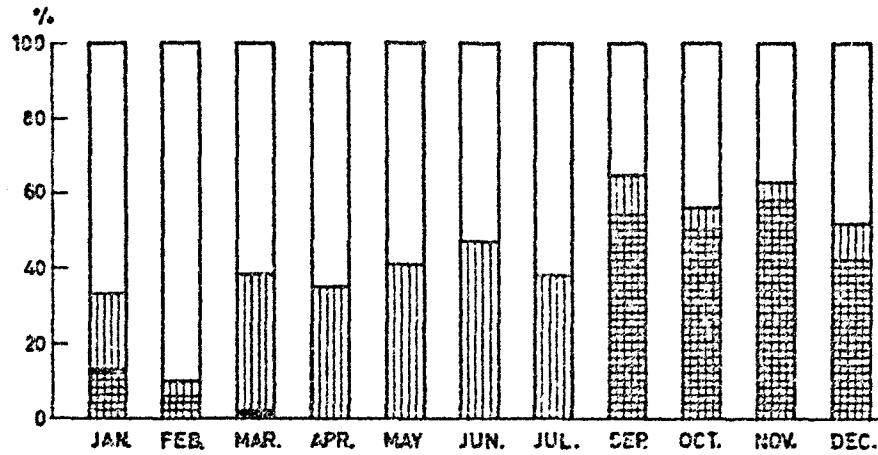


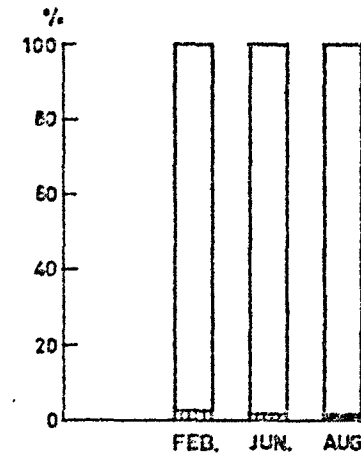
Fig. 5 - Comparison of length distribution of Nephrops (males and females) caught by trawl (—) and tangle net (---) in stated months

1973

TRAWL



TANGLE NET



1974

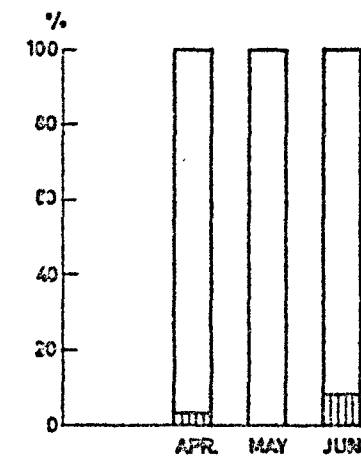
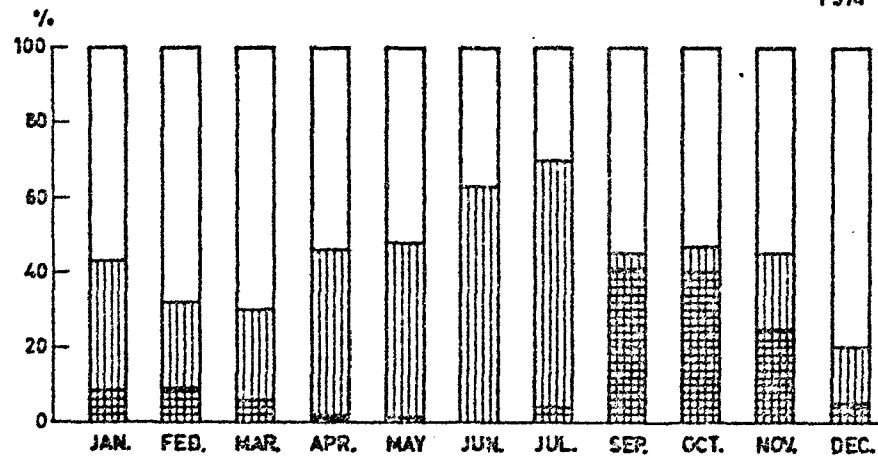


Fig. 6 - Monthly fluctuations of berried females of *Nephtys* caught by trawl and tangle net

males  females  berried females 

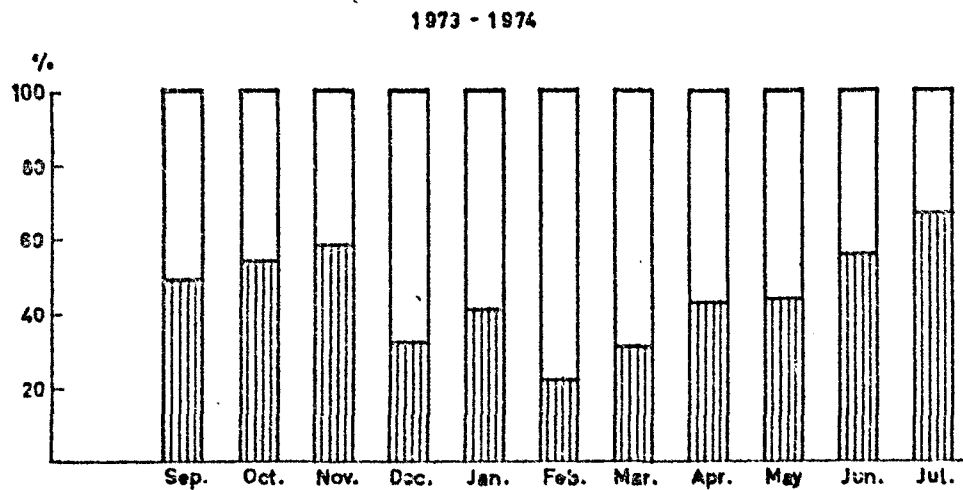
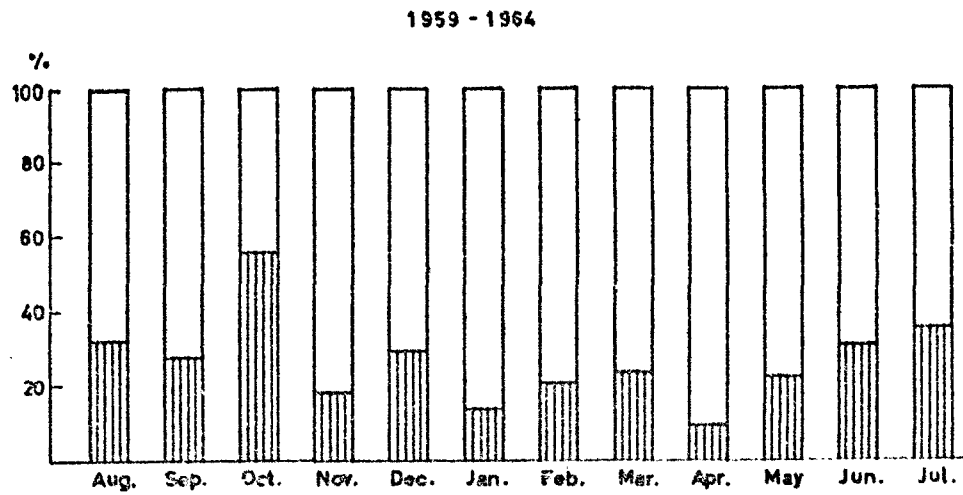


Fig. 7 - Comparison of sex-ratio variation of Nephrops during 1959-1964 (FIGUEIREDO and THOMAS 1967) and 1973-1974