

A PRELIMINARY REPORT ON THE DECAPOD CRUSTACEANS IN THE ESTUARINE AREA OF THE TIBER*

R. MINERVINI (*), M. GIANNOTTA (**), and L. FALCIAI (***)

(*), Laboratorio Centrale di Idrobiologia - Roma

(**) Centro Subacqueo Romano - Roma

(***) Istituto di Anatomia Comparata, Università- Siena

ABSTRACT

Decapods collected during benthos investigations carried on with dredge and bottom trawl in front of Tiber mouth are reported. Species distribution and association are discussed with reference to their substrate preference and biology.

RIASSUNTO

Nota preliminare sui Crostacei Decapodi dell'area prospiciente la foce del Tevere : - Vengono riferiti i primi risultati di tre anni di campagne di ricerca svolte per individuare i popolamenti animali nel tratto di mare interessato dalla foce del fiume Tevere.

Per le ricerche si sono adoperate la draga (mod. Charcot) e la rete a strascico di uso professionale.

Nel corso di tale lavoro si sono analizzate le presenze dei Crostacei Decapodi in relazione alla granulometria dei sedimenti ed alla biologia delle singole specie.

INTRODUCTION

This paper presents part of the results of a research still underway, aiming to identify the animal populations in the estuarine area of the Tiber (DELLA SETA et al. 1977).

The area covers 300 km², being 20 miles long and 5 miles wide.

The Tiber debris being mostly organic result in stressing the normal eutrophication of estuarine areas thus increasing productivity.

With financial support of C.N.R.-I.R.S.A. Cont. n° 78/02611 and Cont. n. 416.

Consequently 30-40 fishing vessels which are based at Porto Canale di Fiumicino, one of the most important fishing harbours in Latium, operate intensively in this area.

WORKING METHODS AND RESULTS

The dredge and the bottom trawl, being complementary, have been used to sample the Decapods. This choice is due to the presence of species having different habits. The dredge (mod. Charcot) with a 50 litres bag, has been used only for benthos sampling. The catches are more regular and homogenous, the bias due to external factors being constant.

On the other hand the bottom trawl was used to catch undredgable or very poorly represented crustaceans.

Fishing vessels usually operating in the area were used for sampling. The samples dredged (sediment samples of nearly 50 litres) were sieved on board with a 1.5 mm mesh, narcotized and stored in alcohol. Sediment samples taken in 65 stations per year have also been used for granulometric analysis (fig. 1). This analysis was made to determine the percentage of sand (particles ranging from 0.5mm to 0.05mm) in relation to mud (particles inferior to 0.05mm). The results are reported in a map where three areas are clearly defined: the first, closer to the coast, having a sand percentage ranging from 60 to 100%, the second from 30 to 59% and the third one from 1 to 29% (fig. 2).

The first area extends beyond the 10m depth curve, the second within the 20m depth curve and the third one, having a more homogenous sediment, covers the area between the 20m and the 100m depth curve. Some indicator species connected with various sediment granulometries have been detected according to PERES and PICARD (1964) (fig. 3).

Bottom trawling samples proved *Diogenes pugilator* and *Macropipus vernalis*, two species closely related to sandy environments, to be dependent on sediment granulometry. Some specimen of *M. vernalis* have, anyhow, been caught on muddy bottoms 100m deep. Many species live in the intermediate area, being usually found both on mud and sand; the species more represented is *Brachynotus gemmellari* not mentioned by Peres and Picard. *Processa nouveli* is only caught on muddy bottoms beyond the 20m depth curve. The middle white part of the map outlines the oil rig area where catches were poor and not homogenous due to the continuous use of a large size dredge and of hydrocarbon dispersants. At the end of this preliminary analysis which clearly defines the distribution areas of some species, we employed bottom trawls in order to catch undredgable species and to acquire further biological knowledge on some species (fig. 4). Two hauls, one to the North and one to the South of the estuary have been made each month at different depth levels (10m, 20m, 50m and 100m). Station EN has been made only to the North and during the night to study the habits of *Penaeus kerathurus*. North and South stations were necessary to point out possible differences in populations due to the river debris, which dominant currents drive to the North. All hauls have been repeated 9 times (including night haul DN), once per month, starting in February up to the end

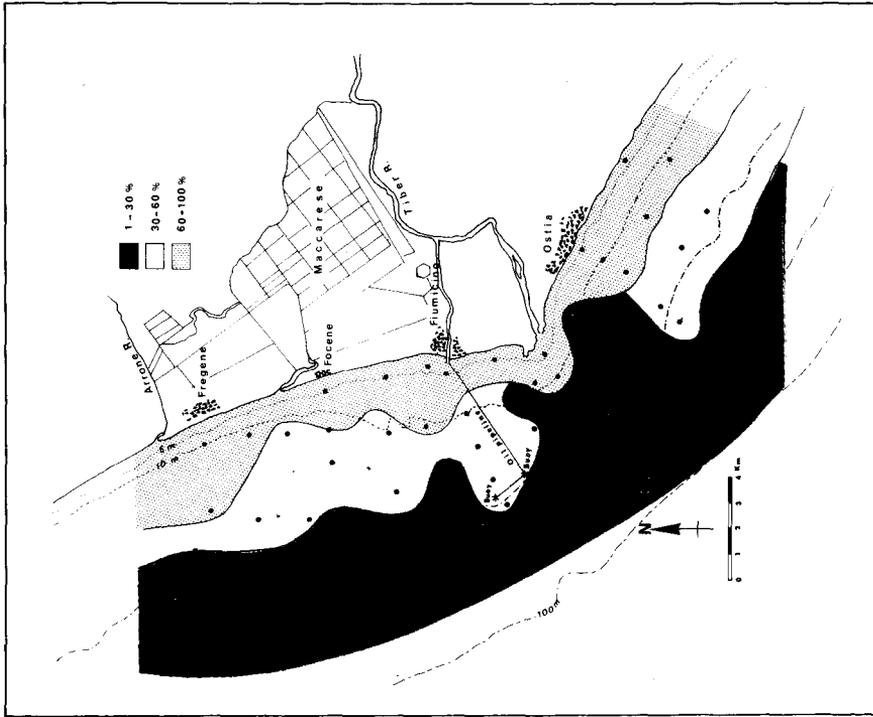


Fig. 2 -Percentage of sand distribution in the surface sediments.

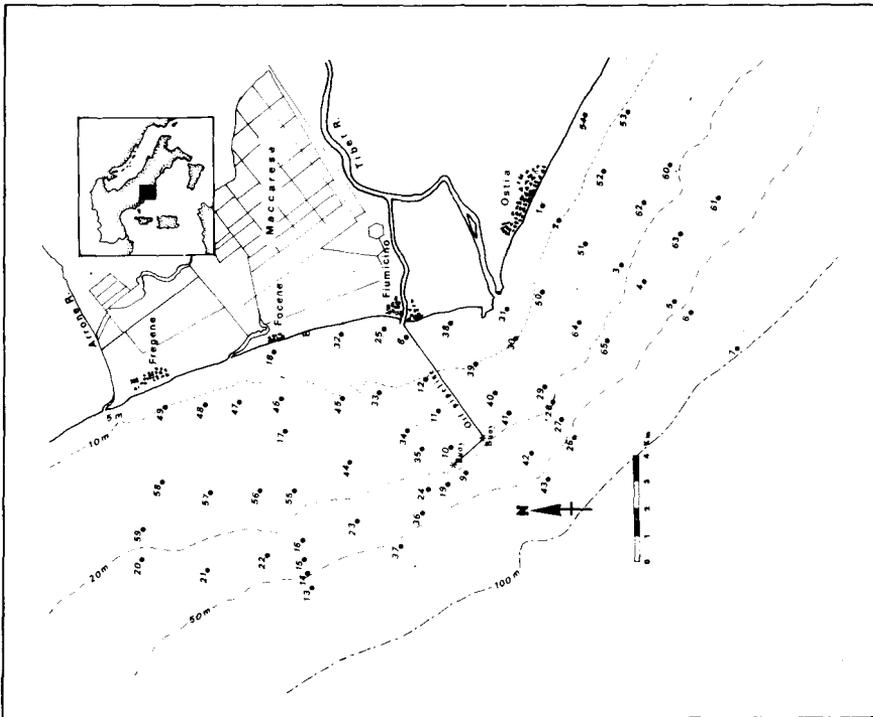


Fig. 1 - Stations of dredging.

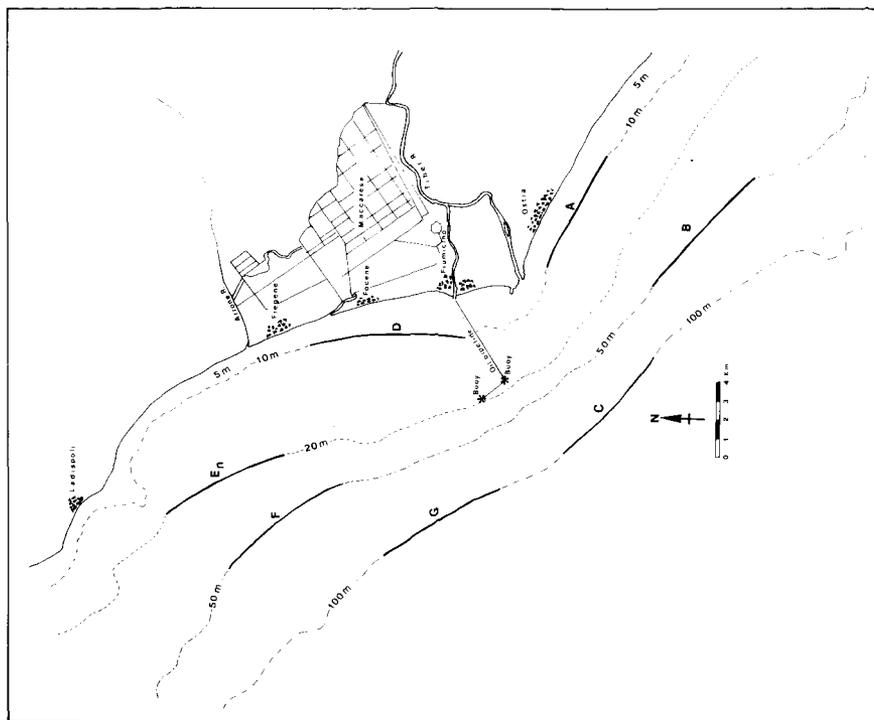


Fig. 4 - (A, B, C, D, E, En, F, G) Areas of trawling.

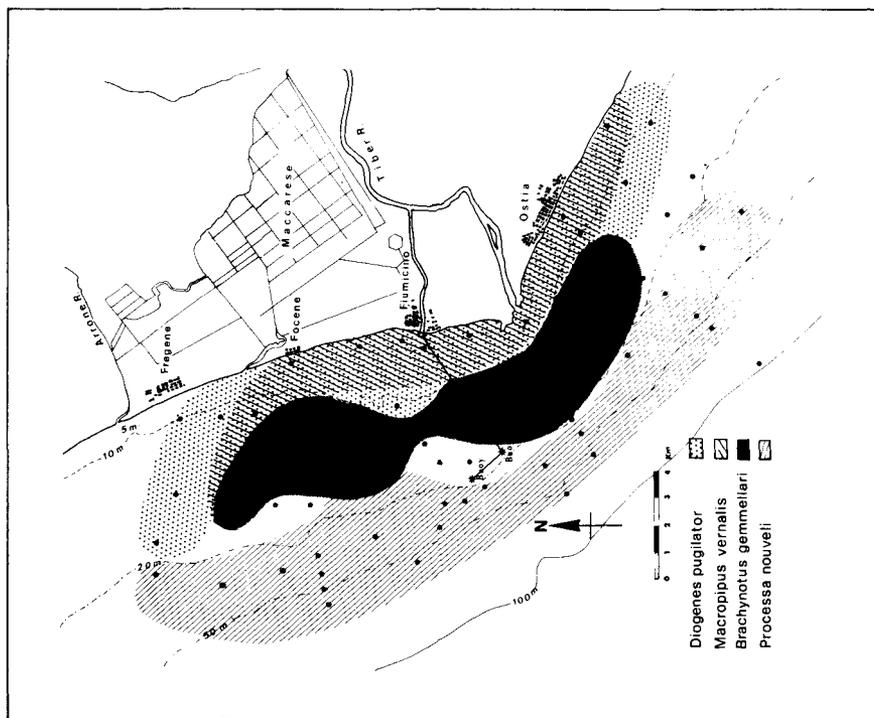


Fig. 3 - Distribution of some species of Crustacea Decapoda related to granulometry of the sediment.

TAB. 1 - List of species caught with Trawl and Dredge

SPECIES	Method capture	
	Trawl	Dredge
<i>Solenocera membranacea</i>	+	—
<i>Penaeus kerathurus</i>	+	—
<i>Parapenaeus longirostris</i>	+	—
<i>Sicyonia carinata</i>	+	+
<i>Alpheus glaber</i>	+	+
<i>Processa macrophthalma</i>	—	+
<i>Processa modica caroli</i>	+	+
<i>Processa nouveli</i>	+	+
<i>Processa edulis edulis</i>	+	—
<i>Palaemon serratus</i>	+	—
<i>Pontocaris cataphracta</i>	+	—
<i>Pontocaris lacazei</i>	+	—
<i>Pontophilus spinosus</i>	+	—
<i>Philocheras bispinosus</i>	—	+
<i>Philocheras monacanthus</i>	+	+
<i>Palinurus elephas</i>	+	—
<i>Scyllarus arctus</i>	+	—
<i>Scyllarides latus</i>	+	—
<i>Calocaris macandreae</i>	+	+
<i>Upogebia sp.</i>	+	—
<i>Diogenes pugilator</i>	+	+
<i>Paguristes oculatus</i>	+	—
<i>Pagurus alatus</i>	+	—
<i>Pagurus prideauxi</i>	+	—
<i>Anapagurus laevis</i>	+	+
<i>Anapagurus bicorniger</i>	+	+
<i>Galathea intermedia</i>	+	—
<i>Ethusa mascarone</i>	+	+
<i>Dorippe lanata</i>	+	+
<i>Ilia nucleus</i>	+	+
<i>Ebalia deshayesi (?)</i>	+	—
<i>Carcinus mediterraneus</i>	+	—
<i>Macropipus pusillus</i>	+	+
<i>Macropipus tuberculatus</i>	+	—
<i>Macropipus depurator</i>	+	—
<i>Macropipus vernalis</i>	+	+
<i>Pilumnus spinifer</i>	+	—
<i>Goneplax rhomboides</i>	+	+
<i>Brachynotus gemmellari</i>	+	+
<i>Parthenope angulifrons</i>	+	—
<i>Inachus communissimus</i>	+	—
<i>Inachus dorsettensis</i>	+	—
<i>Macropodia rostrata</i>	+	—
<i>Macropodia longipes</i>	+	—

of November 78, excluding August. 44 species have been caught in total, 18 with the dredge and 42 with bottom trawl having a total weight of 397.348 g. (Tab. 1).

The percentages of weight per station over total weight are given in figure 5.

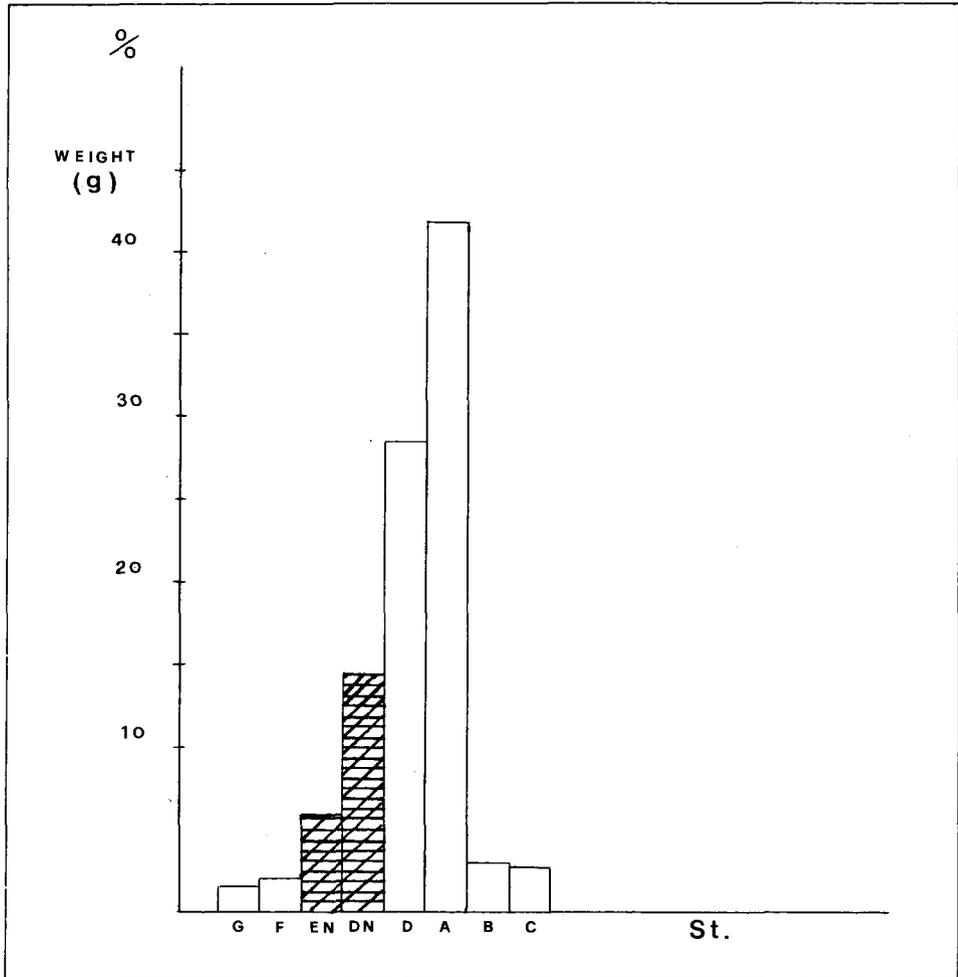


Fig. 5 - Total weight percentage in each station. Night stations are dashed.

Catches are higher in the stations 10m deep (A, D, DN) and decrease in the stations 50m and 100m deep. The dashed zone represents northern night hauls. Figure 6 gives the number of species sampled in each station and the total weight in grams.

Stations on the same depth curve having an higher catch show a decrease in the number of species; anyhow, from the coast towards the open sea, even if the total weight decreases, the number of species caught does not show relevant variations. Among all sampled species, seven amount up to 97,07% of total weight.

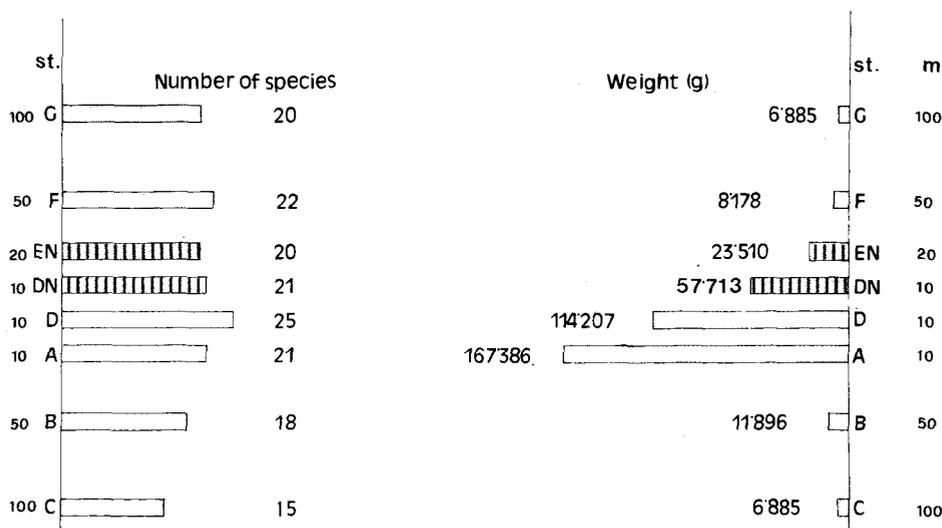


Fig. 6 - Number of species and relative weights in each station. Night stations are dashed.

Macropipus vernalis alone represents 83,25% of Decapod weight and 18% of the total catch at 10m depth.

The remaining six species are: *Parapenaeus longirostris*, *Processa nouveli*, *Brachynotus gemmellari*, *Macropipus depurator*, *Dorippe lanata*, *Penaeus kerathurus*.

The figure 7 shows the percentage of the above mentioned species for each station.

Parapenaeus longirostris has been caught mainly to the North in correspondence of the 100m depth curve which is the superior limit of the distribution area of this species.

Processa nouveli is mainly fished to the North at 50m; this is probably due to the mud accumulated by the currents.

The fishing depth for *Brachynotus gemmellari*, ranges from 10 to 50m; this species present both in the North and in the South is mainly represented in the North.

Macropipus depurator, inhabiting muddy bottoms, has a distribution closely related to its habits. It gathers in deepest areas where mud is more abundant and decreases in relation to the percentage of sand in the sediment as proved from the hauls made at 50, 20 and 10m.

Dorippe lanata is present in each haul. Its fishing depth ranges from 10 to 100m having a maximum in the South between 20m and 50m.

Commercially, the most valuable species is *Penaeus kerathurus*, always present in the fish market of Fiumicino. Large size specimens are mainly fished at 20m depth. In winter season anyhow they move to deeper areas, not beyond 50m, and they crowd the 10m depth area for reproduction. Night hauls are of great impor-

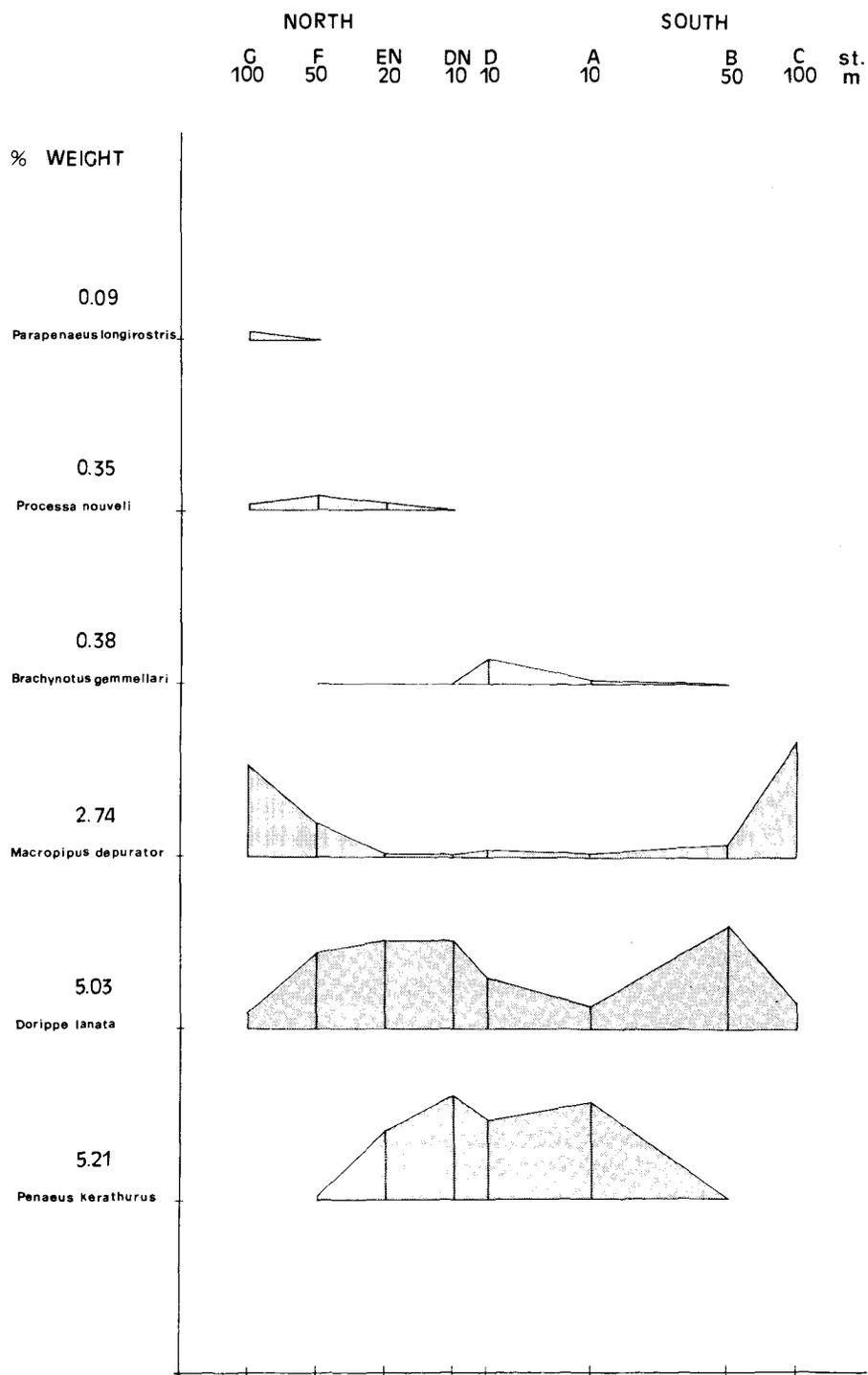


Fig. 7 -Weight percentage of most frequent species in all stations.

tance for the study of *Penaeus*; in fact stations with high night catches often proved to give very poor results when repeated during the day.

The diagram shows the comparison between day and night catches of *Penaeus kerathurus* made in station D in April.

Specimens have been divided in classes according to carapace length and sex.

In the night haul the catch of large size females increases, while the male size of day and night hauls is very similar (fig. 8).

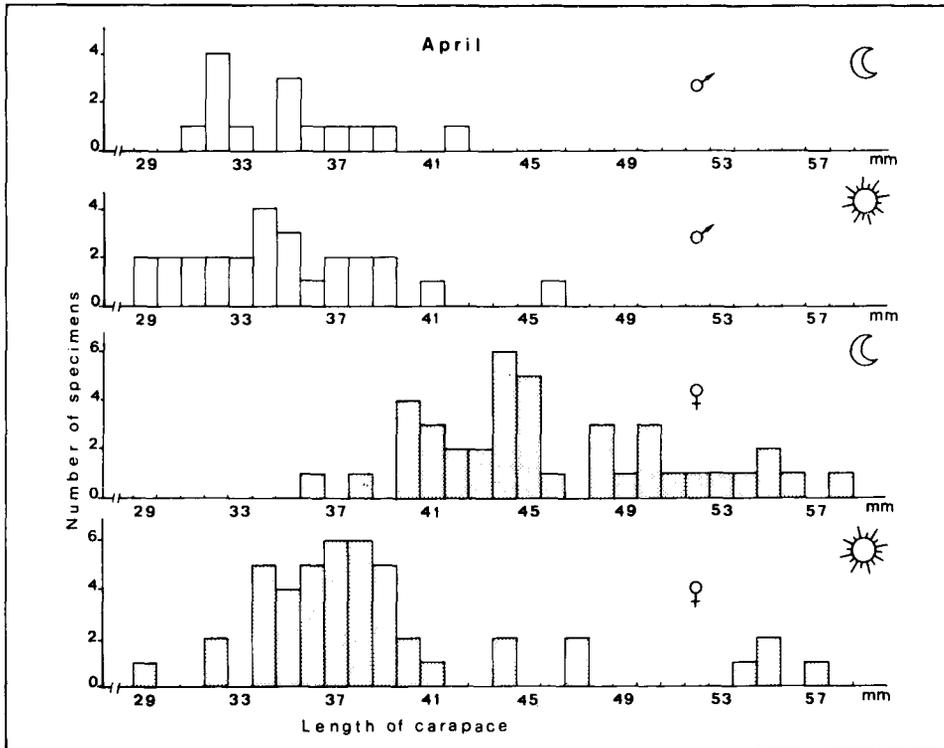


Fig. 8 -Night -and- day catch of *Penaeus kerathurus*.

As an average females have a larger size than males and reach a maximum density of individuals when carapace is 37mm (fig. 9) long; this value decreases to 34mm for males (fig. 10). Immature individuals are seldom fished; in fact over 900 specimens caught only a few weighted less than 12 g. having a total length less than 13 cm.

Figure 11 shows the percentage in weight of *M. vernalis* over the total weight of crustaceans. *M. vernalis* inhabits mainly sandy bottoms but is found in all hauls reaching the maximum values at 10m where sand is most abundant.

In fact to the South of the river the considerable amount of sand in the sediment promotes an higher abundance of *M. vernalis* up to 50m, with respect to *M. depurator* inhabiting mainly muddy bottoms (fig. 12).

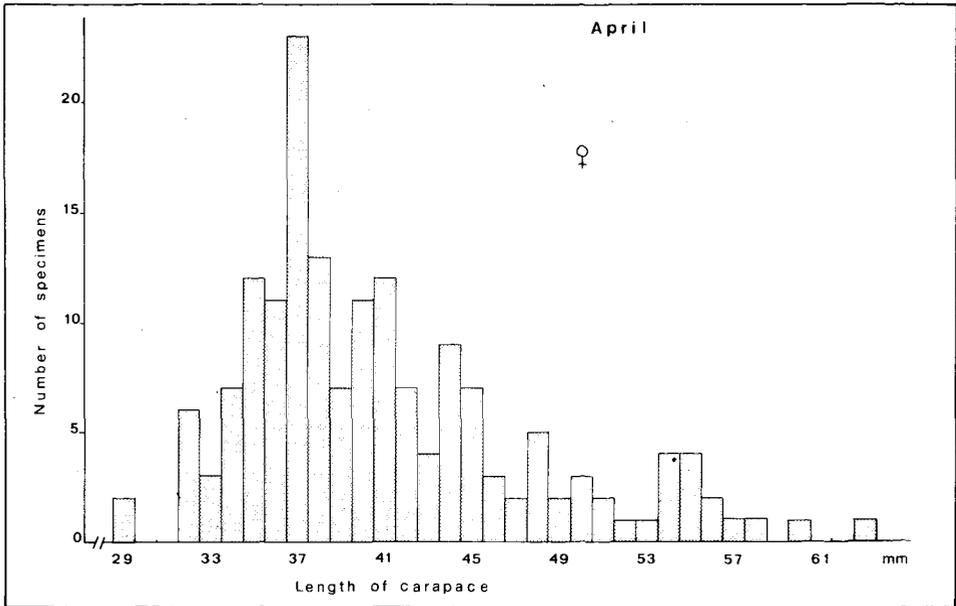


Fig. 9 - Carapace length-frequency distribution for *Penaeus kerathurus*.

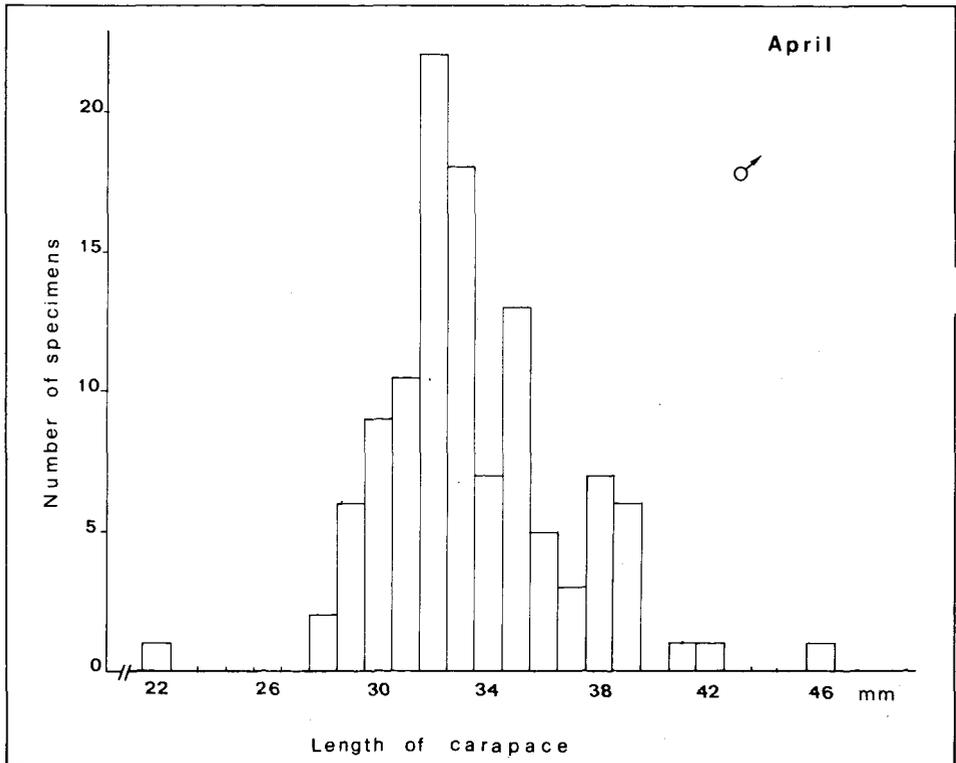


Fig. 10 - Carapace length-frequency distribution for *Penaeus kerathurus*.

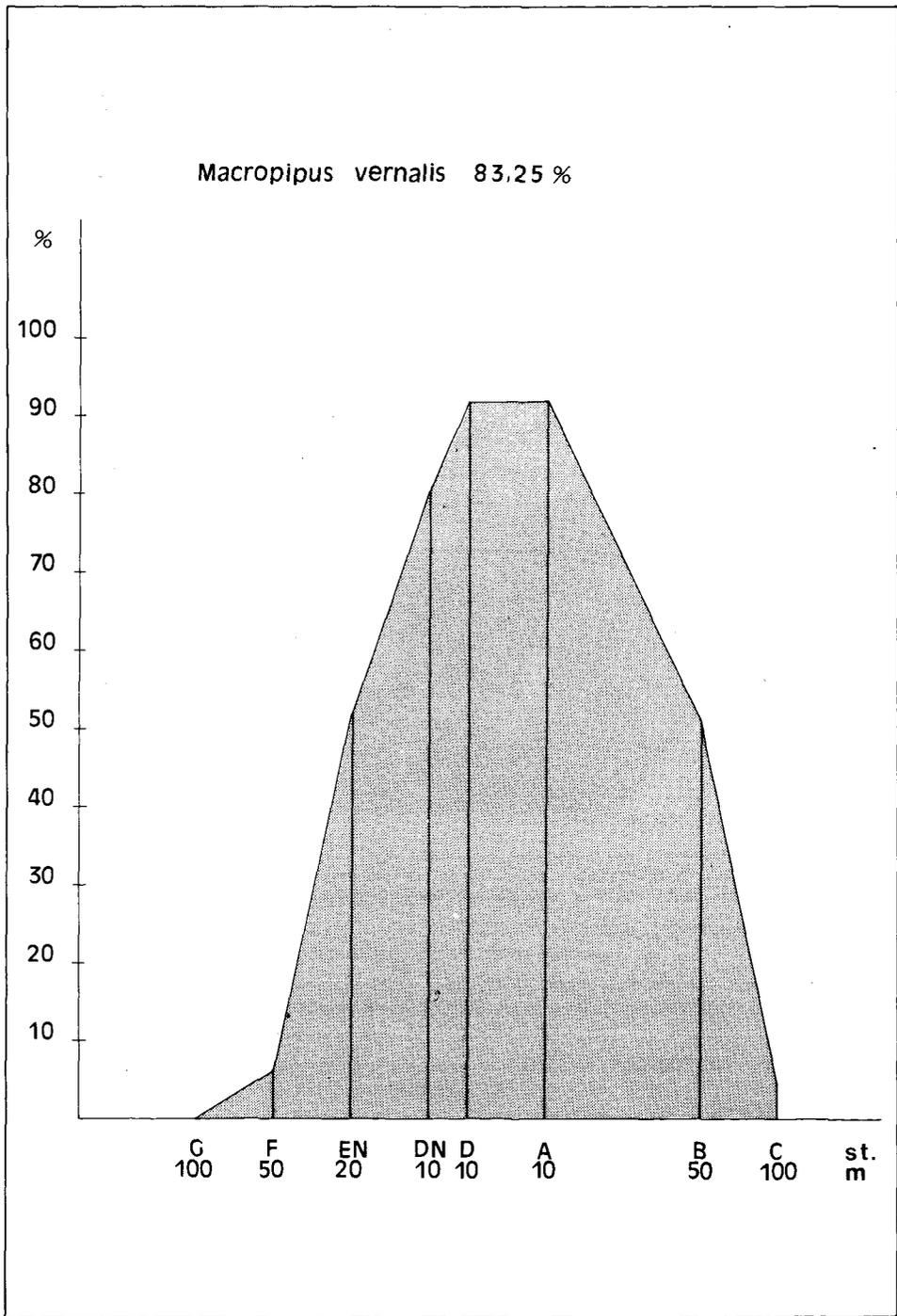


Fig. 11 - Weight percentage of *Macropipus vernalis* in relation to all Decapoda caught.

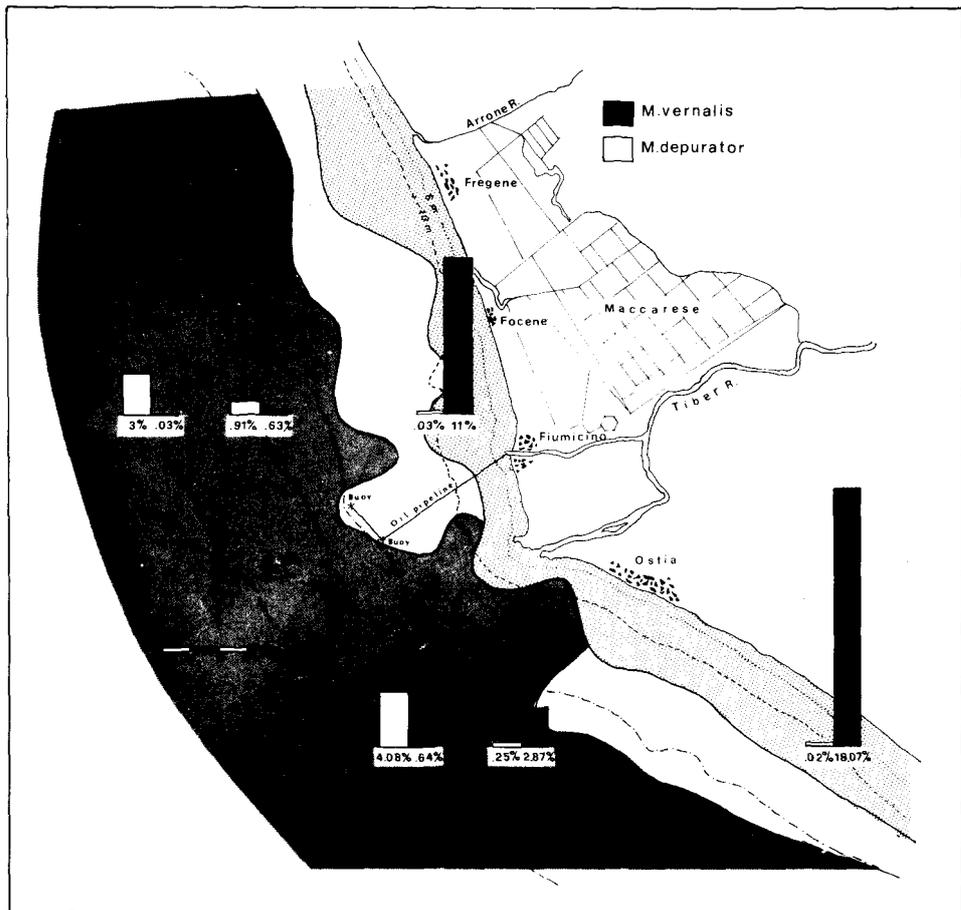


Fig. 12 - Distribution of *Macropipus vernalis* and *Macropipus depurator*.

CONCLUSIONS

The preliminary study of catches proves that the 10m depth area is quantitative-ly and qualitative-ly richest in Decapods (Tab. 2). This is probably due to the fact that this area is more directly enriched by the river and seldom trawled because fishing is forbidden.

The 50 and 100 m area, uncorrelated to river hydrodynamics, is inhabited by species related to muddy bottoms such as: *Macropipus depurator*, *Solenocera membranacea*, *Pontocaris cataphracta*, *Alpheus glaber* and *Processa nouveli*.

Moreover in this area Decapods catch (Kg/h) greatly decreases.

TAB. 2 - Species caught in 50% of hauls at least.

10 m	50 m	100 m
<i>Penaeus kerathurus</i>	<i>Alpheus glaber</i>	<i>Solenocera membranacea</i>
<i>Sicyonia carinata</i>	<i>Processa novelli</i>	<i>Parapenaeus longirostris</i>
<i>Processa modica</i>	<i>Pontocaris cataphracta</i>	<i>Alpheus glaber</i>
<i>Diogenes pugilator</i>	<i>Anapagurus bicorniger</i>	<i>Pontocaris cataphracta</i>
<i>Doripe lanata</i>	<i>Dorippe lanata</i>	<i>Dorippe lanata</i>
<i>Ilia nucleus</i>	<i>Macropipus pusillus</i>	<i>Macropipus depurator</i>
<i>Macropipus depurator</i>	<i>Macropipus depurator</i>	<i>Macropipus vernalis</i>
<i>Macropipus vernalis</i>	<i>Macropipus vernalis</i>	<i>Goneplax rhomboides</i>
<i>Goneplax rhomboides</i>	<i>Goneplax rhomboides</i>	
<i>Brachynotus gemmellari</i>	<i>Inachus communissimus</i>	
<i>Inachus communissimus</i>		
<i>Macropodia rostrata</i>		

REFERENCES

- AL-ADHUB A. H. Y. and WILLIAMSON D. I., 1975. - Some European Processidae (Crustacea, Decapoda, Caridea). *J. nat. Hist.*, 9: 693-703.
- BEN MUSTHAFA A., 1967. - Observation biologiques sur *Penaeus kerathurus* (Forsk.) et etude biométrique. *Ist. nat. Sci. Tec. Oc. Pes. Salammbò, Annales*, 13.
- DECHANCÉ M. and FOREST J., 1962. - Sur *Anapagurus bicorniger* A. Milne Edwards et E.L. Bouvier et *A. petiti* sp. nov. (Crustacea Decapoda Paguridae). *Bull. Mus. Hist. nat. Paris*, ser. 2, 34: 293-307.
- DELLA SETA G., MINERVINI R., MUSSINO R., CASTAGNOLO L., FOCARDI S. and RENZONI A., 1977. - Primi risultati dello studio sui popolamenti bentonici dei fondi mobili dragabili alla foce del Tevere. *Atti 9° Congr. Soc. It. Biol. Mar.*: 215-227.
- FROGLIA C., 1976. - The occurrence of *Philocheirus monacanthus* (Holthuis) and *Brachynotus foresti* Zariquiey Alvarez in the Adriatic Sea. *Atti Mus. Civ. Stor. Nat. Trieste*, 29 (3): 171-174.
- FROGLIA C. and MANNING R. B., 1978. - *Brachynotus gemmellari* (Rizza, 1839), the third mediterranean species of the genus (Crustacea, Decapoda, Brachyura). *Proc. Biol. Soc. Wash.*, 91 (3): 691-705.
- FOREST J., 1978. - Le genre *Macropodia* Leach dans les eaux Atlantiques Européennes (Crustace Brachyura Majidae). *Cahiers Biol. Mar.*, 19: 323-342.
- GORDON I., 1968. - Correction to Parisi's "*Portunus pusillus*" and "*Portunus parvulus* n. sp." from the Mediterranean (Decapoda Brachyura). *Crustaceana*, 14: 319-320.
- PARISI B., 1915. - Il genere *Portunus* nel Mediterraneo e descrizione di una nuova specie. *Monitore Zool. Ital.*, 26: 256-260.
- PERES J. M. and PICARD J., 1964. - Nouveau Manuel de Bionomie Benthique de la mer Méditerranée. *Rec. Trav. St. Mar. Endoune*, 47 (31): 1-137.

- WILLIAMSON D. I. and ROCHANABURANON T., 1979. - A new species of Processidae (Crustacea, Decapoda, Caridea) and the larvae of the north European species. *J. nat. Hist.*, 13: 11-33.
- ZARIQUEY ALVAREZ R., 1955. - El *Macropipus parvulus* (Parisi 1915) es especie válida. *P. Inst. Biol. Apl.*, 21: 91-100.
- ZARIQUEY-ALVAREZ R., 1968. - Crustaceos decapodos Ibericos. *Inv. Pesq.*, 32: 510 pgg.