

Investigations of the rose shrimp *Parapenaeus longirostris* (Lucas, 1846) in the Northern Marmara Sea

Kuzey Marmara Bölgesinde bulunan derin su pembe karidesi *Parapenaeus longirostris* (Lucas, 1846) üzerinde çalışmalar

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Abstract

Rose shrimp is one of the important commercial shrimp species in the Marmara Sea. Data from the coastline between Silivri/Istanbul and Tekirdağ during 1987-1988 are presented in this paper. Sampling was performed with shrimp beam trawling. Catch composition and stocks were investigated. In 1987 the carapax length varied between 85 mm and 346 mm. Maximum length class was 186 mm. In 1988 the carapax length varied between 85mm and 306 mm. The maximum length class was 126 mm. As by-catch, 24 fish species and 20 invertebrate species were caught.

Keywords: Sea of Marmara, Rose shrimp, stocks, catch composition, by-catch.

Introduction

The Marmara Sea is a unique inland sea of Turkey and a link between the Black Sea and Mediterranean Sea. This sea is one of the productive fishing grounds in Turkey. At least 15% of the Turkish fishery production is caught in the Marmara Sea.

Deepwater rose shrimp is one of the important commercial species in the Marmara Sea. This species is exported as canned, fresh and individually frozen, mostly to Italy, Greece, France and Spain.

Contrarily, commercial value in the domestic market is low. Most important fishing grounds of this species are Tekirdağ, Silivri, Hoşköy, Şarköy, Mürefte and Marmara Islands in the northern Marmara Sea. Due to high demand from the external markets, there is threat for the sustainable fisheries of this species. Stock assessment is needed for proper management and regulation for the sustainable use of the resource. Between 1970 and 1987, total of 3242 ton shrimp was caught in the Marmara Sea. Annual production was 168 ton in 1970. In 1983 the catch was at the peak level with 561 ton (Figure 1).

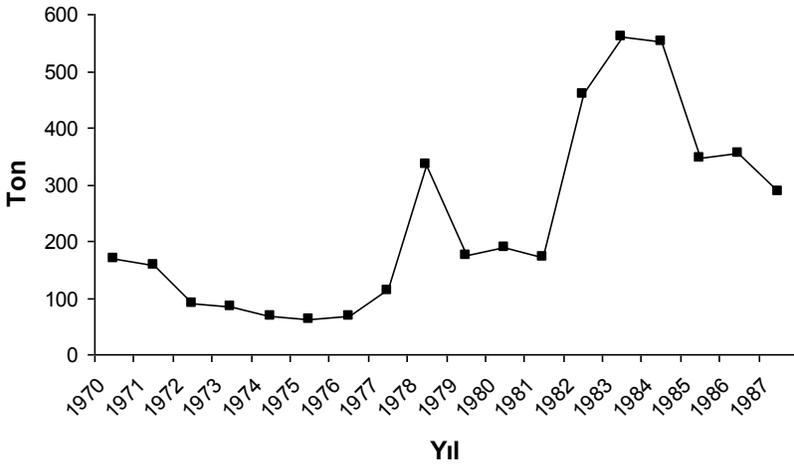


Figure 1. Rose shrimp catch in the Marmara Sea from 1970 to 1987.

Devedjyan (1926) mentioned shrimp fisheries in the Marmara Sea and Istanbul Strait (Bosphorus). Demir (1954, 1959) also reported this species in the Marmara Sea and Bosphorus and determined four Penaeidae species. Artüz (1967) and HAE (1967), Bilecik (1985), Erden and Erim (1971) also studied some fisheries parameters of the deep sea shrimp from the Marmara Sea. However, most of these works took descriptive approaches to the shrimp fisheries in the Marmara Sea.

Parapenaeus longirostris is the most dominant shrimp species in the Marmara Sea and found also in the Aegean and Mediterranean Sea (Figure 2). This species prefers muddy bottom habitat. The maximum

depth which this species was caught from was 700 m and the minimum depth was 20 m, but its general preference is 150 to 400 m (Holthuis 1980). Preference of water temperature is between 14-15 °C. The maximum total length was 160 mm for males and 186 mm for females, but they are usually shorter than 140 mm for males and 160 mm for females. Reproduction takes place between May and July (Artüz 1967). Geldiay and Kocataş (1968) reported that *P. longirostris* was found also in Iskenderun and Mersin Bay.

Small scale fishermen depend on shrimp fisheries in the Marmara Sea. Sustainable management of this species has not been concerned enough by the fisheries authorities due to several reasons, such as weak implementation of 1380 fisheries law in a fisheries circular which is the most appropriate tool for managing shrimp and others stocks in the Marmara Sea.

The aim of this study is mainly the stock assessment of the rose shrimp in the defined fishing area in the northern part of the Marmara Sea, which is a traditional shrimp fishery ground. Relations between environmental factors and shrimps fishery and by-catch data are also provided for the investigated area.

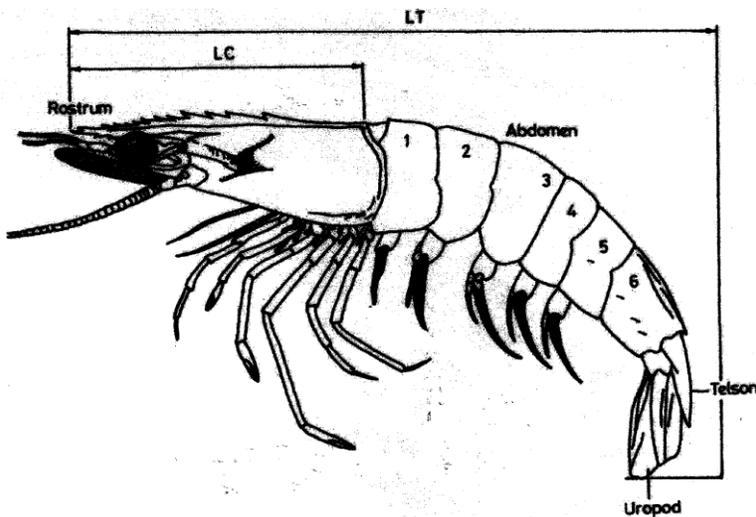


Figure 2. Rose shrimp.

Materials and Methods

This study was conducted in spring and summer seasons during 1987-1988 at five stations in Silivri and Tekirdağ region (Figure 3). A special beam trawl was used, whose length was 2.5 m and cod end was 24mm. The hauling time was 30 minutes for each sampling. Environmental parameters, such as salinity, temperature and dissolved oxygen, were measured with a digital TSO. A special echo-sounder was also used for the bottom topography of the swept area.

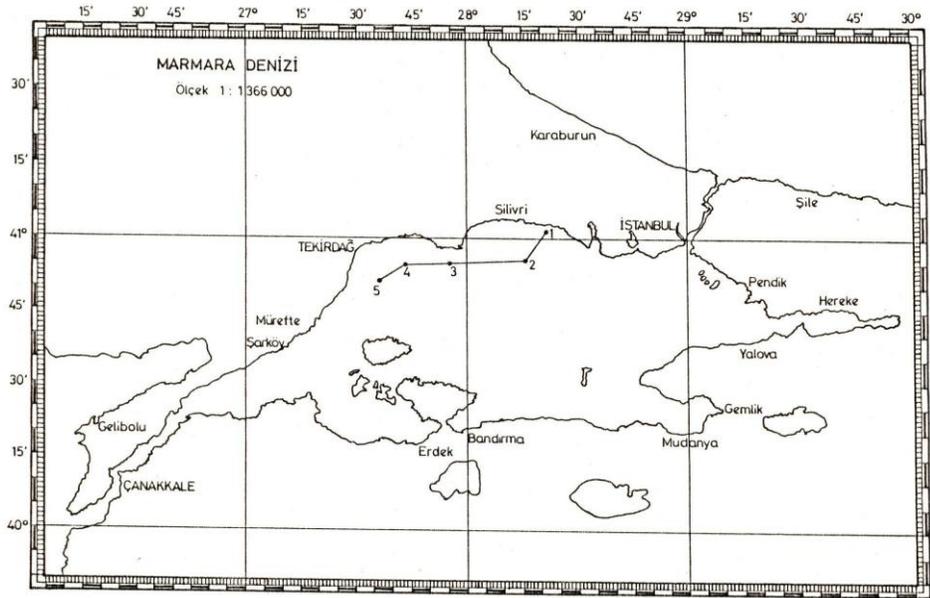


Figure 3. Sampling stations in the Marmara Sea.

The swept area was measured with the equation: $S = v \cdot w \cdot h$ where S (m^2): swept area, v : speed (m/h), w : beam of the trawl (m), h : time as 30 minute.

Total area was calculated as: $1852 \times 2.5 \times 0.30$: 1382 m^2 for each hauling.

The total number of the specimens taken during the period between 1987 and 1988 was 1232. The length from the ocular orbit to the posterior extreme of the cephalothorax length (CL) was measured for each sample. Total length was also measured (TL). The weight was measured up to

the nearest hundred grams. Sex was identified and sexual maturity in females was also recorded. Maturity stages were determined by using a scale of three stages based on the macroscopic examination of gonads (development and coloring). All specimens were stored in the 4 % formalin solutions.

By-caught invertebrate and vertebrate samples were separated after the hauling and stored in the 4 % formalin solutions.

Fishing power analysis was also performed with the special inquiry forms.

Results and Discussion

A total of 863 specimens, 412 in 1987 and 451 in 1988 were analyzed according to the length groups. Among these samples, the male/female ratio was 397/466. The minimum and maximum size distributions found in this study are given in Table 1. In 1987, the carapax length varied between 85 mm and 346 mm. Maximum length class were 186 mm. In 1988, the carapax length varied between 85mm and 306 mm. The maximum length class was 126 mm (Figures 4, 5).

According to these figures, most of the shrimps were between 85- 285 mm in length. Within 85-285 mm, the frequency distribution was even, that is, there was no peak frequency observed for any particular length class, both in 1987 and 1988. There is no difference in frequency distribution of length between 1987 and 1988, except that the range was greater in 1987 than in 1988.

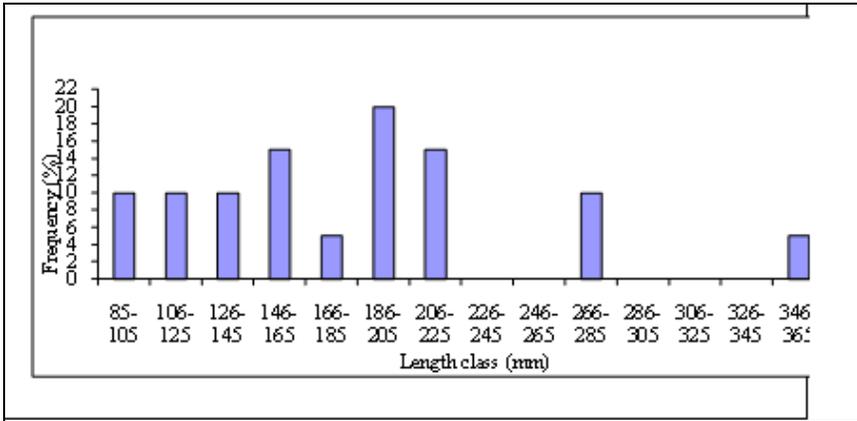


Figure 4. Total length distributions in 1987.

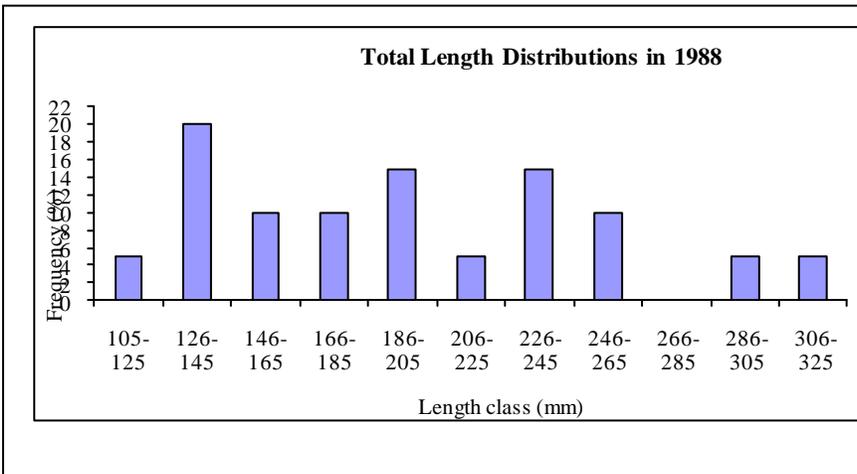


Figure 5. Total length distributions in 1988.

By-catch species of the sampling area are given in Table 1.

Table 1. By-catch species of the sampling area.

	1987					1988					Total
SPECIES	April	May	June	July	Total	April	May	June	July	Total	1987+88
Fishes											
<i>Triglia lyra</i>	6	1	2	2	11	3	5	1	-	9	20
<i>Scorpaena porsus</i>	2	-	1	-	3	-	2	-	-	2	5
<i>Solea vulgaris</i>	7	4	3	1	15	4	3	-	-	7	22
<i>Mullus barbatus</i>	1	-	2	3	6	-	2	-	2	4	10
<i>Gobius niger</i>	2	1	1	-	4	-	-	-	-	-	4
<i>Merluccius merluccius</i>	2	3	2	1	8	9	2	2	4	17	25
<i>Blennius ocellaris</i>	4	1	-	-	5	-	2	-	1	3	8
<i>Raja clavata</i>	-	6	-	3	9	2	2	1	2	7	16
<i>Maena vulgaris</i>	-	3	-	4	7	6	-	-	1	7	14
<i>Arnoglossus laterna</i>	-	1	-	-	1	-	1	-	-	1	2
<i>Mullus surmelatus</i>	-	-	-	1	1	-	-	-	-	-	1
<i>Scorpaena scrofa</i>	-	-	-	-	-	-	1	1	-	2	2
<i>Raja radula</i>	-	-	1	2	3	-	-	-	2	2	5
<i>Gobius niger</i>	-	-	-	1	1	1	-	-	-	1	2
<i>Gobius capito</i>	-	-	-	-	-	-	3	1	-	4	4
<i>Zeus faber</i>	-	-	-	-	-	-	1	-	-	1	1
<i>Sygnathus acus</i>	-	-	-	-	-	-	2	1	1	4	4
<i>Trachinus draco</i>	-	-	-	-	-	-	-	2	-	2	2
<i>Uronoscopus scaber</i>	-	-	-	-	-	-	1	1	-	2	2
<i>Synodus saurus</i>	2	1	-	1	4	1	2	1	2	6	10
<i>Dasyatis pastinica</i>	1	-	3	2	6	2	-	1	3	6	12
<i>Myliobatis Aquila</i>	1	2	-	1	4	-	1	1	-	2	6
<i>Pleuronectes platessa</i>	1	-	2	1	4	1	1	3	2	7	11
<i>Hippocampus hippocampus</i>	-	2	1	-	3	-	-	-	-	-	3

Table 1 continued.											
Invertebrates											
<i>Vermes sp.</i>	5	-	-	-	5	-	1	2	-	3	8
<i>Ostrea edulis</i>	3	1	2	-	6	3	1	2	-	6	12
<i>Ascidia sp.</i>	4	-	-	1	5	3	1	-	-	4	9
<i>Astropecten sp.</i>	-	-	1	-	1	2	1	1	-	4	5
<i>Portunus sp.</i>	1	-	1	1	3	-	-	2	-	2	5
<i>Cardium edule</i>	2	-	1	1	4	-	-	-	-	-	4
<i>Dentalium dentale</i>	1	2	1	-	4	4	-	-	-	4	8
<i>Trutella communis</i>	1	-	-	-	1	-	-	2	-	2	3
<i>Spongia officinalis</i>						-	-	-	-	1	1
<i>Venus verrucosa</i>	-	-	-	-	-	3	-	1	1	5	5
<i>Bryozoa sp.</i>	-	-	1	-	1	-	-	1	-	1	2
<i>Astropecten areneus.</i>	1	-	1	1	3	-	-	-	-	-	3
<i>Astropecten regularis</i>	-	-	-	-	-	1	-	-	-	1	1
<i>Squilla manthis.</i>	1	1	1	-	3	-	-	1	-	1	4
<i>Caryophyllia clavus</i>	1	-	-	2	3	1	-	1	2	4	7
<i>Donax truncates</i>	1	-	-	-	1	-	-	1	-	1	2
<i>Asterina gibbosa.</i>	-	-	-	-	-	2	-	-	-	2	2
<i>Murex trunculus</i>	2	2	1	-	5	-	-	-	-	-	5
<i>Murex brandaris</i>	-	-	-	-	-	-	1	1	2	4	4
<i>Dolium galea</i>	-	-	-	-	-	2	-	-	-	2	2

According to these data, the most abundant by-catch fish species were *Merluccius merluccius*, *Solea vulgaris* and *Triglia lyra*. A total of 24 by-catch fish species were identified as in the two-year period. *Zeus faber* and *Mullus surmelatus* were rare each with a single specimen. As for invertebrates, 20 by-catch species were identified. A total of 44 species were by-catch species during 1987-1988. The most abundant invertebrate species was *Ostrea edulis*. *Spongia officinalis* and *Astropecten regularis* were the rarest. Bayhan et al. (2006) reported a total of 50 by-catch species in the southeastern Marmara Sea during their study. Most common fish species was *Gobius* sp. with 12.86 %. Among them, there found *Sygnathus* spp. which is a fully protected species. In our study, *Sygnathus acus* and *Hippocampus hippocampus* were also found. However, these two species were not yet under protection during the study period.

Environmental parameters were also measured in the study and rose shrimps were found between 12-15°C, 1.24 to 3.10 dissolved O₂ and 39-38 ‰ salinity in the Marmara Sea (Table 2). It can be seen that low dissolved O₂ level is not a disadvantage for shrimps. Salinity ranges were also at the typical salinity level for the Mediterranean originated water mass. These results were consistent with Holtius (1980) which reported that this species lives up to 700 m. depth and in low oxygenated waters.

A total 44 by-catch species were determined. Among fishes *Merluccius merluccius* and invertebrates *Ostrea edulis* were in first rank. Fishing gear of shrimp fisheries should be modified in order to reduce such by-catch.

Total 25 shrimp beam trawls and 127 beam trawls were counted in the Marmara Sea (Table 3). These numbers contained only 25 HP boats and new permits should not be issued for the shrimp fisheries.

Table 2. Environmental parameters at the sampling stations.

Sampling months	Stations	Depth (m)	Temperature (°C)	Salinity	Dissolved O ₂ (mg O ₂ /L)
April	1	40	12	38	1.24
	2	45	11	39	1.60
	3	50	11	39	1.40
	4	43	14	39	2.10
	5	70	14	39	1.80
May	1	52	15	39	2.40
	2	57	14	38	2.20
	3	62	14	38	2.10
	4	73	14	38	2.00
	5	42	15	38	3.10
June	1	46	14	39	2.60
	2	41	12	38	2.20
	3	63	13	39	2.40
	4	61	12	38	2.00
	5	79	14	38	3.20
July	1	51	14	38	2.40
	2	52	13	38	2.10
	3	51	14	38	2.10
	4	60	14	38	2.00
	5	62	15	38	3.10

Table 3. Number of boats in the Northern Marmara Sea.

Name of port	Size of boat		Number of boats
	25HP and 10-15m	25HP and 7-8 m	
Mimar Sinan	11	5	16
Silivri	21	4	25
Selimpaşa	9	7	16
Tekirdağ	14	4	18
Şarköy	15	6	21
Gaziköy	12	7	19
Hoşköy	9	3	12
Total	91	36	127

It is also concluded that shrimps stocks were under threat in the Marmara Sea due to overfishing and fishing pressure in a long term. The number of fishing boats should be limited to mitigate overfishing. This study is a

baseline for further studies on fisheries management in the Sea of Marmara.

Özet

Bu çalışmada Marmara Denizi'nde önemli bir ticari tür olan *Parapenaeus longirostris*, Derin su pembe karidesi' nin 1987-1988 yıllarında Tekirdağ, Silivri ve İstanbul arasındaki alanda Beam Trol kullanarak avcılık durumu, av kompozisyonu ve stok yapısı irdelendi.

Karides avcılığı sırasında Algarna içine giren 24 tür hedef dışı balık tür tespit edilirken *Merluccius merluccius* ilk sırayı almıştır. Avcılık sırasında Algarna içine giren hedef dışı 20 tür omurgasız tür tespit edilirken *Ostrea edulis* ilk sırayı aldı. Toplam 44 tür hedef dışı tür elde edilmiştir.

Bu dönemde araştırma bölgesinde toplam 25 karides balıkçısı ve 127 karides algarnası sayılmıştır. Bölgedeki av baskısının azaltılması için tekne sayısının dondurulması önerilmektedir. Bu çalışma balıkçılık yönetimi amacıyla bir altlık olmayı amaçlamıştır.

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