

Investigations on beam-trawl Fishery for Deep Sea Pink Shrimp *Parapenaeus longirostris* (Lucas, 1846) in the Sea of Marmara

M. Levent ARTÜZ ⁽¹⁾

Abstract

These data can provide useful information both for a better understanding of the deep-water rose shrimp *Parapenaeus longirostris* (Lucas, 1846) beam-trawling and for suggesting advice to fisheries management.

This information might comprise a distinct indication for management. Thus, the protection of nursery areas, through limitation of the fishing pressure throughout the season or in fixed periods, could be considered as an effective, complementary regulation tool for a short-lived species like *P. longirostris*.

Key words: *Parapenaeus longirostris*, beam trawl, *Funiculina quadrangularis*

Özet:

Bu makalede yer alan izlenim ve düşünceler derin su pembe karidesi *Parapenaeus longirostris* (Lucas, 1846) avcılığını daha iyi tanımak ve balıkçılık idaresi ile ilgili birimlere önerilerde bulunmak amaçlı bilgi sağlamayı hedeflemektedir.

Söz konusu izlenime dayalı bilgiler sürdürülebilir karides avcılığını düzenlemekle görevli birimlere bir durum tespiti niteliğindedir. Bu nedenle koruma altındaki alanların sakınılması ve avcılık sezonu veya belirlenmiş zamanlardaki avcılık baskısının üzerine ciddi bir şekilde gidilmesi, *P. longirostris* gibi kısa ömürlü ve ekonomik öneme sahip bir tür için, sürdürülebilirliğin sağlanmasında etkili ve tamamlayıcı bir düzenleme aracı olarak kabul edilebilir.

Anahtar kelimeler: *Parapenaeus longirostris*, beam trawl, *Funiculina quadrangularis*

Investigations

Along the Mediterranean coast the species is much fished for and sold cooked or salted (*Zariquiey Alvarez, 1968*). (*Longhurst 1970*) indicated that this is the most important commercial species of the Mediterranean coasts of Spain, France and Italy. Also in Algeria, Tunisia, Greece and Turkey the species is of commercial value, although on a lesser scale. Outside the Mediterranean the species is fished by trawlers in the area between S. Portugal and Rio de Oro and off Senegal; however, it is not of great importance there. In the southern part of the Gulf of Guinea the fishery for the species at depths between 200 and 325m. is very productive, with a daily yield per trawler of more than 1 Mt (average) to 3 Mt (maximum) (*Crosnier & Forest, 1973*).

The total catch reported for this species to FAO for 1999 was 19 056 Mt. The countries with the largest catches were Italy (4.631 Mt) and Spain (4.237 Mt).(*FAO, 2000*)

In waters of the Sea of Marmara the deep sea rose shrimp trawl fishery is estimated to provide around 40% of the total revenue from the fisheries sector. The Deep Sea Pink shrimp (*Parapenaeus longirostris*,) is the main target species (>60% of the total catch) and is found between 50 and 400 meters depth in the continental shelf and upper slope, related to sediment bottoms with a daily yield during the season per trawler of more than 60 kgs. (average) to 160 kgs. (maximum). These vessels range from 20 to 35 meters in size and 180 to 700 HP. a 20 mm mesh size has been used in this fishery. The Deep Sea Pink Shrimp trawl fleet operates mainly off the North-west and east coasts of Sea of Marmara, from 45 to 120 meters deep. This fishery started in 1968 with 2 vessels but since 2000 1674 beam trawlers are still operating in Sea of Marmara.

⁽¹⁾ *Hidrobiologist, levent@artuz.com, İstanbul, Türkiye*

Results

Observations on board of beam-trawling boats allowed the identification of different fishing areas, at depths greater than 50m., localized between Gemlik and to the west of Sea of Marmara (Şarköy fishing ground). On the fishing grounds from 50-120m. depth the most important target species was *Parapenaeus longirostris*. These “deep sea pink shrimp fishing grounds” were exploited during the legal fishing season, which recorded depending the export facilities of *Parapenaeus longirostris*; usually, two to four hauls were performed on each period on each fishing day, with mean duration of 2hr (\pm 30min.) each.

Primarily the Sea of Marmara, because the layers aren't effected by the atmospheric conditions, seasonal conditions don't affect them to spawn (Artüz İ., 1974)

Although they show little local difference especially in the Sea of Marmara, the spawning time occurs as 2 parts (August-November and April – June)(Artüz İ., 1977) for the Sea of Marmara.

Although the gonads, depending on the 14.2°C temperature, are clear throughout the whole year under thermocline layer water mass, it's considered as mistake that they reproduce all year long

Females of rose shrimp mature for the first time at 22mm. of carapace length immature individuals were found in all depth ranges with the highest percentage at depths shallower than 50m. Spawning takes place at the deeper areas. The percentage of ripe females increases with depth and they dominate below 120m. (Spearman Rank Correlation, $p < 0.001$) (Artuz, I. 1989).

Close bottom contact is necessary for successful operation. To avoid by catch of juvenile fishes selectivity devices are assembled (sieve nets, sorting grids, escape holes). The towing speed for rose shrimp is between 2.5 and 3 knots. When the beam trawl is used for shrimping, the foot rope is held off the seabed by setting a string of roped chain ahead of the foot rope. This allows unwanted species, such as starfish and crabs, to escape under the belly of the net. The shrimp, stimulated by the approaching roped chain, jump vertically and are caught in the net (this means less sorting on board and there is less damage to shrimp through contact with unwanted by-catch). The fish species are also captured as by-catch of the beam trawl fishery targeting crustacean, such as hake, horse mackerel, anglerfish and others.

The low selectivity of the gear as well as the species diversity of the exploited fish assemblages are the main reason for the high species richness detected in the catches, especially as regards the discarded fraction. This may produce an “ecosystem level impact” (Hall, 1996) on a complex of species belonging to the demersal communities.

A long lasting fishery was created neither for shrimps stocks nor for the other economical seafood in seas of Turkey. There has been a big fishing stress on shrimps reserves in the sea of Marmara and other benthic species that share the same habitat because not an efficient control mechanism founded by the ministry or other rural establishments and the lack of efficiency of bans and other regulations for shrimping in circular of seafood fishing and the bans and regulations that were done before without taking the population features of the creatures into consideration. As a result of this, starting from late 1980's (1989) the quantity of rose shrimp landing got less and less and towards the end of 1990 (1999) it was observed that this got 18 times less then before in the 10 year period. According to the DIE reports, the landing quantity got a little more starting from the year 2000 but this never reach the landing quantity of 1989 (Zengin, et. al. 2001)

1) The major impact of beam trawl on species is capture and removal from the ecosystem of small sized organisms (juveniles) and non-target species, which frequently are discarded at sea. Sieve netting and selection grids together with larger cod end mesh sizes are used to mitigate this problem, particularly in rose shrimp trawl fisheries. Square mesh panels can use with some success to reduce capture of non targets species in rose shrimp fisheries.

2) The penetration depth of a beam trawl depends on sediment characteristics and varies between 25 and 40 cm this problem should be solved as soon as possible with the organisation of the length of the boat, the engine power for the benefit of the stocks. The pressure force exerted on the sea floor is strongly related to towing speed and the warp length to depth ratio.

3) In order to continue rose shrimp catching in shrimp production areas there must be “nursery areas” which should feed the main stock. To have a proper production and in order not to lose this economical value there should be areas open for rose shrimp catching in turns of 3 years and nursery areas banned for rose shrimp catching are urgently necessary.

4) *Parapenaeus longirostris* is in natural competition with a demersal form *Funiculina quadrangularis* in the production areas. A proper production is possible by cleaning up the production areas from *F. quadrangularis*. In this way, in order to keep the rose shrimp production in an optimum level *F. quadrangularis* should be cleared away in the area during the production.

The only vehicle that can do these 2 functions at the same time during the rose shrimp catch is beam-trawl. Other methods except beam-trawl, can also by-catch the other different demersal forms, and this causes a great deal of distraction in species diversity and as a result the fertility of rose shrimp catch decreases. Permanent fishing should be regulated with a good organisation of mesh size of the cod-end, configuration of the footrope, body length, beam length and the power of the engine.

5) Another advantage of beam trawling, particularly in countries with “family fisher crews”, is that a small crew is required as only the cod ends are brought on board. Because of this it’s considered as an income of fishery for the families of the local economy.

6) Especially the rose shrimp production areas in western Sea of Marmara are used as anchorage areas for ships. The changes caused by the anchor chains of the ships at the sediment bottom create serious disadvantages for shrimps and shrimp landing.

The change of the bottom structure hinders the use of the equipment during the catch and the distribution of the shrimps in the area as well.

Acknowledgements:

The author thanks the crew of the Sarkoy deep sea pink shrimp fishery vessels and the fishermen association for their collaboration during the study.

This work was carried out with financial assistance of Sevinc and Erdal İnönü Foundation. (Contract Ref. A.128-234.a / 2005)

References

- Artüz, İ. 1989. Marmara denizinde 1986-88 Döneminde yapılan Ekolojik Araştırma sonuçları. Marmara Denizi ve Boğazlarda Çevre Sorunları Sempozyumu 1989.
- Artüz, İ. 1967. Karidesler Hakkında. T.Biol. Derg. Cilt. 17 Sayı, 2-3 İstanbul
- Artüz, İ. 1990. Ülkemizde hangi karidesler yetiştirilebilir? C. B&T. 10.02.90. Sayı:153 sayfa:6. İstanbul
- Artüz, L. 2005. Marmara denizinde *Parapenaeus longirostris*, (LUCAS 1846) “Derin su pembe karidesi” avcılığında kullanılan “Manyat” ağlarının öngörülen amaçları çerçevesince seçicilikleri Fisheries Advisory Commission Technical Paper U.R.Dsc. Nr:123
- Chan, T.Y. & Crosnier, A. 1997. Crustacea Decapoda: deep-sea shrimps of the genus *Plesionika* Bate, 1888 (Pandalidae) from French Polynesia, with descriptions of five new species. In: A. Crosnier (éd.), Résultats des campagnes MUSORSTOM, volume 18. *Mémoires du Muséum national d'Histoire naturelle*, Paris (A)
- Crosnier A. & Forest, J. 1973. Les crevettes profondes de l'Atlantique oriental tropical. *Office de la Recherche Scientifique et Technique Outre Mer (ORSTOM), Faune tropicale*
- Hall, M. A. 1996. On by catches. *Rev. Fish Biol. and Fish.*, : 319-352.
- Hall, S.J. & Mainprize, B. 2004. Towards ecosystem-based fisheries management. *Fish and Fisheries*, 5, 1-20.
- Holthuis, L.B. 1980. FAO species catalogue. Vol.1. Shrimps and prawns of the world. An annotated catalogue of species of interest to fisheries. FAO Fish. Synop., (125)Vol.1:261 p.
- Zengin, M., Polat, H., Kutlu, S., Dinçer, A.C., Güngör, H., Aksoy, M., Özgündüz, C., Karaaslan, E., Firidin, Ş., 2001. Marmara denizindeki derin su pembe karidesi (*Parapenaeus longirostris*, Lucas 1846) balıkçılığının geliştirilmesi üzerine bir araştırma, Sonuç Raporu., (TAGEM/HAYSUD/2001/09/02/004) T.C. Tarım ve Köyişleri Bakanlığı, Tarımsal Araştırmalar genel Müd. Ankara