American-Eurasian J. Agric. & Environ. Sci., 12 (10): 1339-1342, 2012
ISSN 1818-6769
© IDOSI Publications, 2012
DOI: 10.5829/idosi.aejaes.2012.12.10.6637

Length-Weight and Length-Length Relationships of *Metapenaeus affinis* (H. Milne-Edwards, 1837) in Northwest of Persian Gulf (Khuzestan Coastal Waters, Iran)

[1]*Seyed ahmadreza Hashemi,*
[2]*Gholamreza Eskandary and* [3]*Safoura Sedaghat*

[1]Chabahar Maritime and Marine Sciences University, Chabahar, Iran.
[2]South of Iran Aquaculture Fishery Research Center, Ahwaz, Iran.
[3]Department Fisheries, Gorgan University of Agricultural Sciences and Natural Resources, Iran

Abstract: This study was conducted to determine length-weight and length-length relationships of *Metapenaeus affinis* (H. Milne-Edwards) from Persian Gulf in Khuzestan Province in southwestern Iran. The specimens were collected using shrimp trawl net mesh size of 24 mm from October 2008 to September 2009. The mean, maximum and minimum total lengths were 24.70±4.73, 42 mm and 4 mm respectively. The mean, maximum and minimum total weight for this species was 9.62±4.93g, 33.5 and 3 g. respectively. The relationship between total and carapace lengths (TL and CL) was determined according to the power regression model. We determined an isometric power length-weight relationship as: W=0.110×L1.30 (r2=0.74, n=95) and W=0.004×L2.36 (r2=0.90, n=300) for male and female respectively. The relationship between total and carapace lengths (TL and CL) was determined as: W=0.061×L0.61 (r2=0.85, n=95) and W=1.89×L1.10 (r2=0.74, n=300) for male and female respectively. Regression coefficient (b) value in the length-weight relationship differed significantly between males and females (t-test, P<0.05).

Key words: *Metapenaeus affinis* · Length-Weight Relationships · Persian Gulf · Khuzestan Province

INTRODUCTION

Persian Gulf is considered one of the richest areas in fishery resources where large quantities of fish and shrimps are concentrated in different locations, particularly in the territorial waters of the State of Iran [1].

Metapenaeus affinis (H. Milne-Edwards, 1837) is one of the three species of Metapenaeus represented in the fishery on the Khuzestan Province coast. It is commercially valuable in some Asian countries and in the Persian Gulf. Trawlers, trammel nets, beach and boat seines are used to catch this species. Shrimp fisheries are often managed by a minimum spawning stock strategy to prevent overfishing of stocks.

The relationship between body weight and length is simple but essential in fishery management [2]. Length-weight relationships drastically help scientists to convert growth-in-length equations to growth in weight in stock assessment models [3], to estimating growth rates, age structure, to obtain the condition of fish and comparative growth studies [4-6], to estimate biomass from length frequency data.

The present study describes the length-weight relationship of *Metapenaeus affinis* (H. Milne-Edwards) from Persian Gulf in Khuzestan Province in southwestern Iran.

MATERIALS AND METHODS

A total of 395 specimens (300 females and 95 males) of *Metapenaeus affinis* were caught in the Northwest of Persian Gulf are located in Liphe-Busafe and Bahrekan fishing area between 29°44' to 07 'N and 48°45' to 49°50' (Fig. 1).

Corresponding Author: Safoura Sedaghat, Department Fisheries, Gorgan University of Agricultural Sciences and Natural Resources, Iran. Tel: +98-09176590435.

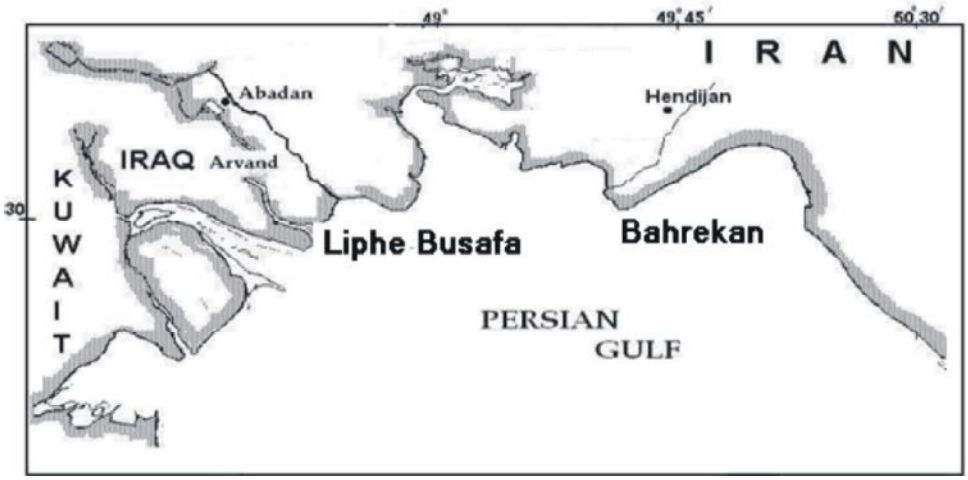

Fig. 1: Location of two landing sites of *Metapenaeus affinis* in Khuzestan Coastal Waters (Iran)

The specimens were collected using shrimp trawl net mesh size of 24 mm from October 2008 to September 2009. Sampled shrimp were fixed with 10% formalin and transferred to the laboratory. For each specimen, total length (TL) and carapace length (CL), whole body wet weight (g) and sex was recorded. The length-weight relationship was estimated by using following equation:

$$W = a L^b$$

where W is the whole body weight (g), L is the total length (mm), a is the intercept of the regression and b is the regression coefficient (slope) [7].

A t-test was used for comparison b value obtained in the power regression with isometric value [8]. Also a t-test was used for comparison b value in the power regression of male and female [9]. The relationship between Total and Carapace lengths (TL and CL) was determined according to the power regression model.

Data were statistically analyzed by analysis of variance (ANOVA) using the General Liner Models procedure coupled with Duncan's multiple range test in SPSS software (ver. 16.0).

RESULTS AND DISCUSSION

Overall 395 fish were measured. The sample size, the minimum, maximum and mean length and weight (±STD), are presented in Table 1.

In present study, the mean, maximum and minimum total lengths were 24.70±4.73, 42 mm and 4 mm respectively (Table 1). Nikoo *et al*. [10] reported the mean, maximum and minimum total lengths of *Metapenaeus affinis* of Mahshahr Creeks, 94.2, 126 mm and 44 mm respectively.

Mohammed [11] reported the mean, carapace lengths of *Metapenaeus affinis* of Kuwaiti waters, 26.7mm for females and 24.5 for males.

Table 1: Length characteristics (mm) and weight characteristics (g) of *Metapenaeus affinis* (H. Milne-Edwards, 1837) from Persian Gulf in Khuzestan Province, Southwest of Iran

			Length characteristics (mm)			Weight characteristics (g)		
	Sex	n	Min.	Max.	Mean±STD	Min.	Max.	Mean±STD
Total length	Male	95	12	27	21.17±3.30	3	11	6.01±1.5
	Female	300	18	42	25.8±4.56	3.5	33.5	10.81±5.08
Carapace length	Male	95	4	13	9.20±1.94	3	11	6.01±1.5
	Female	300	8	16	10.70±1.44	3.5	33.5	10.81±5.08
	Total	395	4	42	24.70±4.73 TL10.33±1.70CL	3	33.5	9.62±4.93

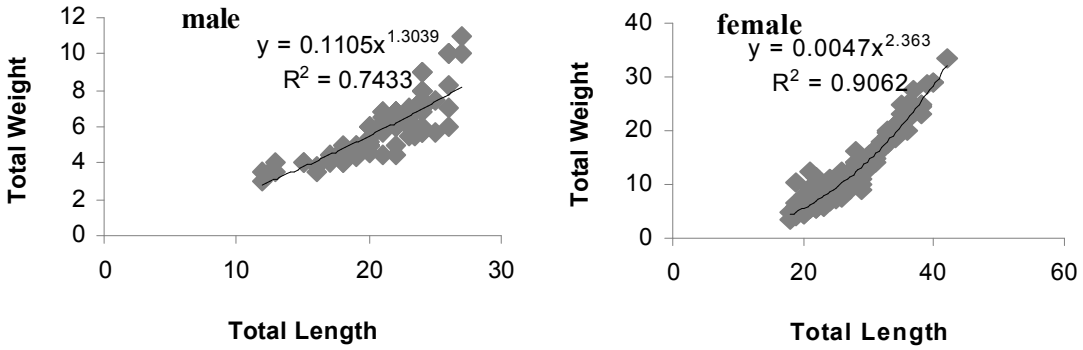

Fig. 2: Length-weight relationship of *Metapenaeus affinis* (H. Milne-Edwards, 1837) from Persian Gulf in Khuzestan Province, Southwest of Iran

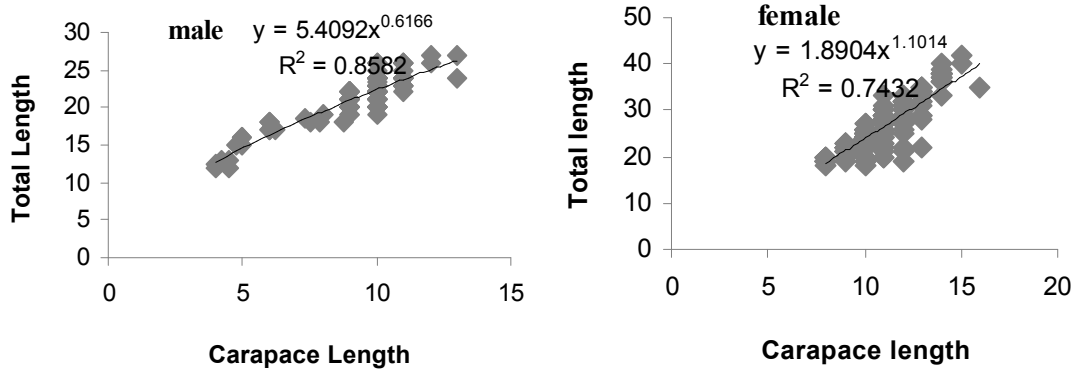

Fig. 3: The relationship between total and carapace lengths (TL and CL) of *Metapenaeus affinis* (H. Milne-Edwards, 1837) from Persian Gulf in Khuzestan Province, Southwest of Iran.

Table 2: The parameters of relationship between total and carapace lengths (TL and CL) of Metapenaeus affinis (H. Milne-Edwards, 1837) from Persian Gulf in Khuzestan Province, Southwest of Iran

Relationship	sex	n	a	b	R2
Weight–length	females	300	0.004	2.36	0.90
	Males	95	0.110	1.30	0.74
Total length –carapace length	females	300	1.89	1.101	0.74
	males	95	5.40	0.61	0.85

For both sexes of all individuals, length-weight relationship was described as: $W=0.110\times L^{1.30}$ (r2=0.74, n=95) for male and $W=0.004\times L^{2.36}$ (r2=0.90, n=300) for female (Fig. 2).

The relationship between total and carapace lengths (TL and CL) was determined as: $W=0.061\times L^{0.61}$ (r2=0.85, n=95) and $W=1.89\times L^{1.10}$ (r2=0.74, n=300) for male and female respectively (Fig. 3).

We determined an isometric power length-weight relationship for male and female. Regression coefficient (b) value in the length-weight relationship differed significantly between males and females (t-test, $P<0.05$).

The parameters of length-weight and length-length relationships of *Metapenaeus affinis* (H. Milne-Edwards, 1837) in Northwest of Persian Gulf are presented in Table 2.

According to Weatherley and Gill [12] the annual length-weight relationships could differ between seasons and years and many factors could contribute to these differences namely, maturity, temperature, salinity, food availability and size. Length-weight relationship may vary seasonally according to the degree of sexual maturity sex, diet, stomach fullness, sample preservation techniques [13], number of specimens examined, area/season effects and sampling, duration.

This study gives information to fishery biologists about total length-total weight and carapace length-total length relationships for *Metapenaeus affinis* (H. Milne-Edwards, 1837) in Northwest of Persian Gulf.

ACKNOWLEDGEMENTS

We thank Dr. Maramazi, the manager of the South of Iran Aquaculture Fishery Research Center, Ahwaz. We are also very grateful the experts of the South of Iran Aquaculture Fishery Research Center, Ahwaz for helping the project work.

REFERENCES

1. Hashemi, S.A.R. and T. Valinassab, 2011. Stock assessment of demersal resources in the West Northern of Persian Gulf waters. World Journal of Fish and Marine Sciences, 3(6): 480-485.
2. Chien-Chung, H., 1999. The length-weight relationship of Albacore. *Thunnus alalunga*, from the Indian Ocean. Fish. Res., 14: 87-9.
3. Bobori, D.C., D.K. Moutopoulos, M. Bekri, I. Salvarina and A.P. Munoz, 2010. Length-weight relationships of freshwater fish species caught in three Greek Lakes. J. Biol. Res., 14: 219-224.
4. Kolher, N., J. Casey and P. Turner, 1995. Length-weight relationships for 13 species of sharks from the Western North Atlantic. Fish. Bull., 93: 412-418.
5. Hashemi, S.A.R., S.A. Taghavi Motlagh and Gh. Eskandary, 2012. Some biological aspect of bartail flathead (*Platycephalus indicus* Linnaeus, 1758) in northwest of Persian Gulf (Khuzestan Coastal Waters, Iran). World Journal of Fish and Marine Sciences, 4(2): 185-190.
6. Goncalves, J.M.S., L. Bentes, P.G. Lino, Ribeiro, J.A.M. Canario and K. Erzini, 1996. Weight–length relationships for selected fish species of the small-scale demersal fisheries of the south and south-west coast of Portugal. Fish. Res., 30: 253-256.
7. Ricker, W.E., 1975. Computation and interpretation of biological statistics of fish populations. Bull. Fish Res. Board Can., 191: 382.
8. Sokal, R.R. and F.J. Rohlf, 1987. Introduction to biostatistics, 2nd edn Freeman Publication, New York. pp: 363.
9. Zar, J.H., 1999. Biostatistical Analysis. 4th edition. Prentice-Hall Englewood Cliffs, New Jersey, pp: 929.
10. Nikoo, S., P. Cochnian, A. Savary, S. Dehghan Medise, S. Saki and L. Mosavy Dehmoery, 2007. Distribution and Species Composition of Penaeidae Shrimps in bottom trawl landings of Mahshahr Creeks. Journal of Marine Biology, 50: 12-23.
11. Mohammed, H.M., 1989. Population dynamics and exploitation of *Metapenaeus affinis* in Kuwaiti waters. NAGA, the ICLARM Quarterly, 60: 38-41.
12. Weatherley, A.H. and H.S. Gill, 1987. The Biology of Fish Growth. Academic Press, London, pp: 14-21.
13. Wootton, J.T., 1992. Indirect effects, prey susceptibility and habitat selection: impacts of birds on limpets and algae. Ecology, 73: 981-991.