Short Communication

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Some Population Characteristics of Long-snouted Seahorse (*Hippocampus guttulatus* Cuvier, 1829*)* (Actinopterygii: Syngnathidae) in the Southeastern Black Sea

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Abstract: Some population parameters of *Hippocampus guttulatus* derived from 272 samples from the southeastern Black Sea coast of Turkey collected between 2009 and 2011 are presented. The majority of the samples was collected from trawl nets (95%), followed by gill nets (4%) and purse seine nets (1%). Mean lengths and weights were found to be 8.304±0.659 cm and 2.129 ±0.511 g, respectively, for females, and 8.319 ±0.714 cm and 2.182 ± 0.574 g, respectively, for males. There were no significant differences between males and females. Length-weight relationship for both sexes was calculated as $W=0.0079L^{2.635}$ (r=0.835). This relationship was $W=0.0076L^{2.6545}$ (r=0.829, n=136) for females and $W=0.0069L^{2.7047}$ (r=0.881, n=136) for males. This study supports the previous findings obtained for length-weight relationships, length-frequency distribution and weight at length data in other seas. The results indicate that growth of seahorses (*Hippocampus guttulatus*) is lower in the Black Sea than the Aegean Sea of Turkey.

Key words: *Hippocampus guttulatus*, southeastern Black Sea, Length-weight

Introduction

Seahorses are grouped with pipefishes, pipehorses and seadragons as members of the family Syngnathidae. They have narrow and elongated body covered with bony bumps.

Seahorses are inhabitants of both temperate and tropical coastal waters. They are distributed all over the Mediterranean Sea, Aegean Sea and Black Sea, and they are represented by *Hippocampus hippocampus* (L., 1758), *H. guttulatus* Cuvier, 1829 (Keskin *et al*. 2002) and suspiciously approached *H. fuscus* Rüppell, 1838 (Lourie *et al*. 2004).

It has been reported that seahorses generally prefer areas among corals, macro algae, mangrove roots and sea grasses although some live on open sandy or muddy bottoms in the littoral zone. They are under high pressure of overfishing due to their intensive use for souvenir industry, ornamental display, traditional medicine, especially in China, and high by-catch rates due to the use of unselective fishing gears. Moreover, their vegetated and epibenthic habitats have been destroyed by the use of trawls and dredges, which are the major fishing gears with negative impact on the seahorses.

The total amount of dried seahorses used for trade in Asia alone exceeded 45 tons among 32 syngnathids trading countries in the world in 1995 (Vincent 1996). In 2000, the number of countries that traded with syngnathids increased to 80 including the countries in Africa and Latin America, while Asian trade with dried seahorses exceeded 50 tons. In order to protect endangered syngnathids, the International Union for Conservation of Nature (IUCN) included these species in the Red List (IUCN 2003). Moreover, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) restricted the trade of seahorses in 2004 (Anonymous 2003).

There are various studies on the biology, reproduction and fisheries of seahorses inhabiting various seas (Vincent 1990, Vincent 1996, Vincent, Sadler

1995, Kvarnemo *et al*. 2000; Masonjones, Lewis 2000, Baum *et al*. 2003, Foster, Vincent 2004). The first studies on members of the Syngnathidae in the Turkish seas were performed by Erazi (1942), Slastanenko (1955-1956) and Bozkurt (1955). In recent years, their distribution (Keskin *et al.* 2002), morphology (Gurkan 2004), length-weight relationships (Gurkan, Taskavak, 2007), and their biometrical characteristics in the Aegean Sea (Gurkan *et al*. 2007) were investigated. However, studies on seahorses living in the Black Sea are very limited. Manav (2007) investigated the fluctuated asymmetry profiles of *H. guttulatus* using 8 relevant morphological variables in the Black Sea, while Gurkan, Culha (2008) reported on the spatial and temporal distribution of syngnathids in the Sinop Peninsula of the Central Black Sea Region. AK *et al.* (2008) studied the length-weight relationship of *H. hippocampus* in the eastern Black Sea.

In the present research we aimed to determine length, weight frequency, sex ratio and length-weight relationships of *H. guttulatus* depending on sexes in the southeastern Black Sea in order to update existing information on this species.

Materials and Methods

A total of 272 individuals of *H. guttulatus* were sampled by trawls, gillnets and purse seines in the southeastern Black Sea coast of Turkey (Fig. 1) from May 2009 to July 2011. The samples were carried to the laboratory daily, measured with a ruler – total length to the nearest 0.1 mm, head to end of tail (stretched), and weighed with 0.01 g precision balance (Kern EW). Species identification was done by the method of Lourie *et al.* (2004).

Length-weight relationship was derived using the equation $W=a.L^b$ (Ricker 1975), where 'a' is the 'y' intercept and 'b' is the slope derived by least squares method after log-transforming the equation as log (W) = log (a)+blog (L). The degree of association between the variables of length and weight was computed by the correlation coefficient (r).

Results

The specimens identified as *Hippocampus guttulatus* (see Table 1 for synonymous names), 136 males and 136 females (Table 2), were identified on the basis of characters included in Table 3. The majority of the samples (95%) was provided from trawl nets, followed by gillnets (4%) and purse seine nets (1%). This showed that the trawling in coastal waters has the highest impact on the seahorse populations living in the littoral zone. However, seahorses

Fig. 1. Research area

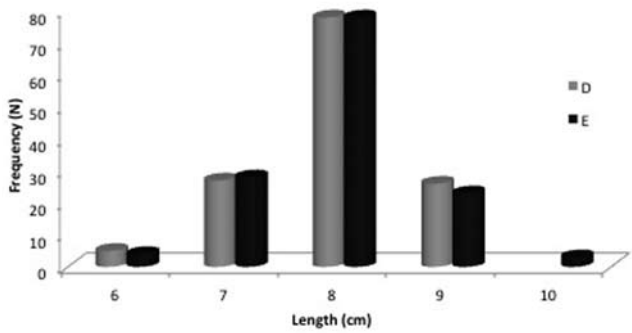

Fig. 2. Length frequency distribution by sexes (M: male, F: female)

Table 1. Synonyms of *Hippocampus guttulatus*

Synonym	Author
Hippocampus ramulosus	Leach, 1814
Hippocampus longirostris	Schinz, 1822
Hippocampus guttulatus	Cuvier, 1829
Hippocampus filamentosus	Duméril, 1870
Hippocampus guttulatus multiannularis	Ginsburg, 1937
Hippocampus hippocampus microstephanus	Slastenenko, 1937
Hippocampus hippocampus microcoronatus	Slastenenko, 1938

Table 2. Length frequencies of seahorses by sexes

Length (cm)	Female		Male	
	N	%	N	%
6.0-6.9	5	3.68	4	2.94
7.0-7.9	27	19.85	56	20.59
8.0-8.9	78	57.35	78	57.35
9.0-9.9	26	19.12	23	16.91
10.0-10.9	-	-	3	2.21
Total	136	100	136	100

Table 3. Biometric characters of *H. guttulatus*

Measure Type (cm)	Minimum-Maximum Value	Average Value
Head Length	1.47-2.16	1.87
Snout Length	0.51-0.98	0.86
Tail Rings	31-36	33.54
Dorsal Fin Rays	16-20	18.32
Pectoral Fin Rays	14-18	16.63
Trunk rings	10-11	11.25
Trunk rings supporting the dorsal fin	2	2.00
Tail rings supporting the dorsal fin	1-2	1.58
Cheek spines	2	2.00
Eye spines	2	2.00

have no commercial value in the Black Sea fisheries. Actually, this species is caught as non-targeted fish (by-catch) and released back to the sea during the separation of landings from the fishing gear. It is estimated that only a small percentage of seahorses may go for game fisheries and collectioners.

The length frequency distribution of the 272 seahorse samples obtained from the survey area from 2009 to 2011 is presented in Table 2 and Fig. 2. Most of the specimens were found in 8.0-8.9 cm length group in both sexes.

The length of the samples ranged from 6.5 cm to 10.3 cm, while weight values ranged from 1.01 to 4.13 g (Table 3). The mean length and weight values were calculated as 8.311±0.686 cm and 2.148±0.539 g, respectively. The sex ratio was 1:1, and both sexes were equally represented in the samples.

Mean length and weight values with their standard deviations by length groups are given in Table 4. The mean length and weights of the samples were determined as 8.304±0.659 cm 2.129±0.511 g for females, and 8.319±0.714 cm and 2.182±0.574 g for males, respectively. Fig. 3 illustrates the length-weight relationships for all specimens, and separately for females and for males, according to the equations: $W= 0.0079L^{2.6354}$ (n=272; r=0.835); $W=0.0076L^{2.6545}$ (n=136; r=0.829) and $W=0.0069L^{2.7047}$ (n=136; r=0.881), respectively.

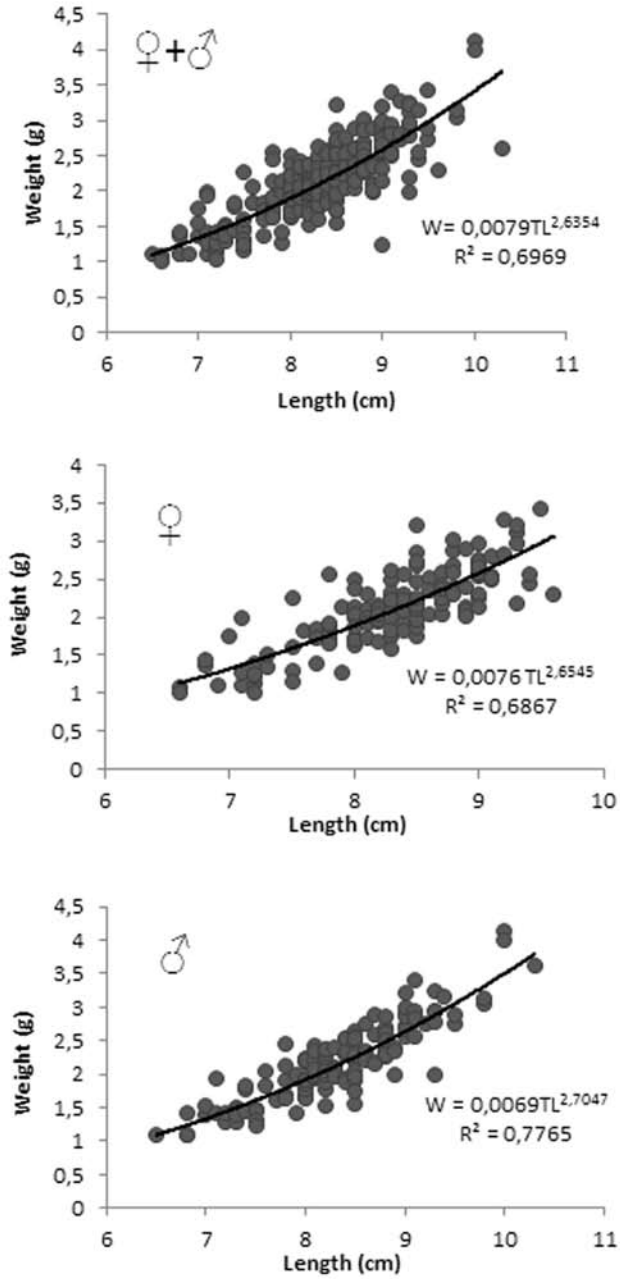

Fig. 3. Length-weight relationship of seahorses by sex groups

Discussion

Length and weight parameters were found similar to those obtained in previous studies. The mean length of seahorses in this study was lower than 13.33 cm obtained by Gurkan *et al*. (2007) and Gurkan, Taskavak (2007) in the Aegean Sea. The reason might be attributed to the sampling material used from different habitats. The mean weight calculated in the present study was also lower than 6.54 g observed by the same researchers mentioned above. Similarly habitat variations and differences in sample size can explain the differences in the

Table 4. Mean lengths and weights by sex groups

Length (cm)	N		Mean Length±SD		Mean Weight±SD	
	F	M	F	M	F	M
6.0-6.9	5	4	6.740±0.134	6.725±0.150	1.198±0.189	1.183±0.165
7.0-7.9	27	56	7.489±0.294	7.461±0.277	1.594±0.387	1.614±0.301
8.0-8.9	78	78	8.404±0.276	8.374±0.277	2.195±0.332	2.167±0.299
9.0-9.9	26	23	9.150±0.182	9.226±0.244	2.669±0.334	2.873±0.289
10.0-10.9	-	3	-	10.100±0.173	-	3.910±0.269
Total	136	136	8.304±0.659	8.319±0.714	2.129±0.511	2.182±0.574

Table 5. Comparison of length and weight data from different studies

Study	Location	Mean Length	Mean Weight	N	a	b	r^2
Gurkan, Taskavak (2007)	İzmir Bay, Aegean Sea	13.33	6.54	200	0.0105	2.47	0.64
Verdiell-Cubedo *et al*. (2006)	Mar Menor Coastal Lagoon, Spain	-	-	31	0.0024	2.91	0.97
Gurkan *et al*. (2007)	İzmir Bay, Aegean Sea	13.33	6.54	200	0.0105	2.47	0.64
Present Study	Southeastern Black Sea	8.311	2.148	272	0.0079	2.64	0.69

values observed in the present study. When comparing the 'a' and 'b' parameters from the length-weight equation with other studies, it was found out that the 'a' value in our study is lower than those of the seahorses living in Izmir Bay (Gurkan *et al*. 2007, Gurkan, Taskavak 2007), and higher than the Mar Menor Coastal Lagoon (Verdiell-Cubedo *et al*. 2006). The 'b' value is higher than the values received for the Izmir Bay and lower than the Mar Menor Coastal Lagoon (Table 5).

Conclusions

More comprehensive study can only be done with the larger size of samples. In this research we preferred using specimens caught as by-catch only from the active fishing gears used in the southeastern Black Sea. In order to provide better conservation of this species, more attention should be paid to the use of selective fishing gears not only for endangered commercial species but also for the seahorses. This study demonstrates that the main trap for unintentional catching of seahorses is trawl fishing, although the majority of the samples (over 90%) was alive during sampling operations on board of the fishing vessels. Fortunately, having no commercial value in Turkey, all seahorses are released back to the sea by fishermen, however, it is difficult to select these species for releasing during high fishing load. Therefore, selecting them during trawling operations is more important than releasing them back to the sea from the vessels

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