

COMU Journal of Marine Sciences and Fisheries

Journal Home-Page: <http://jmsf.dergi.comu.edu.tr> Online Submission: <http://dergipark.org.tr/jmsf>



RESEARCH ARTICLE

Length-Weight Relationship and Diet Composition of *Pomadasys stridens* (Forsskal, 1775) from İskenderun Bay (Eastern Mediterranean Sea)

Sencer Akalın, Tuncay Murat Sever, Dilek İlhan*, Murat Kaya, Burak Altay

Faculty of Fisheries, Ege University, 35100, Bornova, İzmir, Türkiye
Faculty of Fisheries, Ege University, 35100, Bornova, İzmir, Türkiye
Faculty of Fisheries, Ege University, 35100, Bornova, İzmir, Türkiye
Faculty of Fisheries, Ege University, 35100, Bornova, İzmir, Türkiye
Faculty of Fisheries, Ege University, 35100, Bornova, İzmir, Türkiye

<https://orcid.org/0000-0001-9839-6485>
<https://orcid.org/0000-0001-5231-4077>
<https://orcid.org/0000-0003-1228-105X>
<https://orcid.org/0000-0002-3242-6079>
<https://orcid.org/0000-0003-0410-896X>

Received: 26.11.2024 / Accepted: 27.01.2025 / Published online: 14.07.2025

Keywords:

LWR
Diet
Pomadasys stridens
İskenderun Bay
Eastern Mediterranean Sea

Abstract: A total of 513 the striped piggy, *Pomadasys stridens* were collected from İskenderun Bay, Eastern Mediterranean, by a fishing boat at depths of 18-20 m in July and August 2017. The overall sex ratio (female:male) was 1:1. The total length (weight) of females varied between 7.1 cm and 14.6 cm (4.78 g to 44.97 g), and of males between 7.5 cm and 15.5 cm (6.61 g to 59.15 g). The length-weight relationships were: $W=0.00965 \cdot L^{3.164}$ ($r=0.983$) for females, $W=0.00876 \cdot L^{3.195}$ ($r=0.986$) for males and $W=0.00834 \cdot L^{3.219}$ ($r=0.988$) for both sexes. A total of 156 *P. stridens* stomachs were analyzed and 22 taxa were identified. Copepods formed the main prey group for all length classes. Amphipoda, Polychaeta and Decapoda were found to be important prey groups for this species feeding in the area. A total of 9 different copepod species were identified with the highest percentage IRI values determined for *Calanopia elliptica* (Calanoida) and *Euterpina acutifrons* (Harpacticoida).

Anahtar kelimeler:

LWR
Besin kompozisyonu
Pomadasys stridens
İskenderun Körfezi
Doğu Akdeniz.

İskenderun Körfezi'nde (Doğu Akdeniz) *Pomadasys stridens* (Forsskal, 1775)'in Boy-Ağırlık İlişkisi ve Besin Kompozisyonu

Öz: Toplam 513 adet *Pomadasys stridens* bireyi İskenderun Körfezi (Doğu Akdeniz)'nden bir balıkçı teknesi ile Temmuz ve Ağustos 2017'de, 18-20 m derinlikten toplanmıştır. Cinsiyet oranı (dişi:erkek) 1:1 olarak hesaplanmıştır. Dişilerin toplam boyu (ağırlığı) 7,1 cm ile 14,6 cm (4,78 g ile 44,97 g), erkeklerin ise 7,5 cm ile 15,5 cm (6,61 g ile 59,15 g) arasında değişmiştir. Boy-ağırlık ilişkileri: dişiler için $W=0,00965 \cdot L^{3,164}$ ($r=0,983$), erkekler için $W=0,00876 \cdot L^{3,195}$ ($r=0,986$) ve tüm bireyler için $W=0,00834 \cdot L^{3,219}$ ($r=0,988$)'dir. Toplam 156 *P. stridens* midesi incelenmiş ve 22 takson tanımlanmıştır. Copepodlar tüm boy sınıfları için esas av grubunu oluşturmuştur. Amphipoda, Polychaeta ve Decapoda'nın bölgede beslenen tür için diğer önemli av grupları olduğu bulunmuştur. Copepoda sınıfından 9 tür tanımlanmış ve en yüksek IRI değerleri *Calanopia elliptica* (Calanoida) ve *Euterpina acutifrons* (Harpacticoida) için belirlenmiştir.

Introduction

In recent years, especially in the Mediterranean, the vast majority of studies on biodiversity are conducted on Lessepsian species. The striped piggy, *Pomadasys stridens* (Forsskal, 1775), is a lessepsian migratory fish of the family Haemulidae. They live in coastal waters and swims in schools at depths of up to 25 m on sandy bottoms. It is considered as a commercially fundamental food fish in the northern Indian Ocean especially Aqaba Gulf, Persian Gulf and the Bitter Lakes in Egypt (Karimi et al., 2014). *P. stridens*, was first recorded in 1969 by Torchio from the Genoa Bay in Italy (Golani et al., 2002). There are various records on the Aegean and Mediterranean coasts (Bilecenoğlu et al., 2009; Ergüden et al., 2015;

Vahabnezhad et al., 2015; Akyol & Ünal, 2016; Akyol & Çoker, 2018; Vahabnezhad et al., 2018; Osman et al., 2019). The aim of the present paper was to describe the length-weight relationship (LWRs) and diet composition of *P. stridens* from İskenderun Bay, a very important fishing area in the north-eastern Mediterranean, lies beside the southern Turkish metropolitan cities of Adana and Hatay. LWR of fishes is very important in fisheries research because it is essential in establishing stock composition and evaluating fish condition.

*Corresponding author: dilek.ilhan@ege.edu.tr

How to cite this article: Akalın, S., Sever, T.M., İlhan, D., Kaya, M., & Altay, B. (2025). Length-weight relationship and diet composition of *Pomadasys stridens* (Forsskal, 1775) from İskenderun Bay (Eastern Mediterranean Sea). COMU J. Mar. Sci. Fish, 8 (1): 14-22 doi:10.46384/jmsf.1591598

Material and Methods

The striped piggy specimens were captured between July to August 2017 in the İskenderun Bay (Figure 1) and

a total of 513 *P. stridens* samples were examined. Total length (± 1.0 mm) and weight (± 0.001 g wet weight) were recorded for each fish. The sex ratio was evaluated by using the chi-square test (χ^2) (Zar, 1999).

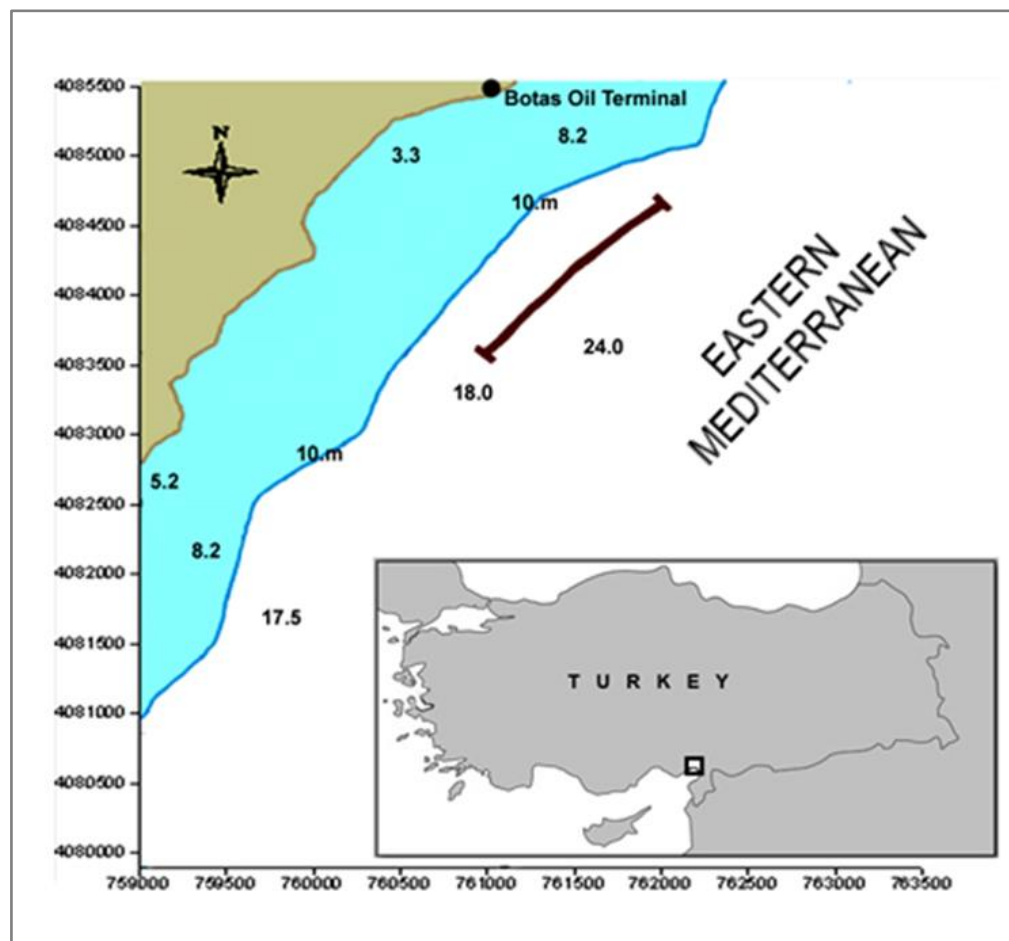


Figure 1. The sampling area of *Pomadasys stridens*

Parameters of the length-weight relationship were obtained by fitting the power function $W=a \cdot L^b$ to length and weight data where; W is the total weight (g), L is the total length (cm) and a (intercept) and b (slope) are regression constant (Sparre and Venema, 1992). The student's t -test was used to test isometric growth (Ricker, 1973).

The fish stomachs were removed immediately following capture and were stored in 4% buffered formalin solution until the contents were analysed. For analysing food composition of length groups, the samples were divided into 5 length groups as; below 8 cm, between 8.1-10.0 cm, between 10.1-12.0 cm, between 12.1-14.0 and bigger than 14.1 cm. The contents of each stomach were placed on a petri dish and identified to the possible lowest taxonomic class using a binocular microscope. All food items were counted and weighed wet to the nearest ± 0.0001 g after removing excess liquid. Completely digested food remains were also recorded as unidentified.

Three widely-used measures were utilized to quantify stomach contents and also to reveal the relative importance of various food items in the diet: percentage frequency (%FO), percentage composition by number (%N), and percentage composition by weight (%W). (Bowen, 1996; Tirasin, and Jørgensen, 1999). Additionally, the index of relative importance (IRI) was estimated for each food item (Pinkas et al., 1971).

In order to determine the preference categories of the prey groups IRI (Index of Relative Importance) values suggested by Morato-Gomes (1995) was used. IRI values were reported as percentage as an estimate of relative importance of each prey type in the diet of examined fish and to make comparisons between other studies (Cortés, 1997 and 1998). Main important prey (MIP) was considered when $IRI \geq 30 \times (0.15 \times \Sigma \%F)$, secondary important prey (SP) was considered when $30 \times (0.15 \times \Sigma \%F) > IRI > 10 \times (0.05 \times \Sigma \%F)$ and occasional prey (OP) was considered when $IRI \leq 10 \times (0.05 \times \Sigma \%F)$.

Percentage Frequency of Occurrence	=>	$\%F_i = \frac{\sum_{j=1}^i M_{ij}}{N} \times 100$
Percentage Composition by Number	=>	$\%N_i = \frac{\sum_{j=1}^{n_j} N_{ij}}{\sum_{i=1}^{n_i} \sum_{j=1}^{n_j} N_{ij}} \times 100$
Percentage Composition by Weight	=>	$\%W_i = \frac{\sum_{j=1}^{n_j} W_{ij}}{\sum_{i=1}^{n_i} \sum_{j=1}^{n_j} W_{ij}} \times 100$
Index of Relative Importance	=>	$IRI_i = \%F_i \times (\%W_i + \%N_i)$
Percentage IRI	=>	$\%IRI_i = \frac{IRI_i}{\sum_{i=1}^n IRI_i} \times 100$

Results

Of the 513 individuals of *P. stridens*, 182 (35.48%) were males, 181 (35.28%) females, and 150 (29.24%) were immature fishes. The female:male ratio was 1:1 and the chi-square analysis indicated that there was no statistically significant differences among sexes (χ^2 , $p < 0.05$). The total length (weight) of females ranged between 7.1 - 14.6 cm (4.78 g - 44.97 g), and males

between 7.5 - 15.5 cm (6.61 g - 59.15 g). The majority of fish belonged to length group of 7.0 cm, accounting for 47% of all samples (Fig 2).

According to Student's t-test, positive allometric growth ($P > 0.05$) was observed for females, males and combined sexes in the research area (Table 1).

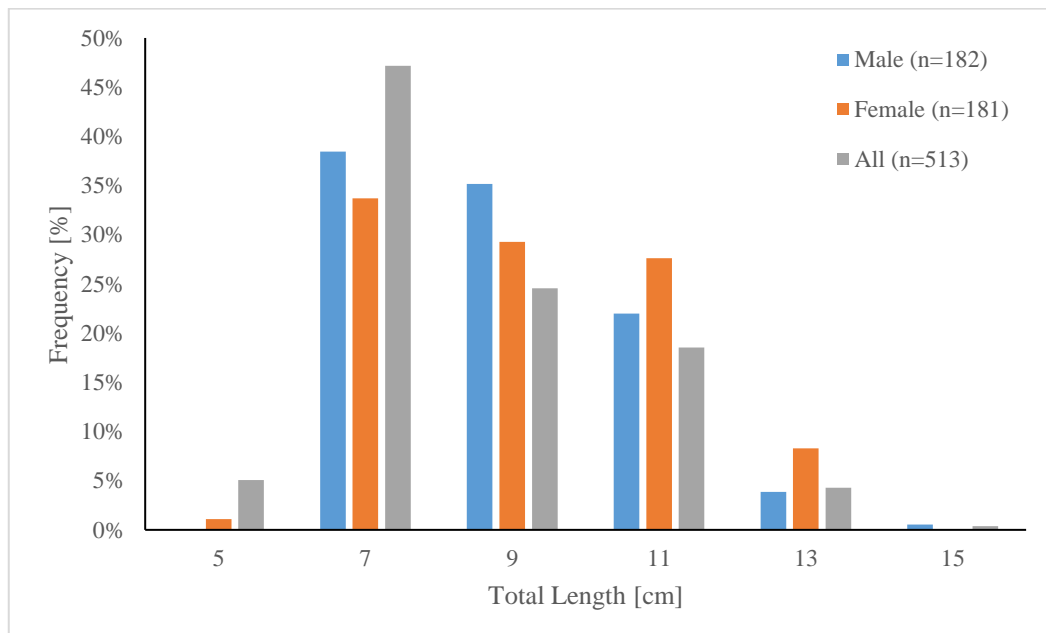


Figure 2. Length frequency distribution of *Pomadasys stridens* from Iskenderun Bay, Eastern Mediterranean Sea

Table 1. Parameters of length–weight relation of *Pomadasys stridens* from İskenderun Bay, Eastern Mediterranean Sea

Sex	n	TL (cm)	TW (g)	a	b	SE(b)	R	t-test	Growth Type
♀	181	7.1-14.6	4.78-44.97	0.00965	3.164	0.0433	0.983	3.287 ^a	A+
♂	182	7.5-15.6	4.74-52.21	0.00876	3.195	0.0418	0.986	4.665	A+
♀ + ♂	513	5.5-15.6	1.98-58.23	0.00834	3.219	0.0241	0.988	9.087	A+

n, number of specimens studied; TL, total length; TW, total weight; a, intercept; b, slope; SE(b), standard error of the slope; R, coefficient of determination, GT, growth type; A+, positive allometric; a, t-test, $t < 0.05$, $n > 200 = 1.65$

In the present study, 1 of 156 stomachs analyzed; 14 were empty and 142 contained prey items. The total number of the prey items recovered were 8157 representing 22 taxa. It was determined that the specimens in all length groups had dominantly full stomachs.

Copepods were identified as the major prey item for all length groups. In addition, Amphipoda were found to be another essential prey item for the length group of 12.1 – 14.0 cm. It was determined that Polychaeta and Decapoda

larvae were also important prey items for this species feeding in the area (Table 2).

Our findings indicated that, striped piggy in İskenderun Bay feeds mainly on copepods, followed by decapod crustacean larvae and amphipods. IRI% values was calculated as 92.39% for Copepods, 1.9 % Amphipoda, 2.98 % Decapod crustacean larvae and 2.73 % all other preys.

Table 2. Length groups and total main prey taxa IRI % for *Pomadasys stridens* in İskenderun Bay, Eastern Mediterranean Sea

Prey group	Length Groups					Total (n=142)
	<8.0 cm (n=21)	8.1-10.0 cm (n=21)	10.1-12.0 cm (n=39)	12.1-14.0 cm (n=34)	>14.1 cm (n=27)	
Copepoda	96.40	98.13	93.47	36.10	40.77	92.39
Gastropoda	0.42	0.18	0.33	0.07	0.10	0.27
Ostracoda	0.49	0.41	0.34	0.29	0.66	0.40
Bivalvia	0.01	0.00	0.01	0.00	0.00	0.01
Cirriped nauplius	0.00	0.00	0.01	0.00	0.00	0.01
Mysidacea	0.00	0.00	0.01	0.81	2.57	0.05
Amphipoda	0.03	0.04	2.20	44.49	6.71	1.90
Decapoda larvae	2.52	1.11	1.70	3.44	11.69	2.98
Penaidae	0.00	0.00	0.02	0.00	0.00	0.01
Polychaeta	0.11	0.03	1.79	14.55	36.42	1.89
Chaetognatha	0.00	0.00	0.01	0.00	0.00	0.01
<i>Salpa</i> spp.	0.00	0.00	0.01	0.00	0.00	0.01
Fish	0.00	0.08	0.04	0.26	0.74	0.04

Table 3. Length groups and total main prey copepod species IRI % for *Pomadasys stridens* in İskenderun Bay, Eastern Mediterranean Sea

	Length groups					Total
	<8.0	8.1-10.0 cm	10.1-12.0 cm	12.1-14.0 cm	>14.1 cm	
Calanoida	2.65	0.03	0.57	0.44	0.45	0.90
<i>Calocalanus pavo</i>	0.01	0.01	0.00	0.00	0.00	0.01
<i>Calocalanus</i> sp.	0.00	0.00	0.01	0.00	0.00	0.01
<i>Calanopia elliptica</i>	22.85	34.33	46.67	11.90	15.52	31.70
<i>Candacia simplex</i>	0.68	0.00	0.00	0.00	0.00	0.08
<i>Candacia</i> sp.	0.01	0.00	0.00	0.00	0.00	0.01
<i>Corycaeus</i> sp.	0.00	0.00	0.00	0.00	0.12	0.01
<i>Oncaea media</i>	0.00	0.01	0.00	0.00	0.00	0.01
<i>Oncaea</i> sp.	0.01	0.00	0.02	0.00	0.00	0.01
Harpacticoida	43.82	51.48	43.88	20.85	20.89	49.09
<i>Euterpina acutifrons</i>	25.35	11.78	1.65	1.17	0.13	8.90
Other Groups	4.61	2.35	7.20	65.64	62.89	9.25

Nine different copepod species were identified (Table 3). Highest IRI values were determined for *Calanopia elliptica* (Calanoida) and *Euterpina acutifrons* (Harpacticoida). *C. elliptica* is an invasive species for the Mediterranean and it is a pelagic species. It is distributed in neritic and epimesopelagic (Razouls et al., 2005-2023).

Its distribution in the İskenderun Bay was also reported by zooplanktonic studies (Dönmez, 1998). All the copepod species determined in the present study are characteristic for the depths where *P. stridens* live (Weikert and Trinkaus, 1990; Sever, 1997; Dönmez, 1998).

Table 4. Preferred prey items of *Pomadasys stridens*, according to Morato Index, in İskenderun Bay, Eastern Mediterranean Sea

	Length groups					Total
	< 8.0 cm	8.0 - 10.0 cm	10.1 - 12.0 cm	12.1 - 14.0 cm	14.1 cm >	
	IRI ≥ 1307.16	IRI ≥ 964.30	IRI ≥ 1384.60	IRI ≥ 1098.54	IRI ≥ 983.34	IRI ≥ 1159.87
(MIP)	Copepoda	Copepoda	Copepoda	Copepoda	Copepoda	Copepoda
				Polychaeta	Polychaeta	
				Amphipoda		
	IRI > 145.24	IRI > 107.14	IRI > 153.84	IRI > 122.06	IRI > 109.26	IRI > 128.87
(SP)	Decapoda larvae	Decapoda larvae	Polychaeta	Decapoda larvae	Decapoda larvae	Decapoda larvae
			Decapoda larvae		Amphipoda	Polychaeta
					Mysidacea	
	IRI ≤ 145.24	IRI ≤ 107.14	IRI ≤ 153.84	IRI ≤ 122.06	IRI ≤ 109.26	IRI ≤ 128.87
(OP)	Ostracoda	Ostracoda	Amphipoda	Mysidacea	Fish	Amphipoda
	Gastropoda	Gastropoda	Ostracoda	Ostracoda	Ostracoda	Ostracoda
	Polychaeta	Amphipoda	Gastropoda	Fish	Plants	Gastropoda
	Amphipoda	Polychaeta	Other groups	Gastropoda	Gastropoda	Other groups
	Bivalvia larvae	Other groups				

MIS=Morato Index score; MIP=main important prey, SP=secondary prey, OP=occasional prey

According to the Morato Index, copepods were the main prey group for all length groups analyzed. In some length groups (IV-V) Polychaeta and Amphipoda were also observed as the primary prey category. Secondary prey items were Decapod larvae and Polychaeta and the all other prey types were considered as occasional preys like Ostracoda, Gastropoda, and Amphipoda, etc. (Table 4).

Discussion

Lessepsian migrants currently constitute 16.3% of Turkish marine fish fauna, and the invasion of the

Mediterranean appears to persist unabated. (Bilecenoğlu, 2024). The correlation between native and invasive fish is crucial for the protection and sustainability of fish stocks. Therefore, these new species' biological characteristics and hosts should be revealed. *P. stridens* is a widespread fish species on the Turkish Eastern Mediterranean coast and has relatively higher abundance and biomass in commercial fish catches, especially those below 50 m (pers. obs. of the first author and communication with the fishermen). The abundance of this exotic species may have negative effects on the native demersal fish species due to competition for food.

Table 5. The number of specimens, female:male ratio and total length range values *Pomadasys stridens* obtained by different authors from different area

Research Area	N	F:M	TL	Author
Arabian Gulf	216	1:0.70	14.0-19.0	Ahmad & Al-Ghais (1997)
Yumurtalık shores, Adana, Eastern Mediterranean	6	-	13.3-15.8	Bilecenoğlu et al. (2009)
Northwest of Persian Gulf, Iran	396	1:0.4	11.1-23.5	Hashemi & Taghavimotlagh (2012)
Karachi Coast, Pakistan	391	1:0.66	5.6-21.0	Safi et al. (2014)
Karachi, Pakistan	192	-	13.8-20.8	Ahmed et al. (2015)
İskenderun Bay, Eastern Mediterranean	335	-	7.6-17.7	Ergüden et al. (2015)
Khuzestan Coastal Waters (Northwest Persian Gulf)	218	-	7.5-24.0	Hoveizavi et al. (2016)
Persian Gulf and Oman Sea	2	-	18.8-19.0	Jawad et al. (2017)
İskenderun Bay, Eastern Mediterranean	1064	1:0.71	9.8-18.3	Özbek (2017)
Bitter Lakes, Egypt	-	-	7.0-19.9	El-Azim et al. (2017)
İskenderun Bay, Eastern Mediterranean	659	1:1.26	5.0-18.3	Uyan et al. (2018)
Persian Gulf, Iran	276	1:0.4	8.0-20.5	Vahabnezhad et al. (2018)
Marmaris coast, Southern Aegean Sea	4	-	13.6-14.0	Akyol & Çoker (2018)
Gulf of Suez	409	-	6.6-19.0	Osman et al. (2019)
Northern Part of Persian Gulf (Bushehr)	591	1:3.30	11.7-23.0	Karimi et al. (2019)
Gulf of Suez, Red Sea, Egypt	165	-	8.2-16.3	Basuonie et al. (2020)
İskenderun Gulf, North-eastern Mediterranean	1131	1:0.94	7.3-18.9	Avşar et al. (2021)
Mersin Bay, North-eastern Mediterranean	565	1:0.87	5.3-17.6	Tüzün & Gücü (2023)
Syrian coast, Eastern Mediterranean	647	-	7.3-18.9	Nader et al. (2024)
İskenderun Bay, Eastern Mediterranean	363	1:1	7.1-15.5	Present study

For the Mediterranean Sea, *P. stridens* was first recorded in the Gulf of Genoa, Italy by Torchio in 1969 (Golani et al., 2002). After that, it was reported by BenTuvia (1976) from Bardawil Lagoon, Egypt. In recent

studies, the reported number of specimens of this species, female:male ratio and total length range values are given in Table 5. In both the species' native distribution areas and in the Mediterranean, females seem to have higher

abundance than males. But in some studies, the ratio favored males (Uyan et al., 2018; Karimi et al., 2019). Our findings were 1:1 for the İskenderun Bay, which is almost similar to 1:0.94 reported by Avşar et al., (2021) from the same area. Differences in the sex allocation of *P. stridens* are not clearly explained. They could be coincidental because the size distribution of the male and female specimens overlapped in many studies, reflecting similar growth rates.

Our findings suggest that the striped piggy showed a positive allometric growth in İskenderun Bay. Osman et al. (2019), Ergüden et al. (2015) and Avşar et al. (2021) also reported that this species showed a positive allometric growth in Gulf of Suez and İskenderun Bay. On the other hand, Hashemi and Taghavimotlagh (2012) and El-Azim et al. (2017), stated that isometric growth was observed in the northwest Persian Gulf (Iran) and Bitter lakes (Egypt), respectively. Özbek (2017) noted that females of this species exhibited negative allometric growth, while males and all individuals exhibited isometric growth in İskenderun Bay (Eastern Mediterranean). Differences in b obtained from other locations relate substantially on the form and condition of the species. Additionally, several factors may cause variations in equations of the LWR among seasons and years, such as salinity, temperature, sex, gonadal development (Pauly, 1984; Sparre & Venema, 1992).

Our findings revealed that *P. stridens* feeds on mainly crustaceans (Copepoda, Decapoda, Amphipoda and Mysidacea) and Polychaeta in the İskenderun Bay. Safi et al. (2013) reported that the species feeding on crustaceans, molluscs, teleosts and polychaeta in Pakistan waters of Oman Sea. In addition, they also predicted that the species is an active predator and its feeding habits were related with the abundance and variety of the prey groups and the environmental factors. Vahabnezhad et al. (2015) indicated that the first preferred food items for the species is crustaceans (Decapoda, Copepoda, Amphipoda, Cumacea and Ostracoda) and molluscs (Gastropoda, Bivalvia). The second preferred prey type was Nematoda and the occasional prey was Echinodermata. El-Azim et al. (2017) stated that *P. strident* is a carnivorous species, fed majorly on crustaceans (62.12%), molluscs (20.31%) small fishes (11.31%), polychaetes (1.26%) in the Bitter lakes, Egypt. Tüzün and Gücü (2023) reported that the species primarily feed on crustaceans (mainly copepods), and additionally on annelids (polychaetes and oligochaetes) in Mersin Bay, Northeastern Mediterranean Sea.

The differences in prey selectivity of this species between different studies could be due to the different composition of the prey items in the areas and discrepancies in length groups of the fishes (Biswas, 1993).

Studies on the feeding of *P. stridens* are lacking both in the Turkish coasts of the Mediterranean Sea and other areas where the species is native or invasive. This study is important as it presents the diet of *P. stridens* for the first time in İskenderun Bay, Eastern Mediterranean. More

research is needed to shed light on the reproduction biology and population structure of this species in the area to manage the commercial species at a sustainable level.

Conflict of Interest

The authors affirm that they do not have any conflicts of interest.

Author Contributions

Akalin S.: Conceived, designed and performed analysis, wrote the paper. Sever T. and İlhan D.: Worked laboratory, performs analysis, and wrote the paper. Kaya M.: Collected specimens and wrote the paper. Altay B.: performed analysis, and wrote the paper.

Ethics Approval

No ethics committee approval is required for this study.

References

- Ahmad, S., & Al-Ghais, S.M. (1997). Relation Between Age and Heavy Metal Content in the Otoliths of *Pomadasys stridens* Forskål 1775 Collected from the Arabian Gulf. *Arch. Environ. Contam. Toxicol.*, 32, 304-308.
- Ahmed, Q., Khan D., & Yousuf, F. (2015). Interrelations of Fresh Body Weight and Total Body Length and Condition Factor in Adult *Pomadasys stridens* (Forsskal, 1775) (Family Pomadasyidae) From Karachi, Pakistan. *Fuust J. Biol.*, 5(1), 161-168.
- Akyol, O., & Ünal, V. (2016). First record of a Lessepsian migrant, *Pomadasys stridens* (Actinopterygii: Perciformes: Haemulidae), from the Aegean Sea, Turkey. *Acta Ichthyol. Piscat.*, 46 (1): 53–55. DOI: 10.3750/AIP2016.46.1.08
- Akyol, O., & Çoker, T. (2018). On the Presence of the Lessepsian *Pomadasys stridens* (Haemulidae) in the Aegean Sea (Marmaris Bay, Turkey). *Turkish Journal of Maritime and Marine Sciences*, 4 (2), 163-166. <https://dergipark.org.tr/tr/pub/trjmms/issue/40277/485579>
- Avşar, D., Mavruk, S., Yeldan, H., & Manaşırli, M. (2021). Population dynamics of an emergent invasive fish, striped piggy, *Pomadasys stridens* (Actinopterygii, Perciformes, Haemulidae) in the Gulf of İskenderun, north-eastern Mediterranean. *Acta Ichthyologica et Piscatoria*, 51(1): 13–21. <https://doi.org/10.3897/aiep.51.63320>
- Basuonie, A.A.A., Sabrah, M.M., El-Sherbeny, A.S.H., & El-Sabbagh, M.S.A. (2020). Analysis of morphometric and meristic characteristics of *Pomadasys stridens* (Forsskal, 1775), Family: Haemulidae from the Gulf of Suez, Red Sea, Egypt. *Egyptian Journal of Aquatic Biology & Fisheries*, Vol. 24(6): 281 – 294.
- Ben-Tuvia, A. (1976). Occurrence of Red Sea fishes *Herklotsichthys punctatus*, *Autisthes puta* and

- Rhonciscus stridens* in the eastern Mediterranean. *Israel Journal of Zoology*, 25, 212-213.
- Bilecenoglu, M., Kaya, M., & Eryigit, A. (2009). New data on the occurrence of two alien fishes, *Pisodonophis semicinctus* and *Pomadasys stridens*, from the Eastern Mediterranean Sea. *Mediterranean Marine Science*, 10 (2): 151–155. DOI: 10.12681/mms.117
- Bilecenoglu, M. (2024). Diversity of fishes along the coasts of Türkiye. *Turk. J. Zool.* 48:589-616. doi:10.55730/1300-0179.3197
- Biswas, S.P. (1993). *Manual of methods in fish biology*. South Asian Publishers, New Delhi.
- Bowen, S.H. (1996). Quantitative description of the diet. In: Murphy B.R., Willis D.W. (Eds.) *Fisheries techniques*, 2nd ed. American Fisheries Society, Bethesda, Maryland, 513-532.
- Cortés, E. (1998). Methods of studying fish feeding: reply. *Canadian Journal of Fisheries and Aquatic Sciences*, 55(12): 2709, <https://doi.org/10.1139/f98-202>
- Dönmez, A. (1998). Vertical Distribution and Seasonal Change of Zooplanktonic Organisms of the Copepoda and Cladocera (Crustacea) Groups in the Coastal Area Between Botaş (Yumurtalık) and Arsuz (İskenderun) of the Gulf of Iskenderun. Master's Thesis, Çukurova University, 62 p.
- El-Azim, H.A., Mehanna, S.F., & Belal, A.A. (2017). Impacts of water quality, fishing mortality and food availability on the Striped piggy *Pomadasys stridens* production in Bitter Lakes, Egypt. *Annals of Marine Science*, 1(1): 19-27.
- Erguden, D., Erguden, S.A., & Gurlek, M. (2015). Length–weight relationships for six fish species in İskenderun Bay (eastern Mediterranean Sea coast of Turkey). *Journal of Applied Ichthyology*, 31 (6): 1148–1149. DOI: 10.1111/jai.12839
- Golani, D., Orsi-Relini, L., Massuti, E., & Quignard, J.P. (2002). CIESM Atlas of exotic species in the Mediterranean. Vol. 1. Fishes. CIESM Publications, Monaco.
- Hashemi, S.A., & Taghavimotlagh, S.A. (2012). Population Parameters and Length-Weight relationship of striped piggy (*Pomadasys stridens*) in northwest of Persian Gulf (Khuzestan Coastal Waters, Iran). *Journal of Novel Applied Sciences*, 1: 57-62. Link: <https://goo.gl/440Nid>
- Hoveizavi, S., Doustshenas, B., Eskandari, G., Savari, A., Mohammadasgari, H., & Jamali, H. (2016). Length-Weight Relationships for Eight Species of By-Catch and Discard Fishes in the Fishing Grounds of Khuzestan Coastal Waters (Northwest Persian Gulf). *Advances in BioResearch*, 7(3), 71-72. DOI: 10.15515/abr.0976-4585.7.3.7172.
- Jawad, L.A., Jahromi, F.L.K., Teimori, A., Mehraban, H., & Esmaeili, H.R. (2017). Comparative morphology of the urohyal bone of fishes collected from the Persian Gulf and Oman Sea. *Journal of the Marine Biological Association of the United Kingdom*, 97(6): 1311-1333. Doi: 10.1017/S0025315416000680.
- Karimi, S., Katiraei, E., Soofiani, N.M., Taghavimotlagh, S.A., & Vazirizadeh, A. (2019). Feeding habits of striped piggy, *Pomadasys stridens* (Forsskal, 1775) (Haemulidae) in northern part of the Persian Gulf. *Int. J. Aquat. Biol.*, 7(2): 85-92.
- Karimi, S., Mahbobi Soofiani, N., Paykanheirati, F., & Katiraei, E. (2014). Reproductive Biology of Stripped Piggy (*Pomadasys stridens* Forsskal, 1775) in Northern Part of Persian Gulf (Bushehr). *JAIR*, 2014; 2 (3) :87-100.
- Morato-Gomes, T. (1995). Ecologia alimentar de *Serranus atricauda* (Günther, 1874) dos Açores. “Licenciatura” Thesis, Universidade do Algarve, Faro, Portugal.
- Nader, I.H., Nour A.B., Hamam, A., & Jullanar, S. (2024). Assessment of Population Growth and Fishing Vulnerability of *Pomadasys stridens* along the Syrian Coast (Eastern Mediterranean Sea) International Journal of Oceanography & Aquaculture, 8(3), 000333.
- Osman, H.M., Saber, M.A., & El Ganainy, A.A. (2019). Population structure of the striped piggy *Pomadasys stridens* in the Gulf of Suez. *Egyptian Journal of Aquatic Research*, 45:53-58. <https://doi.org/10.1016/j.ejar.2019.02.002>
- Özbek, B.F. (2017). Some Bio-Ecological Aspects of *Pomadasys stridens* (Forsskal, 1775) in İskenderun Bay. İskenderun Technical University, Institute of Engineering and Science. Master's Thesis, 48p.
- Pauly, D. (1984). *Fish Population Dynamics in Tropical Waters: A Manual for Use with Programmable Calculators*. International Center for Living Aquatic Resources Management, Studies and Reviews 8, Manila, 325 p.
- Pinkas, L., Oliphant, M.S., & Iverson, I.L.K. (1971). Food habits of albacore, bluefin tuna and bonito in Californian waters. *Calif. Dept. Fish Game Fish. Bull.*, 152, 1–105.
- Razouls, C., Desreumaux, N., Kouwenberg, J., & de Bovée, F. (2005-2023). - *Biodiversity of Marine Planktonic Copepods (morphology, geographical distribution and biological data)*. Sorbonne University, CNRS. Available at <http://copepodes.obs-banyuls.fr/en> [Accessed June 02, 2023]
- Ricker, W.E. (1973). Linear regressions in fishery research. *Journal of the Fisheries Research Board of Canada*, 30(3), 409–434. <https://doi.org/10.1139/f73-072>
- Safi, A., Khan, M.A., Khan, M.Z., & Hashmi, M.U.A. (2013). Observations on the Food and Feeding Habits of Striped piggy, *Pomadasys stridens* (Forsskal, 1775) (Family; Pomadasyidae) from Karachi Coast, Pakistan.

- International Journal of Fauna and Biological Studies*, 1(1): 7-14.
- Safi, A., Khan, M.A., & Khan, M.Z. (2014). Study of some morphometric and meristic characters of striped piggy fish, *Pomadasys stridens* (Forsskal, 1775) from Karachi Coast, Pakistan. *The Journal of Zoology Studies*, 1(4): 01-06.
- Sever, T.M. (1997). Establishment of pelagic copepods and quantative and qualitative distributions of important copepod species in Aegean Sea of Turkey (in Turkish). PhD Thesis, University of Dokuz Eylül, 133 p.
- Sparre, P., & Venema, S.C. (1992). *Introduction to tropical fish stock assessment. Part 1. Manual*. FAO Fisheries Technical Paper, No. 306/1, Rev.1, FAO, Rome.
- Tirasin, E.M., & Jørgensen, T. (1999). An Evaluation of the Precision of Diet Description. *Marine Ecology Progress Series*, 182: 243-252.
- Tüzün, S., & Gücü, A.C. (2023). Diet variations of Striped Piggy, *Pomadasys stridens* (Forsskal, 1775) (Teleostei: Haemulidae) in the northeastern Mediterranean Sea. *Regional Studies in Marine Science*, 66(6), 103129. <https://doi.org/10.1016/j.rsma.2023.103129>
- Uyan, A., Reyhaniye, A.N., & Turan, C. (2018). Reproductive biology and age-growth parameters of striped Piggy *Pomadasys stridens* (Forsskal, 1775) in the Iskenderun Bay. In: *3rd International Congress on Applied Ichthyology & Aquatic Environment (HydroMedit)*. Greece, pp. 290–294.
- Vahabnezhad, A., Kaymaram, F., Taghavi Motlagh, S.A.A., Valinasab, T., & Fatemi, S.M.R. (2015). Feeding Habits of Striped Piggy (*Pomadasys stridens*) in the Persian Gulf (Bushehr Area Waters). *Journal of Aquaculture Development*, 9 (3): 71-82.
- Vahabnezhad, A., Mirzaei, M.R., & Karimi, S. (2018). Reproductive Biology of *Pomadasys stridens* (Forsskal, 1775) in the Northern Coasts of the Persian Gulf, Iran. *Turkish Journal of Fisheries and Aquatic Sciences*, 18:1363-1370. DOI: 10.4194/1303-2712-v18_12_04.
- Weikert, H., & Trinkaus, S. (1990). Vertical mesozooplankton abundance and distribution in the deep Eastern Mediterranean Sea SE of Crete. *Journal of Plankton Research*, 12: 601-628.
- Zar, J.H. (1999). *Biostatistical analysis*. 4th ed. Upper Saddle River, NJ, USA: Prentice Hall, 662.