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Morphology, sex ratio, and diet of *Bothus podas* (Delaroche, 1809) in Heraklion Bay, Crete (Greece)

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Abstract: The aim of the present study is to provide morphometric relationships for the Mediterranean wide-eyed flounder *Bothus podas* (Delaroche, 1809), to identify possible sexual dimorphism, and to determine the feeding habits and the functional role of the species in the ecosystem. Sampling was carried out during a trawl survey off the coast of northern Crete in early May of 2015. A total of 425 specimens were examined (175 males and 250 females; total length (TL) range: 6.2–13.5 cm and 6.0–15.1 cm, respectively). The relationships between TL and weight, interorbital space (IO), body height (BH), and mouth dimensions (horizontal mouth opening: HMO, vertical: VMO mouth opening, and mouth area: MA) were all significant ($P < 0.05$) and of power types. The estimated value of the exponent b of the length–weight relationship (LWR) for sexes combined was 2.923. Sexual dimorphism was exhibited for the relationships between TL and IO, BH, VMO, HMO, and MA, whereas this was not true for the LWR. The diet spectrum of *B. podas* includes mainly benthic invertebrates and to a lesser extent small benthic fishes. On one occasion, an individual larva of *Fistularia commersonii* was recorded in the stomach contents of a male, and this is the first report of any predator of this Lessepsian invader in the Mediterranean.

Key words: *Bothus podas*, morphometric relations, diet, sexual dimorphism, Mediterranean

1. Introduction

The Mediterranean wide-eyed flounder *Bothus podas* (Delaroche, 1809) is a small bothiid species usually living on shallow soft and mixed sediments on the continental shelf to a depth of about 400 m (Nash et al., 1991). In terms of fisheries, it is in general a species of low commercial value (e.g., Tuya et al., 2014), but in some areas of its distribution (e.g., Atlantic Sea: Díaz de Astarloa, 2002), it attains larger sizes with significant commercial value.

A number of single-species studies exist for wide-eyed flounder, mainly dealing with growth (Nash et al., 1991; Schintu et al., 1994), reproduction (Morato, 2007; Abid et al., 2010), diel variability (Nash et al., 1994), diet composition (Nash et al., 1991; Bell and Harmelin-Vivien, 1983; Schintu et al., 1994; Darnaude et al., 2001; Esposito et al., 2010; Karachle and Stergiou, 2011a; Abid et al., 2013), migration routes (Evseenko, 2008), and gear selectivity (Esposito et al., 2010). However, those studies refer to areas of the central-western Mediterranean. In eastern Mediterranean waters, the only studies on the biology of the species are those of Karachle and Stergiou (2011a, 2011b) on its feeding habits in the northern Aegean Sea, and several other reports on its length–weight relationship parameters in multispecies reports.

The aim of the present study is to provide information on the wide-eyed flounder concerning: (a) the relationship between total length and certain morphologic parameters (i.e. standard length, interorbital space, body height, and mouth area); (b) the length–weight relationship parameters; (c) possible sexual dimorphism in the above mentioned morphological characteristics; and (d) the feeding habits and the functional role (trophic level position) of the species in the ecosystem. Such estimates derived from a noncommercially important species (bycatch), such as the one of the present study, remain important and could be incorporated into multispecies ecosystem modeling for the implementation of an ecosystem-based approach to management.

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2. Materials and methods

2.1. Samplings

Sampling was carried out in early May (5 May 2015) off the coast of northern Crete in Heraklion Bay (starting point of the haul: 35°20.830′N, 25°12.716′E; ending point of the haul: 35°20.890′N, 25°14.910′E) at depths of approximately 30 m. The type of trawl used was a slightly smaller version of the typical Greek otter trawl for mixed-bottom fisheries with trawl horizontal opening of 17 m and 40-mm mesh diamond cod-end. Trawl duration was 45 min on the bottom. The seabed was characterized by sandy substrates with some *Caulerpa* spp., brown algae, and *Codium* spp. Trawl catch composition was mostly represented by sparids, red mullets, gurnards, small flatfish, seahorses, cephalopods, decapods, and echinoids. For the purpose of the study, a total of 425 individuals of wide-eyed flounder were subsampled and stored in a freezer for further analyses.

2.2. Morphometry

In the laboratory, total length (TL) and standard length (SL) were measured to the nearest millimeter and total weight (W) was weighed to the nearest gram. The sex of each individual was also recorded. A digital caliper (precision: 0.001 cm) was used to measure the interorbital space (IO; the area on top of the head between the eyes), body height (BH; the vertical maximum distance from the dorsal margin of the body to the ventral margin of the body measured at the base of the pectoral fin where it attaches to the body) (http://www.fishbase.org), and the mouth dimensions (i.e. horizontal [HMO] and vertical mouth opening [VMO]). Using the HMO and VMO values, mouth area (MA) was estimated, assuming its shape to be that of an ellipse (Erzini et al., 1997):

$$MA = \pi \left(\frac{HMO}{2}\right)\left(\frac{VMO}{2}\right).$$

The relationships of IO, BH, HMO, VMO, and MA with TL were then established using the power model $Y = aTL^b$, where a is the coefficient of shape and b is the power fulfilling the dimensional balance (Lleonart et al., 2000). The power model was used as it is conceptually simple and its parameters easy to estimate (Katsanevakis et al., 2007).

Length–weight relationships (LWRs) were established using the power type equation $W = aTL^b$ for the sexes separately and combined. When b-values equal 3, the growth of fish is considered isometric, while in cases where the estimated b-values are lower or higher than 3, the growth is considered negative or positive allometric (Lleonart et al., 2000; Froese, 2006).

Comparisons of means were performed using the Student t-test and one-way analysis of variance (ANOVA) depending on the parameters analyzed, whereas the post hoc Student–Newman–Keuls test (SNK) was used in significant cases (Zar, 1999). The Kolmogorov–Smirnov test (K-S) was also used to compare the length frequency distributions within the sexes to detect statistical differences (Siegel and Castellan, 1988). Finally, comparisons of the slopes of the equations were performed using analysis of covariance (Zar, 1999).

2.3. Diet

For the description of diet, the stomach contents of each individual were examined. The sample included all individuals, as there were no signs of regurgitation. The vacuity coefficient (VC; the percentage of empty stomachs) was estimated. Stomach contents were emptied and identified to the lowest possible taxonomic level.

In the frame of this work, the gravimetric method was used. This method was chosen because it is a quantitative measure of the diet and is considered to provide more accurate trophic level estimates (e.g., Pauly et al., 2000; Stergiou and Karpouzi, 2002; Karachle and Stergiou, 2017). Hence, each prey category was weighed to the nearest 0.001 g and the weight of each taxonomic group was expressed as a percentage of the total stomach content mass (*%Wf*; Hyslop, 1980). Moreover, in order to identify the importance of each prey item in the diet of the species and its feeding strategy (i.e. generalized preference or specialization), a Costello graph (Costello, 1990) was constructed. For that purpose, the frequency of occurrence of each prey (FO = 100 × [number of stomachs where prey item i was observed]/[number of stomachs containing food]) was also estimated.

Based on the *%Wf* values, the fractional trophic level (TROPH) values were estimated for each sex separately and combined, using TrophLab, based on the following equation (Pauly et al., 2000):

$$TROPH = 1 + \sum_{j=1}^{G} DC_j \times TROPH_j,$$

where DC_j is the weight contribution of prey item j in the diet, $TROPH_j$ is the trophic level of prey item j, and G is the number of prey species included in stomach contents.

Finally, a literature review on the feeding habits of wide-eyed flounder in other areas of its distribution and TROPH values were estimated, based on the reported diet composition, using TrophLab (Pauly et al., 2000).

3. Results

3.1. Morphometry

Overall, 425 specimens were studied (175 males and 250 females; TL ranges: 6.2–13.5 cm and 6.0–15.1 cm) from Heraklion Bay. The mean TL of the specimens studied was 10.0 cm (standard deviation [SD] = 1.5), whereas the mean total weight was 11.2 g (SD = 4.9) (Table 1). Total length

Table 1. Descriptive and statistical analysis of the studied morphometric parameters studied (i.e. total length: TL, cm; interorbital space: IO, cm; body height: BH, cm; horizontal mouth opening: HMO, cm; vertical mouth opening: VMO, cm; mouth area: MA, cm^2) from the specimens of *Bothus podas* caught in Heraklion Bay in April 2015. F-ratio indicates the Student–Newman–Keuls test (SNK) in the case of significant (ANOVA; P < 0.05) comparisons (*).

Parameters	Mean	Range	SD	F-Ratio	Parameters	Mean	Range	SD	F-ratio
TL					HMO				
Female	9.38	6.0–15.1	1.277	168.28*	Female	0.329	0.191–0.535	0.050	165.34*
Male	10.96	6.2–13.5	1.173		Male	0.397	0.185–0.539	0.058	
Total	10.03	6.0–15.1	1.460		Total	0.357	0.185–0.539	0.063	
IO					VMO				
Female	0.162	0.029–0.410	0.045	986.94*	Female	0.130	0.056–0.262	0.034	134.35*
Male	0.428	0.122–0.658	0.123		Male	0.172	0.086–0.270	0.039	
Total	0.272	0.029–0.658	0.157		Total	0.147	0.056–0.270	0.041	
BH					MA				
Female	1.674	1.159–2.617	0.205	203.31*	Female	0.034	0.009–0.110	0.013	178.79*
Male	1.967	1.320–2.533	0.123		Male	0.055	0.016–0.109	0.018	
Total	1.795	1.159–2.617	0.253		Total	0.043	0.009–0.110	0.018	

frequency distribution peaked once depending on sex, for males at 11 cm (41.7%) and for females at 9 cm (29.2%), whereas no significant difference (K-S, P < 0.05) was found for the length frequency distributions between the sexes. Sex comparison of the mean TL (Table 1) showed that males (TL = 14.2 cm) were significantly larger (one-way ANOVA; F = 168.3, P < 0.05) than females (TL = 9.4 cm). Likewise, for the other studied morphometric parameters (i.e. IO, BH, HMO, and VMO), males (one-way ANOVA; F > 134.35; P < 0.05) exhibited significantly higher estimates than the females (Table 1).

The relationship between TL and SL was significantly (P < 0.05) linear. The estimated value of exponent *b* of the LWR for the sexes combined was 2.923 (the 95% confidence intervals of *b* values ranged from 2.841 to 3.005) and it significantly differed (t-test; P < 0.05) from the isometric value of 3 (Table 2). The corresponding estimated *b*-values for males and females were 2.897 and 2.969, respectively. The between-sexes comparison of the LWR parameters showed that the slopes did not differ between the sexes (ANCOVA; F = 57.1, P > 0.05), whereas this was not true for the intercepts (ANCOVA; F = 0.4, P < 0.05).

All studied relationships of TL with IO, BH, HMO, VMO, and MA were significantly (P < 0.05) of power type (Table 2). The values of the coefficient of determination for all the above relationships ranged from 0.545 (VMO–TL for males) to 0.927 (TL–W for females) (Table 2). In addition, the comparison of the relationships between TL and IO, BH, VMO, HMO, and MA were significantly (ANCOVA; F > 6.13; P < 0.05) different by sex (Table 2), both for the intercepts and the slopes of the relationships, with only the exception of the intercept estimated for the relationship between TL and BH (Table 2).

3.2. Diet

The stomach contents of all 425 individuals were examined. The vacuity coefficient was 22.1% for both sexes combined; it was 15.4% in males and 26.8% in females (Table 3). Overall, 15 different prey items were identified in the stomach contents of wide-eyed flounder, with Mollusca and Crustacea being the groups with the highest diversity in terms of species (Table 3). Crustacea also had the highest *%Wf* contribution (64.0%, 68.0%, and 59.3% in total, males, and females, respectively; Table 3). The prevalence of Crustacea in the diet of wide-eyed flounder in Heraklion Bay is also depicted in the Costello graph (Figure), with Brachyura and Natantia being the dominant prey. Following Crustacea, plants (9.5%), Mollusca and detritus (6.9% each), Echinodermata (6.5%), and Polychaeta (6.2%) were also found in the diet of wide-eyed flounder. Fish were recorded in only one case, without a measurable contribution to the diet (Table 4). The fractional trophic level (TROPH) of the species in Heraklion Bay was 3.28 (SE = 0.52). The TROPH value of females (3.18, SE = 0.50) was lower than that of males (3.36, SE = 0.55), but the difference was not significant (ANOVA; F = 0.04, P > 0.05).

4. Discussion

Morphometric relationships are of great importance in fisheries science, as they determine fish growth patterns, which in turn are essential information in developing ecosystem-based models. Wide-eyed flounder is among

Table 2. Estimated parameters of the relations between total length (TL, cm) and weight (W, g), interorbital space (IO, cm), body height (BH, cm), horizontal mouth opening (HMO, cm), vertical mouth opening (VMO, cm), and mouth area (MA, cm^2). Between-sex comparisons of the estimated parameters for pairs of relations are also shown (ANCOVA, $P < 0.05$).

Relations	*a*	*b*	SE(*a*)	SE(*b*)	R^2	ANCOVA
SL = *a* + TL*b*						
Total	0.1790	0.767	0.079	0.008	0.958	
$W = a \times TL^b$						
Males	0.0109	2.897	0.143	0.062	0.926	*a* = 0.000 *b* = 0.425
Females	0.0137	2.969	0.122	0.053	0.927	
Total	0.0125	2.923	0.095	0.041	0.922	
$IO = a \times TL^b$						
Males	0.0011	2.466	0.360	0.150	0.608	*a* = 0.000 *b* = 0.000
Females	0.0078	1.346	0.216	0.097	0.438	
Total	0.0003	2.902	0.273	0.119	0.585	
$BH = a \times TL^b$						
Males	0.2083	0.938	0.071	0.030	0.853	*a* = 0.434 *b* = 0.000
Females	0.2451	0.859	0.041	0.018	0.897	
Total	0.2141	0.922	0.032	0.014	0.914	
$HMO = a \times TL^b$						
Males	0.0262	1.133	0.173	0.072	0.587	*a* = 0.000 *b* = 0.013
Females	0.0468	0.869	0.109	0.049	0.559	
Total	−3.3780	1.016	0.080	0.035	0.666	
$VMO = a \times TL^b$						
Males	0.0037	1.600	0.266	0.111	0.545	*a* = 0.000 *b* = 0.002
Females	0.0056	1.395	0.175	0.078	0.560	
Total	−5.4970	1.544	0.130	0.060	0.652	
$MA = a \times TL^b$						
Males	0.00001	2.733	0.319	0.133	0.708	*a* = 0.002 *b* = 0.000
Females	0.00020	2.264	0.205	0.092	0.710	
Total	0.00010	2.560	0.151	0.066	0.783	

the species that allow for an external distinction of the sex (e.g., males exhibit larger sizes and greater interorbital and mouth dimensions) due to their unique display of sexual dimorphism (Abid et al., 2010). Differences were also observed for the sex comparison between interorbital space and total length, where males exhibited larger interorbital distances than females (Azores: Nash et al., 1991; Gulf of Gabès: Abid et al., 2010). The same pattern has also been observed here for the first time for the sex comparison of the relationships between mouth dimensions and maximum height with total length, with males exhibiting more pronounced values than females. On the other hand, no apparent difference was found between males and females for the comparison of the length–weight parameters, which are in line with the findings for the wide-eyed flounder in the Azores (Abid et al., 2010).

Differences between the study area and others also existed for the length exhibiting external dimorphism. Males of our study were smaller (93.7% of the total number of males were <12 cm) when compared with other reported sizes from other areas in the central Mediterranean (Abid et al., 2010: TL = 20.1 cm). This phenomenon, known as dwarfism (Stergiou et al., 1997), describes the dominance of small-sized demersal stocks in the eastern Mediterranean when compared with their western Mediterranean counterparts. Results of the present study also indicated a female-biased sex-ratio (58.8%:41.2%), similar to those noted in other studies (Carvalho et al., 2003; Abid et al., 2010) and consistent

Table 3. Contribution (% weight) of the prey items identified in the stomach contents of *Bothus podas*, Heraklion Bay, Crete. TL = Total body length; N = number of individuals; VC = vacuity coefficient; TROPH = fractional trophic level; SE = standard error.

Taxon	Combined	Males	Females
Detritus	6.9	3.8	10.6
Algae	9.5	7.9	11.4
Polychaeta	6.2	4.4	8.3
Mollusca	6.9	8.6	5.0
Bivalvia			
Corbulidae			
Corbula gibba	1.1	1.2	1.0
Gastropoda			
Neritidae			
Smaragdia spp.	0.1	0.2	
Phasianellidae			
Tricolia spp.	1.2	1.7	0.6
Rissoidae	1.9	2.9	0.8
Trochidae			
Jujubinus spp.	2.6	2.6	2.6
Crustacea	64.0	68.0	59.3
Natantia	25.0	24.5	25.6
Brachyura			
Homolidae			
Homola spp.	19.2	20.5	17.7
Inachidae			
Inachus spp.	16.3	19.0	13.2
Leucosiidae			
Ebalia spp.	1.1	1.2	1.0
Unidentified remains	2.4	2.8	1.8
Echinodermata	6.5	7.2	5.6
Ophiuroidea	6.5	7.2	5.6
Fish			
Fistularia commersonii larvae	*	*	
TL range (cm)	6.0–15.1	7.5–15.1	6.0–15.0
N	425	175	250
VC (%)	22.1	15.4	26.8
TROPH (SE)	3.28 (0.52)	3.36 (0.55)	3.18 (0.50)

with the haremic mating system of the species, a common phenomenon of fishes inhabiting sandy substrates (Carvalho et al., 2003) such as the study area here.

The *b*-values of the LWR were estimated for both sexes combined and for each sex separately (Table 2), and their 95% confidence intervals (ranged between 2.773 and 3.075) fell within the range reported from other studies (see Table 4) and lay within the expected range of 2.5–3.5 estimated by Froese (2006). LWRs for the wide-eyed flounder reported from 14 studies worldwide (Table 4) showed that the mean (standard deviation) value of exponent *b* was 3.110 (0.181), ranging from 2.801 (Cyclades) to 3.394 (İzmir Bay, Aegean Sea, Turkey). When both the reported *b* and standard deviation values were taken into account,

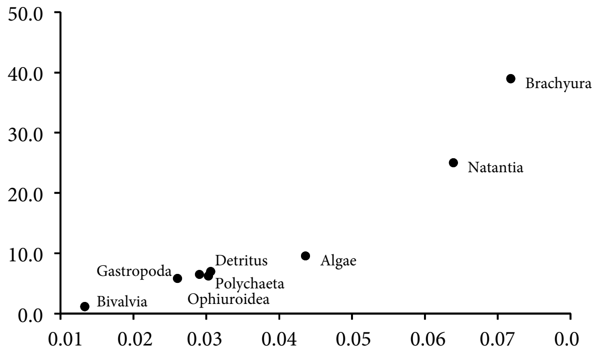

Figure. Costello graph (Costello, 1990) using weight percentage (*%Wf*) and frequency of occurrence for *Bothus podas* from Heraklion Bay.

Table 4. Parameters of the length–weight relationships for *Bothus podas*, as given in various studies. N = Number of individuals; LR = length range; *a* and *b* = parameters of the length–weight relationship; SE_b = standard error of *b*; R^2 = coefficient of determination.

Area	Sex	N	LR (cm)	*a*	*b*	SE_b	R^2	Reference
Atlantic								
Azores	Combined	90	4.0–21.2	0.0164	2.940		0.990	Nash et al. (1991)
	Combined	511	2.7–23.4	0.0082	3.124	0.014	0.991	Morato et al. (2001)
	Males	136	10.6–23.4	0.0104	3.035	0.046	0.970	Morato et al. (2001)
	Females	65	10.2–22.1	0.0141	2.919	0.076	0.959	Morato et al. (2001)
Atlantic, Spain	Combined	36	8.0–21.5	0.0150	2.950		0.990	Mata et al. (2008)
Western Mediterranean								
Canary Islands	Combined	75	3.0–18.3	0.0092	3.096	0.052	0.983	Espino et al. (2016)
Eastern Mediterranean								
Alexandria, Egypt	Combined	310	5.5–13.6	0.0070	3.000		0.972	Abdallah (2002)
Cyclades	Combined	17	9.7–17.3	0.0169	2.801	0.189	0.940	Moutopoulos and Stergiou (2002)
Balearic Islands, W Mediterranean	Combined	225	3.1–21.9	0.0094	3.079	0.114	0.992	Morey et al. (2003)
Babadillimani Bight, Turkey	Combined	1498	4.2–17.3	0.0090	3.099	0.128	0.979	Cicek et al. (2006)
Turkey (NE coasts)	Combined	90	6.2–15.7	0.0096	3.002	0.063	0.980	Sangun et al. (2007)
Izmir Bay, Aegean Sea, Turkey	Combined	17	11.0–18.7	0.0040	3.394	0.118	0.982	Özaydın et al. (2007)
North Aegean Sea, Greece	Combined	22	11.3–17.2	0.0107	3.034	0.196	0.920	Karachle and Stergiou (2008b)
South Aegean Sea, Turkey	Combined	84	10.7–20.1	0.0041	3.373	0.127	0.986	Bilge et al. (2014)
Gökçeada Island, Aegean Sea, Turkey	Combined	194	2.5–20.1	0.0040	3.367		0.983	Altın et al. (2015)
Egypt	Combined	155	5.0–17.0	0.0005	3.287		0.985	Akel (2016)
Heraklion Bay	Combined	425	6.0–15.1	0.0125	2.923	0.041	0.922	Present study
	Males	175	6.2–13.5	0.0109	2.897	0.062	0.926	Present study
	Females	250	6.0–15.1	0.0137	2.969	0.053	0.927	Present study

the confidence intervals of exponent *b* ranged from 2.967 to 3.253.

Differences in *b* values among studies could be attributed to one or more of the following factors (Moutopoulos and Stergiou, 2002; Froese, 2006): (a) differences in the number of specimens examined; (b) area/season effects; (c) and differences in the measured length ranges and the type of length used.

Regarding the diet composition of the wide-eyed flounder, there are few accounts, mainly in the western

Table 5. Review of the relevant literature on feeding habits of *Bothus podas* in various areas of its distribution (WMED = western Mediterranean, CMED = central Mediterranean, EMED = eastern Mediterranean). Numbers refer to % weight contribution as given by the original authors, whereas + indicates that only a general description of diet was provided. N = Number of individuals examined, LR = length range, TROPH (SE) = fractional trophic level (standard error) estimated in the present study, using TrophLab, except for Karachle and Stergiou (2011).

Food item	Nash et al. (1991) Azores (Atlantic)	Bell and Harmelin-Vivien (1983) Gulf of Marseille (WMED)	Schintu et al. (1994) Latium, Italy (WMED)	Darnaude et al. (2001) Gulf of Fos, France (WMED)	Esposito et al. (2010) North Sicilian coast (WMED)	Abid et al. (2013) Gulf of Gabès (CMED)	Karachle and Stergiou (2011) North Aegean Sea (EMED)
Algae					0.9	0.1	
Nematoda						0.46	
Platyhelminthes						0.02	
Polychaeta	+	10.7	+	19.2	35.3	3.95	14.1
Mollusca							
Gastropoda	+		+	0.1	4.1	0.65	1.3
Bivalvia	+		+	73.5	0.8	0.7	
Nudibranchia							3.8
Scaphopoda					0.1	0.07	
Cephalopoda					1.5	3.34	
Crustacea							
Amphipoda	+	40.6	+	1.1	14.4	27.79	7.1
Isopoda	+				0.8	34.13	38.4
Copepoda	+			*	*	0.05	
Mysidacea			+	0.5	1	2.29	
Cumacea			+	0.1	0.4	1.59	
Tanaidacea	+		+		0.7		
Ostracoda					0.1		
Brachyura			+	4.3	20.6	12.85	4.4
Natantia	+	48.7	+	*	5.3	0.45	20.5
Stomatopoda			+		2.1	0.77	
Other Crustacea	+				0.6	6.6	6.4
Bryozoa						1.44	
Foraminifera						0.4	
Echinodermata							
Asteroidea					*		
Echinoidea	+					0.07	
Ophiuroidea			+	0.2	0.7	0.05	
Holothuroidea				0.2	0.2		
Sipuncula					0.3		
Fish	+			0.8	6.1	2	3.8
Others					0.4	0.28	
N	69	2	111	40	388	749	22
LR (in cm)	4.0–21.2	–	5.5–18.0	3.9–15.8	–	13.0–24.4	11.3–17.2
TROPH (SE)	3.29 (0.48)	3.41 (0.45)	3.40 (0.47)	3.13 (0.32)	3.37 (0.51)	3.39 (0.49)	3.39 (0.53)

Mediterranean (Table 5). The vast majority of those were conducted in the western Mediterranean (four papers), whereas such information is limited in the other areas of the distribution of wide-eyed flounder. Indeed, in the eastern parts of the Mediterranean, its feeding habits have not been thoroughly examined, a fact that could mainly be attributed to its low commercial importance (e.g., Tuya et al., 2014) and its rather low contribution to overall catches (e.g., Moutopoulos et al., 2015). It has been reported that it feeds mainly on benthic invertebrates like Mollusca, Polychaeta, Crustacea, and Echinodermata (Nash et al., 1991; Schintu et al., 1994; Darnaude et al., 2001), but also on small benthic fishes (Nash et al., 1991; Azevedo, 1995; Darnaude et al., 2001) (Table 5). The diet composition of wide-eyed flounder in the present study is in accordance with previous information, with Crustacea being its preferred food. It is noteworthy, however, that on one occasion, in the stomach contents of a male (total length = 12 cm), an individual larva of cornetfish *Fistularia commersonii* was recorded. Cornetfish is a Lessepsian invader in the Mediterranean (e.g., Golani, 2000; Karachle et al., 2004), and this is the first report of a species preying upon wide-eyed flounder in the Mediterranean. The estimated TROPH values ranged from 3.13 to 3.41 (median = 3.39, mean = 3.34, SE = 0.041). Based on all TROPH estimates (previously reported and according to the present study), the species can be classified as an omnivore with a preference for animal material (sensu Stergiou and Karpouzi, 2002; Karachle and Stergiou, 2017).

Given the spatial (bay) and temporal (spring) frame of the present study, the analyzed data should not be considered as generic estimates for all Greek waters and for all seasons. For instance, LWRs are not constant over the year, being variable according to several factors such as food availability, feeding rate, gonad development, and spawning frequency (Froese, 2006). In addition, feeding habits and TROPHs of species have been shown to vary seasonally (e.g., Karachle and Stergiou, 2008a). In addition, the limited horizontal and vertical spatial expansion of the studied area narrowed the length ranges of the studied species (98% of the specimens ranged between 7 and 13 cm). Thus, length ranges did not include the large individuals that may be caught in deeper and more offshore waters; the use of the relationships estimated here should be limited to the observed length ranges.

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