Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
www.hcmr.gr
DOI: https://doi.org/10.12681/mms.42905

Current fish community structure of an anthropogenically pressured system: the case of the Küçükçekmece Lagoon (NW Türkiye)

Gülşah SAÇ, Sevan AĞDAMAR, Harun İNCİ, Özgün Deniz YÜREKLİ, İrem ŞARLAK, Tuğçe YETİM, and Müfit ÖZULUĞ

Mediterranean Marine Science, 27 (2) 2026

Supplementary Material 1

Individual numbers of fish species caught in the Küçükçekmece Lagoon and their distribution according to the type of fishing gear (BG: Benthic gillnet, PG: Pelagic gillnet, SN: Seine net).

Fish species	Site 1 – Eşkinoz (BG)	Site 2 – Sazlı (BG)	Site 3 – Nakkaş (BG)	Site 4 – Menekşe (BG)	Site 5 – Mid-lagoon (PG)	Site 6 – Menekşe (SN)	Site 7 – Paşaeli (SN)
Family: Atherinidae							
Atherina pontica Eichwald, 1831	435	266	510	489	2	153	93
Family: Blenniidae							
Salaria pavo (Risso, 1810)	-	-	-	-	-	-	1
Family: Engraulidae							
Engraulis encrasicolus (Linnaeus, 1758)	122	78	137	137	414	31	-
Family: Gasterosteidae							
Gasterosteus aculeatus Linnaeus, 1758	-	-	-	-	-	7	2
Family: Gobiidae							
Neogobius fluviatilis (Pallas, 1814)	-	-	-	-	-	-	1
Neogobius melanostomus (Pallas, 1814)	-	-	-	-	-	73	6
Gobius niger Linnaeus, 1758	-	-	-	-	-	1	-
Family: Belonidae							
Belone belone (Linnaeus, 1761)	-	-	-	-	-	1	-
Family: Moronidae							
Dicentrarchus labrax (Linnaeus, 1758)	-	-	-	-	-	2	-
Family: Mugilidae							
Chelon auratus (Risso, 1810)	12	7	15	4	-	20	23
Chelon ramada (Risso, 1827)	4	5	-	-	-	-	-
Mugil cephalus Linnaeus, 1758	1	1	-	-	-	1	-
Family: Oxudercidae							
Knipowitschia caucasica (Berg, 1916)	-	-	-	-	-	55	1
Pomatoschistus adriaticus Miller, 1973	-	-	-	-	-	6	-
Family: Poeciliidae							
Gambusia holbrooki Girard, 1859	-	-	-	-	-	7	-
Family: Sparidae							
Sparus aurata Linnaeus, 1758	-	-	-	-	-	1	-
Family: Syngnathidae							
Syngnathus abaster Risso, 1827	-	-	-	-	-	10	-
Syngnathus typhle Linnaeus, 1758	-	-	-	-	-	2	-

Supplementary Material 2

Seasonal CPUE, total length (TL, cm) and mass (W, g) distribution of fish species caught from Küçükçekmece Lagoon (* estimated using gillnet data; ** estimated using seine net data).

Fish species		Autumn	Winter	Spring	Summer
Atherina pontica	**CPUE***	1.31	0.72	39.77	4.99
	TL (min.-max.)	6.7 – 10.1	6.9 – 10.7	6.5 – 11.5	5.6 – 12.5
	W (min.-max.)	2.21 – 7.45	2.42 – 11.04	2.15 – 14.23	1.18 – 17.69
	CPUE**	2.72	-	4.30	3.22
	TL (min.-max.)	2.8 – 8.8	-	1.8 – 12.3	1.7 – 10.7
	W (min.-max.)	0.13 – 4.69	-	0.04 – 16.50	0.03 – 9.46
Salaria pavo	**CPUE****	-	-	0.03	-
	TL (min.-max.)	-	-	8.0	-
	W (min.-max.)	-	-	6.35	-
Engraulis encrasicolus	**CPUE***	2.04	0.01	5.67	7.92
	TL (min.-max.)	8.7 – 12.1	6.8 – 10.6	8.3 – 13.0	4.6 – 13.6
	W (min.-max.)	5.52 – 12.01	2.09 – 9.38	3.40 – 13.84	0.58 – 20.06
	CPUE**	-	-	-	0.91
	TL (min.-max.)	-	-	-	3.5 – 11.4
	W (min.-max.)	-	-	-	0.20 – 7.60
Gasterosteus aculeatus	**CPUE****	-	-	0.40	0.15
	TL (min.-max.)	-	-	1.7 – 2.4	2.4 – 3.5
	W (min.-max.)	-	-	0.05 – 0.15	0.13 – 0.33
Neogobius fluviatilis	**CPUE****	-	-	0.03	-
	TL (min.-max.)	-	-	5.6	-
	W (min.-max.)	-	-	1.99	-
Neogobius melanostomus	**CPUE****	0.04	-	7.03	0.91
	TL (min.-max.)	5.4	-	3.6 – 9.4	3.3 – 9.5
	W (min.-max.)	2.08	-	0.45 – 14.47	0.50 – 15.02
Gobius niger	**CPUE****	0.04	-	-	-
	TL (min.-max.)	6.3	-	-	-
	W (min.-max.)	3.10	-	-	-
Belone belone	**CPUE****	-	-	-	0.03
	TL (min.-max.)	-	-	-	4.1
	W (min.-max.)	-	-	-	0.05
Dicentrarchus labrax	**CPUE****	0.07	-	-	-
	TL (min.-max.)	3.8 – 4.6	-	-	-
	W (min.-max.)	0.64 – 1.03	-	-	-
Chelon auratus	**CPUE***	0.07	-	0.08	0.87
	TL (min.-max.)	23.7 – 26.5	-	18.8 – 23.4	13.9 – 28.2
	W (min.-max.)	126.87 – 174.63	-	54.39 – 125.16	21.77 – 208.88
	CPUE**	0.43	-	2.10	-
	TL (min.-max.)	4.5 – 6.5	-	3.6 – 13.2	-
	W (min.-max.)	0.89 – 2.74	-	0.45 – 17.64	-
Chelon ramada	**CPUE***	0.05	-	0.19	-
	TL (min.-max.)	25.4 – 25.9	-	15.2 – 25.0	-
	W (min.-max.)	161.54 – 169.52	-	31.27 – 163.93	-

Continued

Supplementary Material 2 continued

Fish species		Autumn	Winter	Spring	Summer
Mugil cephalus	**CPUE***	-	-	0.03	0.03
	TL (min.-max.)	-	-	33.8	18.1
	W (min.-max.)	-	-	451.16	68.34
	CPUE*	0.04	-	-	-
	TL (min.-max.)	15.0	-	-	-
	W (min.-max.)	31.94	-	-	-
Knipowitschia caucasica	**CPUE****	-	-	0.17	1.69
	TL (min.-max.)	-	-	3.8	1.7 – 4.2
	W (min.-max.)	-	-	0.41	0.04 – 0.72
Pomatoschistus adriaticus	**CPUE****	-	-	-	0.18
	TL (min.-max.)	-	-	-	2.6 – 6.2
	W (min.-max.)	-	-	-	0.08 – 0.17
Gambusia holbrooki	**CPUE****	0.18	-	0.17	0.03
	TL (min.-max.)	2.9 – 3.6	-	2.6	2.8
	W (min.-max.)	0.21 – 0.41	-	0.17	0.20
Sparus aurata	**CPUE****	-	-	0.17	-
	TL (min.-max.)	-	-	4.1	-
	W (min.-max.)	-	-	3.94	-
Syngnathus abaster	**CPUE****	-	-	-	0.29
	TL (min.-max.)	-	-	-	3.8 – 11.5
	W (min.-max.)	-	-	-	0.02 – 0.83
Syngnathus typhle	**CPUE****	-	-	-	0.06
	TL (min.-max.)	-	-	-	7.9 – 10.2
	W (min.-max.)	-	-	-	0.18 – 0.30

Supplementary Material 3

1. Shapiro–Wilk Normality Test

To assess the distribution of response variables prior to canonical correspondence analysis (CCA), Shapiro–Wilk tests were performed for each taxon. The results indicated that none of the variables followed a normal distribution (p < 0.05 for all taxa), confirming that the dataset was non-parametric in nature.

Variable	**W Statistic**	***p*-value**
Eng	0.7986	0.00082
Ath	0.6111	3.85×10^{-6}
Chea	0.5493	9.18×10^{-7}
Cher	0.4518	1.20×10^{-7}
Mug	0.3512	1.85×10^{-8}

2. Canonical Correspondence Analysis (CCA) Significance Tests

A permutation-based ANOVA (999 permutations) was conducted to assess the overall model significance, individual canonical axes, and environmental terms included in the CCA model.

Overall model significance:

- $p = 0.002$, indicating a statistically significant relationship between species composition and the set of environmental predictors.

Axis-wise significance:

- CCA1 was significant ($p = 0.001$), while the remaining axes (CCA2–CCA4) were not ($p > 0.05$).

Term-wise significance:

- Among the environmental variables, WT ($p = 0.003$), D ($p = 0.003$), and S ($p = 0.019$) showed statistically significant effects on species distribution.
- EC was marginally significant ($p = 0.077$), while DO, pH, and SDD were not significant ($p > 0.1$).

Variance Inflation Factors (VIF):

- VIF scores indicated potential multicollinearity issues for pH (VIF = 21.71), EC (VIF = 111.67), and S (VIF = 75.11).