CHIRONOMIDAE POTAMOFAUNA of EMET, ORHANELI and MUSTAFA KEMAL PAŞA STREAMS, CATCHMENT AREA of LAKE ULUABAT

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Abstract

In order to determine the benthic invertebrate fauna of Emet, Orhaneli and Mustafa Kemal Paşa Streams which is constituent of catchment area of lake Uluabat, samples were collected at November 2004, April and July 2005 at 19 stations by using hand net. Also some environmental parameters of the sterams' water were analyzed (water temperature, pH, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, NO_2–N, NO_3–N, NH_4–N, PO_4–3). In total 19,684 individuals were collected and 82 taxa detected (only Chironomidae samples were identified at species level).

In the benthic invertebrate fauna Oligochaeta (40.05%) and Chironomidae (18.8%) were found to be dominant and the other groups were found to be below 10% dominancy rate (Gammaridae, Hemiptera, Ephemeroptera, Gastropoda, Ceratopoganidae, Nematoda, Odonata, Bivalvia, Hirudinea, Hydracarina, Neuroptera, Trichoptera, Plecoptera, Tabanidae, Gerridae and Asellidae). Chironomid larvae were the second dominant group consisting on average 18.8% of the total zoobenthic fauna. Chironomus (Camptoch.) tentans (5.52%) was the most abundant chironomid species in the basin, other dominant Chironomid species were Cryptochironomus defectus, Micropsectra notescens, Acricotopus lucens, Cardiocladius capucinus and Orthocladius thienemanni. The values of Diversity Indices (Shannon-Wiener and Margalef) varied between 0.70 and 3.07; 0.65 and 2.42 respectively.

Keywords: Chironomidae, Emet, Orhaneli and Mustafa Kemal Paşa Streams.

INTRODUCTION

Benthic invertebrate communities react rapidly to pollution-affected in freshwater systems. They are one of the most important biologic indicators for ecological status of both rivers and lakes and their abundance, species composition and distributions' are shown inland water quality. Because of this characteristic, benthic invertebrate communities are useful tools in detecting pollution, freshwater ecosystem health. Among the benthic community Chironomidae larvae is the most widely distributed and frequently the most abundant group of insects in freshwater environments [1]. They occur in all zoogeographical regions of the world, including Antarctica. Chironomidae larvae constitutes almost half of the total benthic invertebrate community species in several aquatic ecosystems. They may even be present in puddles and in damp places between yellowing leaves. Given the ecological importance of the Chironomidae in the dynamics of aquatic ecosystems, they were often used as bioindicators in studies monitoring water quality [2]. Turkey is the country not only covered almost entirely by three of the world's 34 biodiversity hotspots (Caucasus, Irano-Anatolian, and Mediterranean) but also it has important bird areas (IBA) and wetland and in the Palearctic Region [3]. Among them Lake Uluabat has tectonic origins, shallow and eutrophic freshwater lake on the South side of the Sea of Marmara [3]. In 1998, Lake Uluabat and its surrounding area were included in the Ramsar List that was established in response to Article 2.1 of the Convention on Wetlands held in Ramsar, Iran in 1971. Emet, Orhaneli and Mustafa Kemal Paşa Streams are most important river systems in Turkey and they constitutes catchment area of Lake Uluabat.

Although there are many studies on water quality and fish fauna about both in Lake Uluabat and its basin, but there are few studies on benthic invertebrates community (especially

Chironomidae). The Ephemeroptera fauna of Lake Uluabat basin was reported in detail by Tanatmış [4]. Ertorun and Tanatmış [5] were published Hydraenidae species diversity of South Marmara Region in Turkey (Coleoptera); Kazancı [6] identified *Agnetina werneri* (Plecoptera) in Orhaneli Stream, Dalkıran [7] reported a new species of Prosopistoma (Ephemeroptera), Odabaşı and Arslan [8] described a new *Bithynia* species (*B. timmii*) from lake Uluabat.

The studies on the Chironomidae fauna in Lake Uluabat basin are not sufficient at present. For this reason the Chironomidae fauna of Lake Ulubat basin, which has been located in an important transitional area between Europe and Anatolia since the glacial age, was studied in order to contribute to the knowledge of the Chironomidae fauna of Turkey.

MATERIAL and METHOD

The shallow and eutrophic Lake Uluabat is located in the western part of Turkey (40°10' N, 28°35' E) at an altitude of 9 m above sea level with a surface area of 156 km^2 (Figure 1) [3]. Lake is fed principally by the Mustafakemalpaşa River formed by the conflux of two streams, Emet and Orhaneli, in the vicinity of the village of Camandar. The waters flowing out of the lake outlet join the Susurluk (Simav) stream, to the north of Karacabey, and empty into the Marmara Sea [9].

Water and zoobenthic samples were collected from November 2004, April 2005 to July 2005 at 19 sampling stations in catchment area of Lake Uluabat (Figure 1). The bottom samples were washed in situ using a 200 µm mesh size, the material was preserved in 4% formalin, in the laboratory all samples were removed from the debris, sorted under a stereoscope and transfered to 70% ethanol. In the present study total 19,684 benthic invertebrate samples were collected and All samples were identified to family, ordo or classis level preserved in 70% alcohol and 82 taxa detected. Only Chironomidae samples were identified at species level and the identification of the chironomidae samples was done using references [10-16].

During each sampling period, the water temperature, pH and DO were measured in the field with a water quality checker (TOA WQC 22A). The water samples were analyzed in the laboratory for biochemical oxygen demand (BOD), chemical oxygen demand (COD), phosphate-phosphorus (PO_4–3), NH_4–N, NO_3–N and NO_2–N. The minimum, maximum, and average values of the environmental parameters in the period of investigations from November 2004 to July 2005 are shown in Table 3. Mean value of measured environmental parameters were classified by Turkish Standards [17] in Table 3.

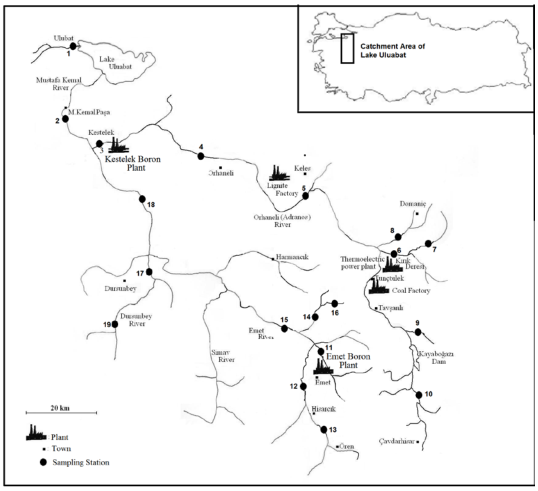

Figure 1. Catchment area of Lake Uluabat and sampling stations

RESULTS and DISCUSSION

In total 19,684 individuals were collected and 82 taxa detected (only Chironomidae samples were identified at species level). In the benthic invertebrate fauna Oligochaeta (40.05%) and Chironomidae (18.8%) were found to be dominant and the other groups were found to be below 10% (Gammaridae, Hemiptera, Ephemeroptera, Gastropoda, Ceratopoganidae, Nematoda, Odonata, Bivalvia, Hirudinea, Hydracarina, Neuroptera, Trichoptera, Plecoptera, Tabanidae, Gerridae and Asellidae). Chironomid larvae were the second dominant group consisting on average 18.8% of the total zoobenthic fauna.

Taxonomic composition of zoobenthos differed significantly among the studied stations and sites (Table 1). The average dominancy of identified species was shown in Table 1. It was found that the Uluabat basin's zoobentos was dominated by Oligochaeta and Chironomidae (according to average dominancy were 40.5% and 18.8%, respectively). These two groups known as pollution tolerant species. According to Shannon-Wiener and Margalef diversity index, species diversity for zoobenthos of the lake basin was found as 1.60-3.72 at average respectively. While the second station was determined to has the highest diversity (H'=3.73; Margalef 5.53), the sixth station was determined to has the lowest (H'=0.706; Margalef 1.312) (Table 1 and 2).

Table 1. *Values of indices of the sampling sites in the catchment area of Lake Uluabat*

Stations / **Diversity Indic.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Shannon_H	2.88	3.07	1.12	1.75	1.18	0.70	1.93	1.35	2.55	2.38
Evenness_e^H/S	0.66	0.86	0.12	0.52	0.21	0.28	0.36	0.38	0.51	0.43
Margalef	2.42	1.53	1.53	1.31	1.09	0.65	1.08	0.65	1.97	1.97
Taxa	28	26	26	12	16	8	20	11	26	26
Stations / **Diversity Indic**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	
Simpson_1-D	2.19	0.71	2.26	2.17	2.46	0.75	2.75	1.54	1.05	
Evenness_e^H/S	0.59	0.092	0.68	0.46	0.450	0.096	0.36	0.42	0.17	
Margalef	1.30	1.30	0.65	1.74	1.30	1.30	2.19	0.87	0.65	
Taxa	16	23	15	20	27	23	44	12	17	

When the indices were examined in terms of environmental parameters (as water quality classes), 10th, 11th and 19th stations were determined as clean (class I); 4th, 5th, 8th, 9th, 12th and 15th were determined as clean but slightly impacted (Class II), 2nd, 3rd, 6th, 7th and 13th were determined as polluted (Class III) and while the other stations (1st, 11th, 16th and 17th) were determined as polluted or impacted (Class IV) based on Turkish Surface Water Quality Management Regulation (2015). Only water temperature and pH did not present significant differences between the sampling sites.

In the present study, aimed at determining the Chironomidae fauna in the basin of Lake Uluabat, 65 species of of Chironomidae were determined. *Chironomus (Camptoch.) tentans* (5.52%) was the most abundant chironomid species in the basin, other dominant species were *Cryptochironomus defectus* (2.33%), *Micropsectra notescens* (2%), *Acricotopus lucens* (1.19%), *Cardiocladius capucinus* (1.35%) and *Orthocladius thienemanni* (1.04%).

In the recent study which is dealing with Chironomidae fauna of Lake Uluabat [18], reported that Chironomus (Camptochironomus*)* *tentans* was the most abundant chironomid species contributing with about 66.2% of the total chironomid limnofauna in the lake. *Chironomus (Camptoch.) tentans* which is common in Palearctic region, is frequently referred to in the literature as being positive indicators of organic pollution. In the study which was published by Bazzanti (2000) *Chironomini* species were the dominant tribe in the organically polluted lowland river of Central Italy with the highest density at the most polluted stations [19]. In addittion author also reported that densities of *Micropsectra*, *Polypedilum*, *Cryptochironomus*, *Harnischia* and *Cricotopus* species generally showed a positive correlation with the orthophosphate and biological oxygen demand contents and a negative correlation with the oxygen content. In the present study *Chironomus (Camptoch.) tentans* was found to has the highest dominancy at the 16th and 18th stations 86.5% and 5.6%, respectively. Station 16 is one of the stations showing the lowest average dissolved oxygen and the highest BOD value in the basin (Table 3). According to the environmental parameters, this station has organic pollution and our results indicating that the *Chironomus (Camptoch.) tentans* can adapt to changing environmental conditions and become dominant taxon in the zoobenthic community. In addition, *Cryptochironomus defectus* was the second most abundant chironomid species in the basin. *Cryptochironomus defectus* is also tolerant to organic pollution such as *Chironomus (Camptoch.) tentans* and can live in different types of aquatic systems.

Acricotopus lucens was identified in only 4 stations in the lake basin (4th, 12th, 13rd and 15th). It is the only one species detected at the 4th station and has a highest dominancy at the 15th station (Table 1). The 4th station is Orhaneli and the other three stations are located on the Emet River. No organic pollution was detected in these four stations, and the general feature of the four stations is the relatively high flow rate and small creeks with aquatic vegetation. This species was recorded several times from different part of Turkey. And it was reported as eurythermic taxa inhabiting small bodies of still water and the littoral of lakes [20].

Table 2. Taxonomical list and dominancy value (%) of Chironomidae species which are determined from sampling stations (A: Average)

The highest dominance rate of *Cardiocladius capucinus*, which was detected at six stations in the basin, was found at the 13th station (13.1%). This species previously been reported from western part of Turkey [21] and Gümüldür Stream [22], and it has been reported in the usually under gravel and muddy substratum. The dissolved oxygen values of the stations where *Cardiocladius capucinus* was detected in this study are relatively high, the water temperature is between 15.1-19.3 and the substrate of most of them is sand and gravel. As we mentioned before this species has one of the highest dominancy in the basin, and we may conclude that *Cardiocladius capucinus* may have a wider distribution in Turkey.

Micropsectra notescens is another species with a high average dominancy value (2%) in the basin. It was detected at 8 stations in the basin and the highest dominancy value was observed at 11th station (20.5%). It is know that species of the genus *Micropsectra* Kieffer, 1909 are abundant in many lotic and lentic freshwater habitats throughout the Holarctic region. Many *Micropsectra* species have specific habitat preferences and appear to be stenoecious [23]. Therefore *Micropsectra* species' contain numerous potential environmental indicators to be used in biomonitoring of both running and standing water. Even, recent study which was performed by Stur and Wiedenbrug, 2006, has been revealed high abundance and diversity of *Micropsectra* species in invertebrate communities of groundwater springs [24]. In this study, the environmental parameters of the stations where the species was determined are in a wide range (Table 3). *Micropsectra notescens* is collected from different environments ranging from 1st quality water class to 4th quality water class. Especially, in the 11th station, where the highest dominancy value of *M. notescens* is determined, nitrogen values (NO_3^-N and NH_4^+N) are the highest in the basin. This result shows that *M. notescens* can adopt in very different aquatic habitats and its tolerance range to changing environmental variables is wide.

Table 3. Some environmental variables as average and water quality classes for stations in the catchment area of Lake Uluabat (WQC: Water Quality Class; ADL: Above detection limit). Number in paranthes indicated water quality classes.

It is known that larvae of *Orthocladius*, inhabit all types of flowing water. In addition, representatives are found in lakes, ponds, swamps, thermal waters, hygropetric rock faces, and moist soil [25]. However, several species of orthocladiinae members are considered to be cool-water adapted [26] they expected to be richer during periods of low water temperature in lotic temperate habitats. According to our result *Orthocladius (E.) thienemanni* is the dominant species at the station 10th which has one of the lowest water temperature in the basin. The low dominancy rate in other stations where the species was detected (stations 15th, 16th and 17th) can be related to the relatively high water temperature in these stations. And similar result was also obtained in a study conducted on the Tigris River [27].

The diversity and taxa richness of the zoobenthic communities found in the whole area were not quite diverse. The impression gained from the water-quality measurements made and considering the Turkish Standard, study area is generally slightly polluted by organic wastes. It was found that Oligochaeta and Chironomidae larvae, were dominant, while some taxa were low as is typical of lotic systems, such as Plecoptera, Trichoptera and Ephemeroptera

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Table 2. *Taxonomical list and dominancy value (%) of Chironomidae species which are determined from sampling stations (A: Average)*

	Sampling Stations																			
Taxa	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	A.
Oligochaeta	36.1	37.8	11.4	16.7	84.2	96.4	17.4	23.5	36.7	17.9	19.3	18.3	69.8	56.1	37.6	5.0	34.8	66.2	83.7	40.5
Chironomidae (in total)																				18.8
Tanypus punctipennis	0.6	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	1.0	-	0.8	0.13
Procladius(Psilotanypus) sp.	0.6	-	-	-	-	-	4.3	1.8	0.4	-	13.6	-	-	-	-	0.6	-	5.6	-	1.42
Ablabesmyia monilis	-	-	-	1.7	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	0.11
Krenopelopia sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Clinotanypus sp.	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-	0.06
Larsia curticalcar	0.6	-	-	-	-	-	1.1	-	-	-	-	-	-	-	2.6	-	-	-	-	0.23
Larsia decolorata	-	-	-	-	-	-	-	-	-	-	-	0.1	1.9	-	-	-	-	-	-	0.10
Apsectrotanypus trifascipennis	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	1.5	-	-	-	-	0.09
Nanocladius rectinervis	0.6	-	0.3	-	1.7	-	-	-	0.4	-	-	0.1	-	-	0.5	1.0	1.0	4.2	-	0.52
Nanocladius bicolor	-	-	0.6	-	-	-	-	-	-	-	-	0.1	1.9	-	-	-	-	-	0.8	0.17
Brillia modesta	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
Thienemanniella clavicornis	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	0.03
Thienemanniella vittata	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.5	-	-	-	0.8	0.08
Thienemanniella sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Cardiocladius capucinus	-	-	0.6	-	-	-	2.2	-	-	-	-	-	13.0	-	7.7	1.2	5.5	-	-	1.58
Chaetocladius sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	0.08
Synorthocladius semivirens	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	0.02
Eukiefferiella clypeata	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-	0.06
Eukiefferiella sp.	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	1.5	0.2	0.3	-	-	0.13
Acricotopus lucens	-	-	-	1.7	-	-	-	-	-	-	-	0.1	3.7	-	2-	-	-	-	-	1.35
Rheocricotopus gouini	-	-	-	-	-	-	1.1	-	-	0.4	-	-	-	-	-	-	-	-	-	0.08
Rheocricotopus exiquus	-	-	-	-	-	-	-	-	-	-	-	-	1.9	-	-	-	-	-	-	0.10
Lymnophyes transcaucasicus	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	-	-	-	-	0.10
Corynoneura validicornis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Hydrobaenus pilipes	2.6	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	0.3	-	-	0.19
Metriocnemus cubitalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	0.3	-	-	0.04
Cricotopus tremulus	-	-	-	-	-	-	-	-	-	-	-	-	1.9	-	-	0.2	1.9	-	-	0.21
Parametriocnemus stylatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	0.08
Orthocladius thienemanni	-	-	-	-	-	-	-	-	-	16.5	-	-	-	-	1.5	0.8	1.0	-	-	1.04
Psilometriocnemus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Prodiamesa olivacea	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	0.5	-	-	-	-	0.03
Prodiamesa sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	0.03
Potthastia sp.	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	0.02
Dicrodentipes sp.	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
Dicrodentipes tritomus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	-	-	-	-	0.35
Chironomus thummi	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.03
Polypedilum scalaenum	-	-	-	-	-	-	-	-	-	-	-	-	1.9	-	-	-	-	-	-	0.10
Polypedilum nubeculosum	-	2.7	-	-	-	-	1.1	-	-	-	-	-	-	-	-	0.2	-	-	-	0.21
Polypedilum pedestre	-	-	0.3	-	-	-	-	1.8	0.4	-	-	0.1	-	-	-	-	-	-	-	0.13
Polypedilum sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	0.01
Paradentipes demirsoyus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Cryptotendipes holsatus	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	0.06
Cryptochironomus defectus	0.6	4.1	-	-	2.4	-	1.1	-	-	0.2	26.1	0.1	-	-	-	-	0.3	8.5	0.8	2.33
Chironomus (Camptoch.) tentans	0.6	2.7	-	-	2.1	1.8	3.4	-	-	-	-	-	-	1.0	-	86.3	1.0	5.6	-	5.50
Cryptocladopelma laccophila	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	1.0	-	-	0.11
Acalcarella nucus	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	0.8	0.08
Einfeldia dissidens	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	0.00
Fleuria lacustris	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	0.01
Harnischia fuscimana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Microdentipes pedellus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.02
Omisus sp.	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	0.00
Pentapedilum exectum	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-	0.06
Procladius conversus	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
Paracladopelma camptolabis	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.06
Micropsectra curvicornis	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	0.01
Micropsectra notescens	0.6	4.1	0.6	-	-	-	2.3	7.3	0.4	-	20.5	-	-	-	1.0	-	1.3	-	-	2.00
Micropsectra praecox	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	0.00
Micropsectra sp.	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07
Virgotanytarsus arduennensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	-	-	0.09
Sublettea sp.	-	1.4	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
Tribelos fuscicorne	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	0.02
Stempellina sp.	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	0.09
Other groups (in total)	Gammaridae, Hemiptera, Ephemeroptera, Gastropoda, Ceratopoganidae, Nematoda, Odonata, Bivalvia, Hirudinea, Hydracarina, Neuroptera, Trichoptera, Plecoptera, Tabanidae, Gerridae and Asellidae																			41,15

Table 3. *Some environmental variables as average and water quality classes for stations in the catchment area of lake Uluabat (WQC: Water Quality Class; ADL: Above detection limit). Number in paranthes indicated water quality classes.*

	Sıcaklık °C	pH	DO mg/l	BOD mg/l	KOI mg/l	NO_3^-N/L mg/l	NO_2^-N/L mg/l	NH_4^+N/L mg/l	WQC
1	19.83(I)	8.37 (I)	8.20 (II)	11.50 (III)	70.3 (III)	0.40 (I)	0.03 (II)	0.09 (II)	IV
2	18.90(I)	8.33 (I)	1-7 (I)	8.33 (II)	67.33 (III)	0.76 (I)	0.03 (II)	0.09 (II)	III
3	19.37(I)	8.35 (I)	9.13(I)	9.92 (III)	68.9 (III)	0.58 (I)	0.03 (II)	0.09 (II)	III
4	16.90(I)	8.07 (I)	10.10 (I)	2.33(I)	6.67(I)	1.14 (I)	0.09 (III)	0.02 (II)	II
5	15.13 (I)	8.06 (I)	9.40 (I)	4.50 (I)	11.33 (I)	2.84 (I)	0.06 (II)	0.06 (II)	II
6	15.33 (I)	7.73 (I)	3.67 (III)	6.67 (II)	20.67 (I)	1.43 (I)	0.04 (II)	1.25 (III)	III
7	17.00 (I)	8.55 (I)	9.90 (I)	2.67 (I)	2- (I)	0.60 (I)	0.07 (III)	0.27 (II)	III
8	14.53 (I)	8.37 (I)	10.33 (I)	3.0 (I)	1- (I)	0.97 (I)	0.02 (II)	0.03 (I)	II
9	14.23 (I)	7.87 (I)	10.67 (I)	3.67 (I)	86.0 (IV)	1.20 (I)	0.02 (II)	0.05 (I)	II
10	14.10 (I)	7.90 (I)	1-3 (I)	3.33 (I)	3.67 (I)	1.25 (I)	0.01 (I)	0.07 (I)	I
11	17.67 (I)	8.13 (I)	7.17 (II)	1.33 (I)	7.33 (I)	ADL(IV)	0.04 (II)	ADL (IV)	IV
12	12.10 (I)	7.80 (I)	8.63 (I)	2.0 (I)	17.0 (I)	1.70 (I)	0.04 (II)	0.04 (I)	II
13	16.57 (I)	7.80 (I)	8.70 (I)	2.33 (I)	2- (I)	1.35 (I)	0.09(III)	0.10 (I)	III
14	16.70 (I)	8.13 (I)	8.90 (I)	4.0 (I)	10.3 (I)	2.85 (I)	0.02 (II)	0.04 (I)	II
15	18.33 (I)	8.10 (I)	9.67 (I)	1.67(I)	17.0 (I)	1.8 (I)	0.02 (II)	0.10 (I)	II
16	15.53(I)	7.90 (I)	5.5 (III)	12.50 (III)	36.67 (II)	ADL (IV)	0.19 (III)	1.04 (III)	IV
17	17.77 (I)	8.67 (I)	8.63 (I)	1.67 (I)	51.67 (III)	0.708 (I)	0.03 (II)	ADL (IV)	IV
18	19.70 (I)	7.90 (I)	7.90 (II)	2.0 (I)	1 (I)	0.08 (I)	0.01 (I)	0.02 (I)	I
19	15.60 (I)	8.20 (I)	7.10 (II)	0.5 (I)	12.50 (I)	0.708 (I)	0.01 (I)	0.02 (I)	I