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The native and non-native new record species for the ichthyofauna of Elekçi River (Turkey)

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Abstract

In this study, fish species living in the Elekçi River, which poured from the borders of Fatsa District of Ordu Province to the Black Sea, were revised as taxonomic. Samplings were taken from Elekçi River using an electroshock device from six pre-determined stations in 2018. According to the results, three of the nine fish species were identified as two native and one non-native new record species for Elekçi River for the first time. These native species are *Alburnoides fasciatus* and *Neogobius fluviatilis*, belonged to two families (Leuciscidae and Gobiidae), respectively. However, other sampled species were found also to be *Capoeta banarescui*, *Barbus tauricus* (Cyprinidae), *Rhodeus amarus* (Acheilognothidae), *Alburnus derjugini, Squalius cephalus* (Leuciscidae) and *Ponticola turani* (Gobiidae) from four families. *Oncorhynchus mykiss* (Salmonidae) was the only unnatural species found in Elekçi River in this study.

Keywords: freshwater fishes, fish fauna, taxonomy, diversity

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Elekçi Irmağı (Türkiye)'nın balık faunası için yeni kayıt doğal ve doğal olmayan türler

Özet

Bu çalışmada Ordu İli'nin Fatsa İlçesi'nin sınırlarından Karadeniz Dökülen Elekçi Irmağı'nda yaşayan balık türleri taksonomik olarak yeniden tanımlanmıştır. Elekçi Irmağı'ndan 2018 yılında önceden belirlenen altı istasyondan elektroşoker kullanılarak örneklemeler gerçekleştirilmiştir. Elde edilen sonuçlara göre, Elekçi Irmağı'nda belirlenen dokuz türden iki tür ve doğal olmayan bir tür yeni kayıt olarak tespit edilmiştir. Bu doğal türler sırasıyla, iki familyadan (Leuciscidae and Gobiidae,) *Alburnoides fasciatus* ve *Neogobius fluviatilis*'tir. Bununla birlikte, diğer türler ise dört familyadan *Capoeta banarescui*, *Barbus tauricus* (Cyprinidae), *Rhodeus amarus* (Acheilognothidae), *Alburnus derjugini, Squalius cephalus* (Leuciscidae) ve *Ponticola turani* (Gobiidae) olarak belirlenmiştir. Bu çalışmada Elekçi Irmağı'nda rastlanan doğal olmayan tek tür *Oncorhynchus mykiss*'di (Salmonidae).

Anahtar kelimeler: tatlısu balıkları, balık faunası, taksonomi, çeşitlilik

Introduction

Knowledge of biological diversity is often a reference to wildlife conservation studies. However, since the world is under the threat of global warming, the determination of the biological heritage to be left to future generations has been the most important issue of natural scientists today. It has been reported that fishes consisted of approximately 50% of vertebrates including mammals, birds, and other tetrapods (72.327 species) [1], reach 35.704 [2]. Ichthyofauna studies in Turkey has started with sending to the UK to identify twenty-sea fish species took from Trabzon by a British explorer in the first half of the nineteenth century [3]. Today, it was reported that exists 384 species in Turkey's inland waters [4], but in another reference notified that the valid freshwater species number of Turkey has reached 401 [5]. Nowadays, this number up to 391 with some studies performed by Kaya et al. [6, 7] and Çiçek [8].

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Elekçi River is one of the longest inland waters of the Ordu Province. Elekçi River continues in the southwest-northeast direction by rising from the plateaus such as Kabadüz Plateau were located 45 km south of Fatsa District Center and flows into the Black Sea by passing through the western side of Fatsa. The River forms the main riverbed when reached İslamdağ (Dağgüvezi Çatağı) locality after passing through the middle of Kumru City located 35 km southwest of the coast and uniting with Akkancık, Boyacılı, Çatılı, Karacalar, Kırkkızlar, Pınaralan, and Soğukpınar streams [9]. Looking at ichthyofaunistic studies in and around Ordu, another research was not found the other inland waters of the Ordu except for Melet River, Gaga Lake, Ilıca and Yalıköy Streams, Turnasuyu Stream, Curi Stream, Elekçi River, Gökçebayır (Tifi) Brook and Ilıca Stream [10-17]. Although there is a decrease in the amount of water due to many hydroelectric power plants, it can cause floods as it is in an important rainfall basin. In this part of the Black Sea, there is an excess of nutrients and soil transport during flood times. This has important ecological advantages and disadvantages for both the river and the Black Sea. The main branch of the river passes through many settlements and this increases the pollution load of the river. These situations may also have important effects on the fish fauna of the river. From this point of view, even if not much time has elapsed as to the previous study performed in Elekçi River, it had caused to the identification of some natural species with this study.

2. Materials and methods

In the study, the fish specimens were sampled from a total of six stations, determined in the coordinates on the map (Figure 1 and Table 1) of Elekçi River in 2018. All fish specimens were obtained with SAMUS™ 725MP electroshock device. Later, fish individuals were maintained in Fatsa Faculty of Marine Science (FFMS) of Ordu University (ODU) for the purpose of species identification and anesthetized with clove oil until their breathing stopped before storing in 4% formaldehyde solution. This study was conducted in accordance with ethics committee procedures of animal experiments.

Afterward, dorsal (*D*), pectoral (*P*), pelvic (*V*) and anal fin (*A*) rays (hard and soft rays) of the fish specimens were counted and lateral line (LL) scale counts were made from the arteriormost scale to the posteriormost one (at the end of the hypural plate). In taxonomic examination and evaluation of fish specimens, they were benefited lots of studies [16, 18-25]. Morphometric characters were measured by a digital caliper (Dasqua®) with 0.01 mm precision and recorded in Microsoft® Excel® according to methods informed in some studies [22, 26-31].

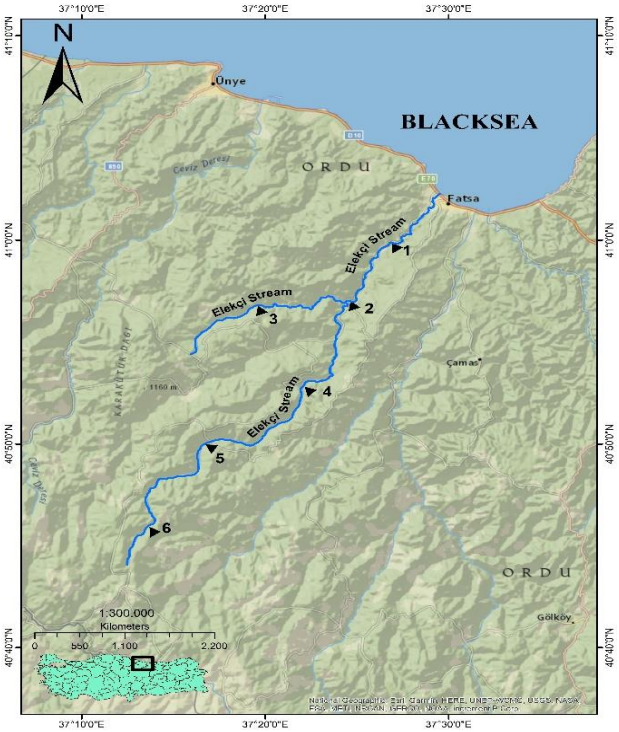


Figure 1. Fish sampling stations in the Elekçi River

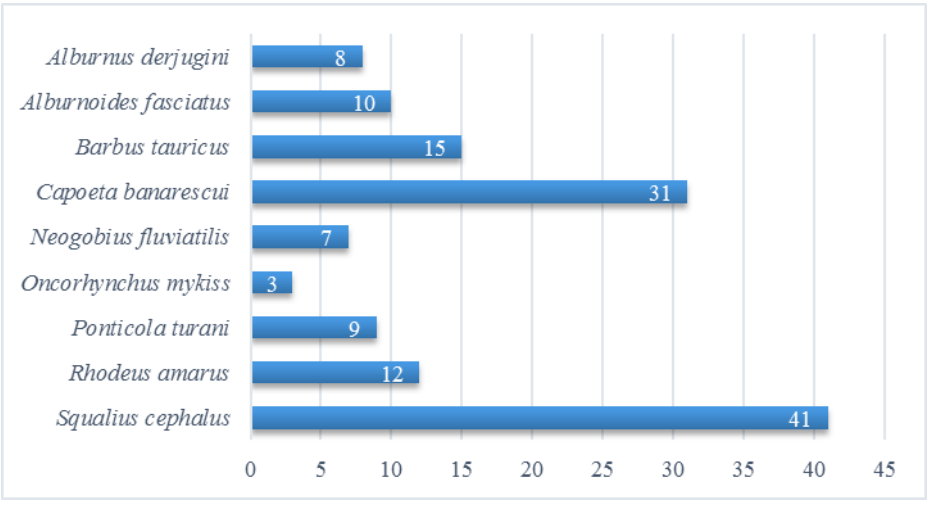
3. Results

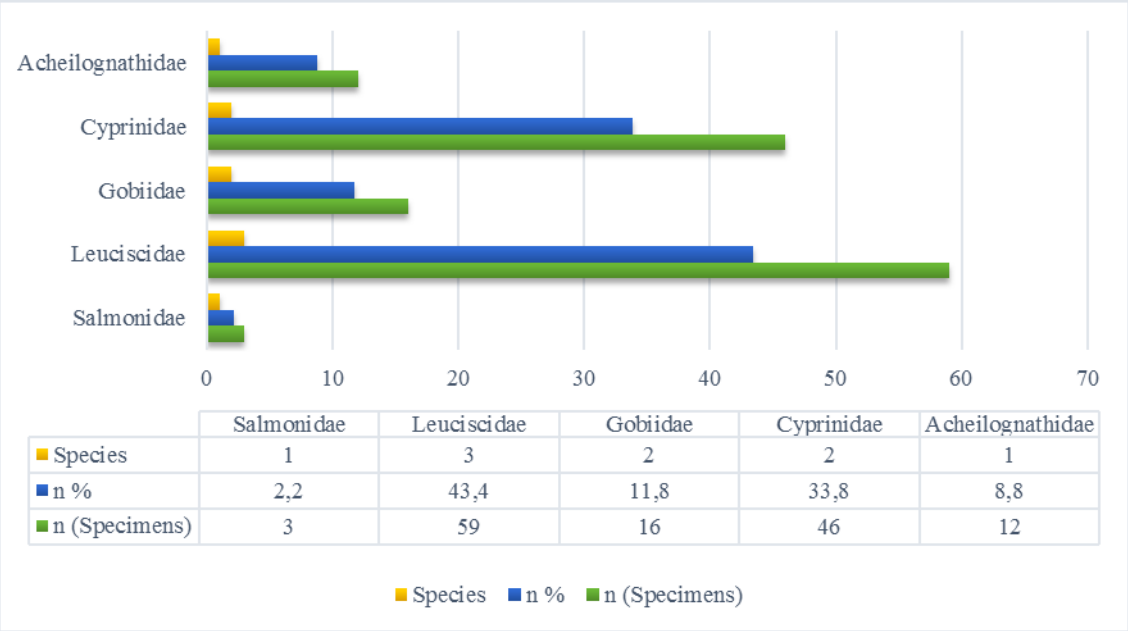
In the field study conducted on Elekçi River, it was determined that the river had a very rugged bed on the side branches except for the main tributary. While no fish was found in the main tributaries of the river, especially near the settlements, many samples were procured in small streams one of the side tributaries of the river such as the third sampling point (Hatipli). As a result of this study, 136 fish samples of 9 species were obtained from Elekçi River (Figure 2). There were presented numerical data about obtained fish species and some specifications of the stations in

Table 1: Longitudes and latitudes of stations, altitudes of stations, and specimen numbers of species by stations.
Table 1. Distribution of species obtained by stations in Elekçi River, st: station no, ∀: altitudes (m), n: sample number

				Species					sample
st	**coordinates**	**∀**	**n**	**Cyprinoids**	**n**	**Gobioids**	**n**	**Salmonid**	**(ODUFFMS)**
1	40°59'52.0" N	55	5	*A. derjugini*	6	*N.*		-	52410-18020
	37°26'53.0" E		2	*B. tauricus*		*fluviatilis*			52410-18030
			16	*S. cephalus*					52410-18090
			9	*R. amarus*					52410-18070
									52410-18050
2	40°56'58.0"N	118	1	*A. fasciatus*	1	*N.*		-	52410-18010
	37°24'22.0"E					*fluviatilis*			52410-18021
			2	*A. derjugini*					52410-18031
			6	*B. tauricus*					52410-18091
			2	*S. cephalus*					
									52410-18051
3	40°56'49.0" N	143	5	*C.*	6	*P. turani*		-	52410-18040
	37°19'37.0" E			*banarescui*					52410-18092
			5	*S. cephalus*					52410-18071
			3	*R. amarus*					
									52410-18060
4	40°56'14.0"N	151	19	*C.*		-	3	*O.*	52410-18041
	37°23'52.0"E			*banarescui*				*mykiss*	52410-18032
			3	*B. tauricus*					52410-18093
			3	*S. cephalus*					
									52410-18100
5	40°55'14.1"N	281	9	*A. fasciatus*	3	*P. turani*		-	52410-18011
	37°23'38.8"E		1	*A. derjugini*					52410-18022
			15	*S. cephalus*					52410-18094
									52410-18061
6	40°55'13.0"N	210	4	*B. tauricus*		-		-	52410-18033
	37°22'13.0"E		7	*C.*					52410-18042
				banarescui					

Like previous faunistic studies in south inland waters of the Black Sea, it was found that cyprinoid species were predominant (Figure 2). However, it was observed that the number of species of cyprinoids decreased in sampling stations in the inner parts of the river. For example, only the *Capoeta* and *Barbus* species were found at station six.





	Salmonidae	Leuciscidae	Gobiidae	Cyprinidae	Acheilognathidae
Species	1	3	2	2	1
n %	2,2	43,4	11,8	33,8	8,8
n (Specimens)	3	59	16	46	12

Figure 2. Percent distribution of fish species achieved from Elekçi River by species number, total sample number (n) of fish families

Family: Cyprinidae

***Barbus tauricus* Kessler, 1877**

(Figure 3)

Type locality: Crimea Peninsula, Ukraine

Examined material. ODUFFMS 52410-18030, 2, 89.11-104.53 mm SL; Turkey: Saraytepe, Fatsa/Ordu: Elekçi River; S. Saygun, 09 Jan 2018. – ODUFFMS 52410-18031, 6, 67.41-111.06 mm SL; Oluklu, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018. – ODUFFMS 52420-18032, 3, 69.66-90.47 mm SL; Salihli, Fatsa/Ordu: Elekçi River; S. Saygun, 30 Apr 2018. – ODUFFMS 52430-18033, 4, 52.53-65.69 mm SL; Gölköy, Fatsa/Ordu: Elekçi River; S. Saygun, 16 Apr 2018.

Meristic characters: D: I/8-9, P: I/12-13, V: I/7-8, A: I/5, LL: 53-54.

Distribution: Crimea barbel restricted to seven streams of Crimea (Black and Azov Sea basins) [32].

Figure 3. *Barbus tauricus*, 111.06 mm SL, ODUFFMS 52410-18031, Oluklu, Fatsa/Ordu, Elekçi River

***Capoeta banarescui* Turan, Kottelat, Ekmekçi and İmamoğlu, 2006**

(Figure 4)

Type locality: Çoruh River

Examined material. ODUFFMS 52410-18040, 5, 44.82-73.21 mm SL; Turkey: Hatipli, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018. – ODUFFMS 52410-18041, 19, 73.16-127.82 mm SL; Salihli, Fatsa/Ordu: Elekçi River; S. Saygun, 30 Apr 2018 – ODUFFMS 52420-18042, 7, 135.00-200.00 mm SL; Gölköy, Fatsa/Ordu: Elekçi River; S. Saygun, 16 Apr 2018.

Meristic characters: D: I/8, P: I/12-14, V: I/7-8, A: I/5, LL: 68-72.

Distribution: Banarescu barb's distributions are only accepted from northeast Turkey from the Çoruh River system, which drains through Georgia and the Black Sea [23].

Figure 4. *Capoeta banarescui*, 113.04 mm SL, ODUFFMS 52410-18041, Salihli, Fatsa/Ordu: Elekçi River

Family: Acheilognothidae
***Rhodeus amarus* (Bloch, 1872)**
(Figure 5)

Examined material. ODUFFMS 52410-18070, 9, 43.31-61.70 mm SL; Turkey: Saraytepe, Fatsa/Ordu: Elekçi River; S. Saygun, 09 Jan 2018. – ODUFFMS 52410-18071, 3, 38.62-57.27 mm SL; Hatipli, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018.

Meristic characters: D: I/8-9, P: I/7-8, V: I/5-6, A: I/8-9, LL: 37-39.

Distribution: The European bitterling distributes Basins of North, southern Baltic, Black, western and southern Caspian and Aegean Seas (from Maritza to Struma drainages); Mediterranean basin, only in northern Rhône (France) and Drin drainages (Albania, Montenegro, Macedonia). Invasive in France in southern Rhône and west of Seine, in southern Russia in Don and Kuban drainages. Introduced to Crimea, Great Britain and northern Italy. Absent in River Ural, Denmark, Scandinavia, Iberian and Apennine Peninsulas, most of Adriatic basin and Black Sea basin, south of Kuban drainage [32].

Figure 5. *Rhodeus amarus* (Bloch, 1872), 49.07 mm SL, ODUFFMS 52410-18070, Saraytepe, Fatsa/Ordu: Elekçi River

Family: Leuciscidae
***Alburnoides fasciatus* (Nordmann, 1840)**
(Figure 6)

Type locality: Rivers of West Transcaucasia

Examined material. ODUFFMS 52410-18010, 1, 66.23 mm SL; Turkey: Saraytepe, Fatsa/Ordu: Elekçi River; S. Saygun, 09 Jan 2018. – ODUFFMS 52410-18011, 9, 66.16-83.14 mm SL; İslamdağ, Fatsa/Ordu: Elekçi River; S. Saygun, 16 Apr 2018.

Meristic characters: D: I/7-8, P: I/11-12, V: I/7, A: I/12-13, LL: 42-44.

Distribution: The Transcaucasian Sprilin distribute from western South Caucasus to Yeşilırmak [33].

Figure 6. *Alburnoides fasciatus* (Nordmann, 1840), 83.17 mm SL, ODUFFMS 52410-18011, İslamdağ, Fatsa/Ordu: Elekçi River

***Alburnus derjugini* Berg, 1923**

(Figure 7)

Type locality: Çoruh River

Examined material. ODUFFMS 52410-18020, 5, 95.91-135-49 mm SL; Turkey: Saraytepe, Fatsa/Ordu: Elekçi River; S. Saygun, 09 Jan 2018. – ODUFFMS 52410-18021, 2, 66.00-121.00 mm SL; Oluklu, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018 – ODUFFMS 52420-18022, 1, 92.49 mm SL; İslamdağ, Fatsa/Ordu: Elekçi River; S. Saygun, 16 Apr 2018.

Meristic characters: D: I/8-9, P: I/11-12, V: I/8, A: I/14-15, LL: 56-58.

Distribution: The Georgian shemaya distributes in eastern Black Sea tributaries, from south of the Caucasus in Russia and Georgia, to the south the Çoruh River in eastern Anatolia and to the west the Sakarya River [34].

Figure 7. *Alburnus derjugini*, 101.52 mm SL, ODUFFMS 52410-18020, Saraytepe, Fatsa/Ordu: Elekçi River

***Squalius cephalus* (Linnaeus, 1758)**

(Figure 8)

Examined material. ODUFFMS 52410-18090, 16, 74.26-157.89 mm SL; Turkey: Saraytepe, Fatsa/Ordu: Elekçi River; S. Saygun, 01 Jan 2018. – ODUFFMS 52410-18091, 2, 115.51-125.22 mm SL; Oluklu, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018 – ODUFFMS 52420-18092, 5, 50.89-67.38 mm SL; Hatipli, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018 – ODUFFMS 52420-18093, 3, 74.21-124.04 mm SL; Salihli, Fatsa/Ordu: Elekçi River; S. Saygun, 30 Apr 2018 – ODUFFMS 52420-18094, 15, 85.90-180.00 mm SL; İslamdağ, Fatsa/Ordu: Elekçi River; S. Saygun, 16 Apr 2018.

Meristic characters: D: I/8-9, P: I/12-14, V: I/8, A: I/7-8, LL: 43-44.

Distribution: The chub ranges Sea of Azov basin (Russia, Ukraine). Landlocked population in Tsimlyansk (Reservoir Don drainage) [32].

Figure 8. *Squalius cephalus*, 120.35 mm SL, ODUFFMS 52410-18090, Saraytepe, Fatsa/Ordu: Elekçi River

Family: Gobiidae

***Neogobius fluviatilis* (Pallas, 1814)**

(Figure 9)

Examined material. ODUFFMS 52410-18050, 6, 62.93-84.78 mm SL; Turkey: Saraytepe, Fatsa/Ordu: Elekçi River; S. Saygun, 09 Jan 2018. – ODUFFMS 52410-18051, 1, 101.03 mm SL; Oluklu, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018.

Meristic characters: D: 1 VI, 2 I/15-17, P: 16-18, A: I/14-15, LL: 66-69.

Distribution: Pontian monkey goby generally distributes Azov and Black Sea basins. Usually close to estuaries. lnvasive in river of northern Black Sea basin. Recorded in l997 from middle Vistula (Poland), which it reached from Dniepr via navigation canal. In Danube upriver to Hungary in Dnieper up to Belarus [32].

Figure 9. *Neogobius fluviatilis*, 70.41 mm SL, ODUFFMS 52410-18050, Saraytepe, Fatsa/Ordu: Elekçi River

***Ponticola turani* Kovačić and Engin, 2008**

(Figure 10)

Type locality: Aksu River

Examined material. ODUFFMS 52410-18060, 6, 50.74-98.53 mm SL; Turkey: Hatipli, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018 – ODUFFMS 52410-18061, 3, 78.52-95.92 mm SL; İslamdağ, Fatsa/Ordu: Elekçi River; S. Saygun, 16 Apr 2018.

Meristic characters: D: 1 V-VI, 2 I/16-17, P: 16-18, A: I/11-13, LL: 60-65.

Distribution: Aksu goby, is one of the endemic species of Turkey, distributes South East Black Sea inland waters.

Figure 10. *Ponticola turani*, 98.53 mm SL, ODUFFMS 52410-18060, Hatipli, Fatsa/Ordu: Elekçi River

Family: Salmonidae

***Oncorhynchus mykiss* (Walbaum, 1792)**

(Figure 11)

Type locality: River McCIoud. Sacrameoto drainage, California, USA [32].

Examined material. ODUFFMS 52410-18100, 3, 172.00-215.00 mm SL; Turkey: Hatipli, Fatsa/Ordu: Elekçi River; S. Saygun, 10 Apr 2018.

Meristic characters: D: I/10, P: I/13, V: I/10, A: I/10, LL: 86-96.

Distribution: The native rainbow trout distributes from Kamchatka and south to lower Amur drainage, and Pacific basin of North America, south to northern Mexico. Established in few Alpine rivers in Austria, Slovenia, Switzerland and in Serechio drainage (Italy) [32].

Figure 11. *Oncorhynchus mykiss*, 198.00 mm SL, ODUFFMS 52410-18100, Hatipli, Fatsa/Ordu: Elekçi River

Alburnoides fasciatus (Leuciscidae), *Neogobius fluviatilis* Gobiidae) and *Oncorhynchus mykiss* (Salmonidae) were first identified, except *Rhodeus amarus*, *Squalius cephalus*, *Capoeta banarecui*, *Barbus tauricus*, *Alburnus derjugini*, *Ponticola turani* (procured from this study (Figures 3 and 4).

In the study, *S. cephalus* was found from each station except sixth in terms of sample number. *N. fluviatilis* and *P. turani* species were achieved from second and third stations only (Table 1). These gobioid species detected in Elekçi River have been the most common species after cyprinoid species. It was *S. cephalus* (30%) found to be the most abundant according to the distribution of fish species in Elekçi River. At the same time, in terms of the species number, it was determined that the most species number within six stations were the second and third stations with eight species.

4. Conclusions and discussion

There was only one taxonomic study of Elekçi River. In this research conducted by Yılmaz [15] in 2012-2013, there were 7 cyprinoids and 1 gobioid in Elekçi River and only the morphometric and meristic characteristics of these species were indicated. There were respectively *Rhodeus sericeus*, *Squalius cephalus*, *Capoeta tinca*, *Capoeta sieboldii*, *Vimba vimba*, *Alburnus chalcoides*, *Barbus tauricus*. Some of the taxa determined in this study were not included in the results of Yılmaz [15] or their systematic status changed due to taxonomic revisions made later. However, only two species identified in this study, *B. tauricus* and *S. cephalus*, were defined to be morphologically similar to the results of the previous study. It was determined that three of the 9 species identified in this study, which were conducted at different times (2018) and did not use the same sampling stations as the previous research. Natural species are *A. fasciatus* and *P. turani* and unnatural was found *O. mykiss* species.

Eggs of *Oncorhynchus mykiss* were first imported in 1882 to Germany. Offspring of these first fishes were distributed throughout Europe but eggs from different origins were imported several more times from North America. Stocks with different spawning seasons were mixed, crossed and selected in order to produce trout of the same market size at all seasons. The rainbow trout cultivated in Europe is a true domesticated species, with little in common with its wild ancestors. In North America, rainbow trout may be anadromous and migrate to sea to forage (steelhead trout). ln northern Europe, rainbow trout is commonly cultivated in marine and brackish waters. Steelhead trout spawning was recently observed in Norway and it is expected that the species will spread across northern Europe. In most areas. stocks of *O. mykiss* are maintained only by regular stocking of hatchery-reared fishes, but many self-sustaining populations have become established in Alpine streams of Austria, Slovenia and probably elsewhere too. This is or may become the case in other hill streams of· central, northern and southern Europe (natural production is apparently not observable in many areas because it is masked by stocking) [32]. Although *O. mykiss* is not a natural species, it was found that it was adapted to the stream although it was mixed from the farms, but no offspring or mature individuals were encountered. Rainbow trout, released into many streams pond, natural and artificial lakes by producing in aquaculture facilities of public and private sector in Turkey, reportedly is located inside the world top 100 invasive species [35]. Trout is cultured although not widespread in the inland waters of Ordu and there are several rainbow trout farming facilities in the spring waters that feed Elekçi River. Therefore, three samples of rainbow trout were obtained at the fourth sampling

point close to these farms. Rainbow trout is not a natural species for Elekçi River, but they may adapt to the river rather than spring water for a short time if they're not hybrid generation releasing into the river.

Yılmaz [15] suggested that this species was *C. tinca* by due to so much resemblance to the other. In this study, determined to be *Capoeta banarescui* differentiating from *C. tinca* with some morphological features clarified by Turan et al. [23] and Bayçelebi et al. [33]. Any samples of *C. sieaboldi*, one of two *Capoeta* species presented in the former study was not obtained in this study. However, *Vimba vimba* reported by Yılmaz [15] could not be found any samples from 6 stations in this research. While *Rhodeus sericeus* indicated in the previous study was not reported in the waters of our country [4, 36], this finding was confirmed by this study and it was determined that there was only *R. amarus* in Elekçi River. Species of *Alburnus chalcoides* reported in the previous study were clarified morphologically to be *Alburnus derjugini* in this study according to some criterias indicating by Bogutskaya et al. [37].

Squalius cephalus and *S. orientalis* are two species that are similar to each other and have been difficulty distinguished. Berg (1949) had identified *S. cephalus* from *S. orientalis* (as subspecies of *S. cephalus*) by the number of branched anal-fin rays (usually $8^{1/2}$ in *S. cephalus* vs. usually $9^{1/2}$ in *S. orientalis*) and body shape (body more elongate in *S. orientalis*) [24, 32]. 86% of the 41 specimens (ODUFFMS 52410-1809) obtained in this study had the specified shape which are quite elongate and have all $8^{1/2}$ branched anal-fin rays.

Neogobius fluviatilis and *Ponticola turani*, which commonly found according to other studies [10-17, 38] in inland waters of the Ordu Region, were also found the less extensively in Elekçi River. The species identified as *Neogobius fluviatilis* according to Yılmaz [15] was corrected as *Ponticola turani* in this study in terms of morphological features mentioned about in the first study reported by Kovačić and Engin [29] and it has been recorded taxonomically a valid species name for this river. On the other hand, *N. fluviatilis* was detected surely in this study for the first time.

As a result, in this study, it was determined that there were two new record natural species *A. fasciatus*, and *N. fluviatilis* and a non-natural species *O. mykiss*, including *R. amarus*, *P. turani*, *A. derjugini* and *C. banarescui*, three renamed species in eight natural of nine species, belonging to five different families (Cyprinidae, Leuciscidae, Acheilognathidae, Gobiidae and Salmonidae) in Elekçi River. In other words, together with the results of the other study, it can be said that the number of species increased to minimum eleven with the addition of new record species in Elekçi River in this study. Besides, it should be considered that aim of the work when starting this study was not to refute the hypothesis of the previous study, but to evaluate the fish of this river taxonomically. Although the stations are different as to previous, in the study, had been come across different fish species, because had made a large number of sampling at different times and periods.

During the sampling period, it was observed that the river water was less than the river bed. Even in the first 15-20 km of the river, even at the sampling points (5^{th} and 6^{th} stations) at higher elevations of the river than in other stations, there is a visible degree of contamination and environmental conditions threaten the habitats of the fish. This is understood by the fact that fish samples are procured from the more clear and clean side brooks that feed the river. Changes that threaten the future of flora and fauna need to be monitored and further physico-chemical studies should be conducted for all year . In addition, there may be a risk that species will be lost due to floods and overflowings in this region, which receives heavy rainfall. It's thought that the lack of adequate sewerage control system and rehabilitation works carried out by official institutions along the river will endanger the fish fauna of Elekçi River. Nevertheless, *O. mykiss* considered as an invasive species must be followed and taken under control if it breeds. Finally, with a large-scale faunistic study including all streams and springs in the river basin, all natural/non-natural fish species should be determined precisely.

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