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Endemic freshwater fishes of Turkey

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Abstract

Turkey shows a notable diversity of habitats, with significant variations in altitude, rainfall, temperature, topography and geological history, which is reflected in its richness of biodiversity. Although there are quite a number of publications on the freshwater fish taxonomy, the data set for endemic freshwater fish as assemblages are poor. According to recent findings, a total of 194 endemic freshwater fish species are now recognised within the political boundaries of Turkey. Endemic fish consist of 47.4% of the Turkish freshwater ichthyofauna (409 species). At the family level, the Cyprinidae comprises the greatest number of endemic species (110 species; 56.7% of the endemic species), followed by the Nemacheilidae (31 species; 16.0%), Cyprinodontidae (18 species; 9.3%), Cobitidae (14 species; 7.2%), Salmonidae (12 species; 6.2%), Gobiidae (7 species; 3.6%), Petromyzontidae (1 species; 0.5%) and Clupeidae (1 species; 0.5%). A total of 143 species (73.71%) are found within a single basin. Considering species diversity, the Konya endorheic basin (64.10%) is the richest in endemics, followed by Burdur (52.38%), Büyük Menderes (40.28%), Van Gölü (38.46%) and Antalya (34.00%). IUCN Red List criteria of 194 endemic species that were evaluated, 18 species (9.3%) are CR, 38 species (19.6%) EN, 17 species (8.8%) VU, 12 species (6.2%) NT, 35 species (18.0%) LC, 11 species (5.7%) DD and 59 species (30.4%) NE. In total, 4 (2.1%) of the species which are endemic to Turkey are already extinct. In this study, the endemic freshwater fish fauna is analysed in terms of their systematic, ecology and distribution pattern for inland basins of Turkey.

Keywords: Endemicity, Anatolia, IUCN Red List, River basins.

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Introduction

Endemic fishes are important part of the natural heritage for each country. Their conservation has implications on a world-wide basis since, by definition, an endemic taxon is found nowhere else. Areas with significant numbers of endemics and/or systematically significant endemics are prime candidates for conservation. On this basis, these areas can be useful indicators to show priorities in management and protection of natural biodiversity (Coad 2006). The high diversity and levels of endemism in freshwater fishes stem largely from the fact that their habitats are highly fragmented, linear and unidirectional (rivers) or completely isolated (many lakes and springs) with rare opportunities for natural range extension (Angela et al. 2016).

Geological and topographic structures are among the main factors affecting species diversity of Turkey. Mountain ranges extend in an east-west direction parallel to the north and south coasts, and are a principal factor in determining ecological conditions. Turkey's freshwaters a notable diversity of habitats, with significant variations in altitude, rainfall, temperature, topography and geological history, which is reflected by its richness of freshwater fishes. Therefore, its zoogeography is of considerable interest (Taşar et al. 2012). The remarkable Turkish biota has interested foreign naturalists and scientists for a long time, with the first discussion of Turkish freshwater fishes dating back to Bennett (1835). Studies, both formal and informal, during the following decades significantly increased the knowledge of the Turkish freshwater fish diversity. Research on the fish fauna of Turkey, including the descriptions of new fish species, was performed by foreign (mainly European) researchers, including Johann Anton Güldenstädt, Albert Günther, Filippo de Filippi, Johann Jakob Heckel, Franz Steindachner, George Albert Boulenger etc. (Fricke et al. 2007). New species recordings have continued in the next century mainly with contributions by Béla Hankó, Werner Ladiges, Mladen S. Karaman, Teodor Nalbant, Petru Banarescu, Nina G. Bogutskaya, Jörg Freyhof etc. The outstanding work of Prof. Curt Kosswig from 1937

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to 1955 resulted in an increase of fisheries research, together with an increasing awareness of fish taxonomy among Turkish researchers (Bilecenoğlu et al. 2014). In this study the endemic freshwater fish fauna is analysed in terms of their systematic and ecology. Moreover, the IUCN Red List criteria and threats for the endemic fish species are discussed.

Material and Methods

The species in the following list are compiled from two different sources of information. The data were cross-checked and supplemented by information of recent publications dealing with species present regarding the inland waters of Turkey and/or describing new species of fishes from Turkey. We follow the family classification of Van der Laan et al. (2014), with orders, families and subfamilies arranged systematically, but genera and species alphabetically within each family/subfamily. The actual taxonomic status of the species follows Eschmeyer et al. (2018) unless mentioned otherwise. The higher classification follows Nelson et al. (2016). Repositories follow Fricke and Eschmeyer (2018). English names of fish follow Fricke et al. (2007) and Froese and Pauly (2016), most of the Turkish names of fish follow Geldiay and Balık (2007). The definition of areas of endemism follows Harold and Mooi (1994).

All species were classified according to their IUCN Red List Categories (IUCN 2016): Abbreviations are; [NE] Not evaluated, [DD] Data Deficient, [LC] Least Concern, [NT] Near Threatened, [VU] Vulnerable, [EN] Endangered, [CR] Critically Endangered and [EX] Extinct.

Results

Systematics: Up to date, a total of 409 fish species reported from freshwater ecosystems of Turkey (Çiçek et al. 2015, 2016, Emiroğlu et al. 2016, Yoğurtçuoğlu and Ekmekçi, 2018). The earliest described endemic species is *Alburnus tarichi* in 1814, with 12 other species in the 19th century. Of which 87 species were identified in 20th century and others (94 species) were identified in the last two decades (Fig. 1). The endemic fish species are given below in systematic order.

Class Petromyzonti

Order Petromyzontiformes

Family Petromyzontidae Bonaparte, 1831

Lampetra lanceolata Kux & Steiner, 1972 [Turkish brook lamprey/Türk dokuzgözlüsü] [EN]

Lampetra lanceolata Kux and Steiner (1972): 377, figs. 1-3, 6, 10 (upstream of Iyidere River, Trabzon, Turkey; holotype: MMB 2077/2).

Distribution: Black Sea tributaries, Anatolia.

Class Actinopterygii

Order Clupeiformes

Family Clupeidae Cuvier, 1816

Genus *Clupeonella* Kessler, 1877 (1 species)

Clupeonella muhlisi Neu, 1934 [Marmara sprat, Apolyont sprat/Cüce ringa, filisa balığı] [NE]

Clupeonella muhlisi Neu (1934): 446, fig. 1 (Lake Apolyont [Uluabat Gölü], Marmara Region, Turkey; no types known).

Distribution: Uluabat Gölü, Bursa Province.

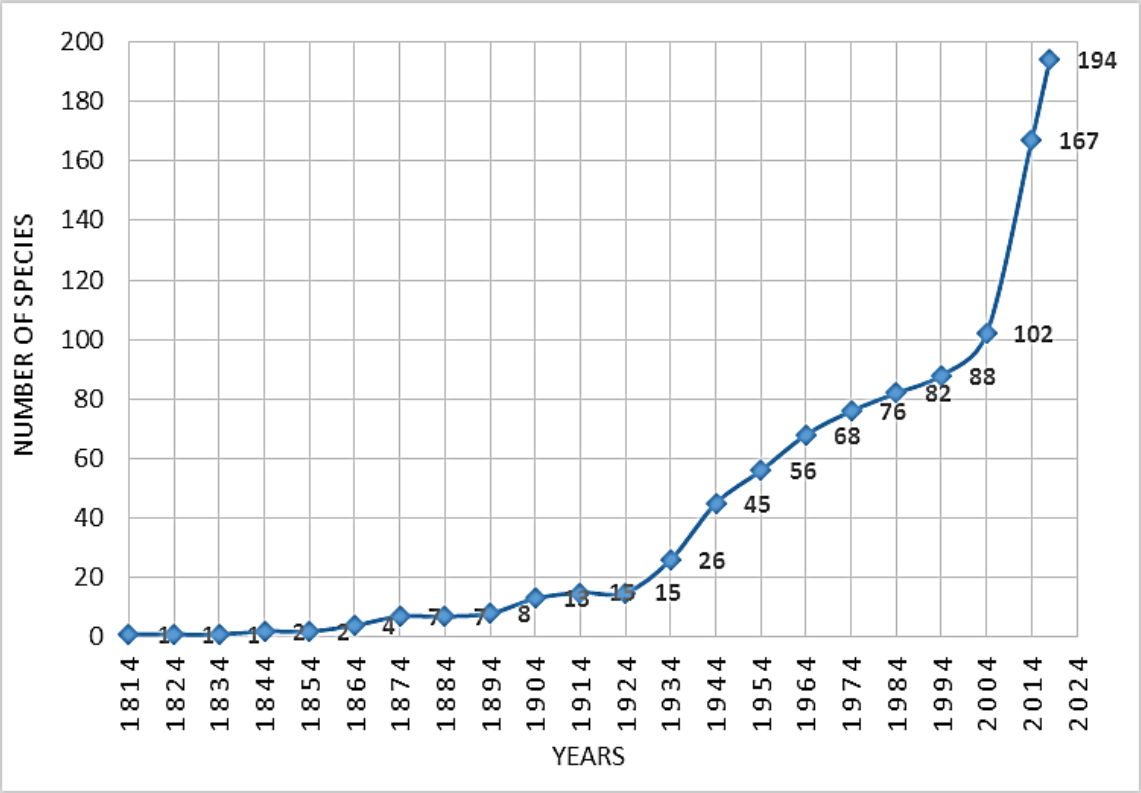

Figure 1. Description of endemic freshwater fishes of Turkey from 1814 to now in each decade.

Order Cypriniformes
Family Cyprinidae Rafinesque, 1815
Genus *Capoeta* Valenciennes, 1842 (12 species)
Capoeta antalyensis (Battalgil, 1944) [Antalya barb/Siraz balığı] [VU]
Varicorhinus antalyensis Battalgil (1944): 132, fig. 4 (Antalya, southwestern Turkey; no types known).
Distribution: Mediterranean tributaries, Antalya Province.

Capoeta aydinensis Turan, Küçük, Kaya, Güçlü & Bektaş, 2017 [Aydin barb/Siraz balığı] [NE]
Capoeta aydinensis Turan et al. (2017): 437, Figs. 1a-b, 2a-d, 3 (Turkey, Aydin Province, Çine Stream, Büyük Menderes drainage, 37°25'N, 28°08'. Holotype: FFR 01926. Paratypes: FFR, IUSHM)
Distribution: Büyük Menderes Basin, western Anatolia.

Capoeta bergamae Karaman, 1969 [Bergama barb/Siraz balığı] [NT]
Capoeta bergamae Karaman (1969): 29, pl. 1 (fig. 5), pl. 4 (fig. 3) [Southwestern Anatolia, Turkey; syntypes: ZMH H4146 and 3897 (7), 3597 (5), 3603 (2)].
Distribution: Aegean Sea tributaries, western Anatolia.

Capoeta caelestis Schöter, Özuluğ & Freyhof, 2009 [Taurus scraper/Siraz balığı] [LC]
Capoeta caelestis Schöter et al. (2009): 230, figs. 1-4 (Göksu River, at Göksu, below Göksu power station, approximately 80 kilometres northwest of Silifke, 37°02.74'N, 32°44.56'E, Karaman Province, Turkey; holotype: IUSHM 37930-252).
Distribution: Mediterranean tributary, Göksu River, Antalya and Karaman provinces.

Capoeta ekmekciae Turan, Kottelat, Kirankaya & Engin, 2006 [Grusinian scraper/Siraz balığı] [NT]
Capoeta ekmekciae Turan et al. (2006): 148, figs. 1-2, 4a (Çoruh River, Borçka, 30 kilometres north of Artvin, 41°22'N, 41°41'E, Artvin Province, Turkey; holotype: ESFM-PISI/2004-076).
Distribution: Black Sea tributary, Çoruh River basin, Artvin Province.

Capoeta erhani Turan, Kottelat & Ekmekçi, 2008 [Ceyhan scraper/Siraz balığı] [LC]
Capoeta erhani Turan et al. (2008b): 264, figs. 1-2a (Ceyhan drainage, Menzelet Reservoir, Geçit stream on road from Kahramanmaraş to Adana, 37°37'N, 36°39'E, Kahramanmaraş Province, Turkey; holotype: FFR 776).
Distribution: Mediterranean tributary, Ceyhan River basin.

Capoeta kosswigi Karaman, 1969 [Van barb/Siraz balığı] [DD]
Capoeta capoeta kosswigi Karaman (1969): 31, pl. 1 (fig. 4), pl. 5 (fig. 1) [Lake Van, Turkey; syntypes: ZMH 4145 and 3565 (9), 3591 (1)].
Distribution: Van Gölü and Van Gölü tributaries, Van and Bitlis provinces.

Capoeta mauricii Küçük, Turan, Şahin & Gülle, 2009 [Longsnout scraper/Siraz balığı] [EN]
Capoeta mauricii Küçük et al. (2009): 73, figs. 1-2 (Sanöz Stream, 1 kilometre west of Beyşehir, Lake Beyşehir drainage, Konya Province, Turkey; holotype: FFR 3800).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries.

Capoeta oguzelii Elp, Osmanoğlu, Kadak & Turan, 2018 Oghuzs barb/Siraz balığı [NE]
Capoeta oguzelii Elp et al. (2018): 104, Figs. 1-5, Ezine Stream at Devrekani, Black Sea drainage, Kastamonu province, Turkey, 41°44'02"N, 33°52'58"E. holotype: FCME 2017-05a., paratypes FCME 2017-05b)
Distribution: Ezine Stream, southern Black Sea basin.

Capoeta pestai (Pietschmann, 1933) [Egirdir barb/Siraz balığı] [CR]
Varicorhinus pestai Pietschmann (1933): [1] 21 (Egirdir Lake, Turkey; syntypes: MSNM 34 (1); RMNH 24395 (1 out of 2).
Distribution: Eğirdir Gölü and Eğirdir Gölü tributaries, Isparta Province.

Capoeta tinca (Heckel, 1843) [Anatolian khramulya/Kara balığı, Siraz balığı] [LC]
Scaphiodon tinca Heckel (1843): [31] 1021 (Bursa, Nilüfer River basin, Turkey; lectotype: NMW 55931:1; lectotype designated by Bănărescu & Herzig-Straschil in Bănărescu 1999:413).
Distribution: Marmara Sea tributaries, Bursa Province.

Capoeta turani Özuluğ & Freyhof, 2008 [Seyhan scraper/Siraz balığı] [NT]
Capoeta turani Özuluğ and Freyhof (2008a): 290, figs. 1-3 (Çakit Stream, south of Salbas, lower part of River Pozanti, 37°05.77'N, 35°07.02'E, Adana Province, Turkey; holotype: IUSHM 36300-100).
Distribution: Mediterranean tributary, Seyhan River basin.

Genus ***Barbus*** Cuvier, 1816 (5 species)
Barbus anatolicus Turan, Kaya, Geiger & Freyhof, 2018 [Barbel/Bıyıklı balık] [NE],
Barbus anatolicus Turan et al. (2018): 539-557, figs. 3-7 (Kırşehir prov., Kızılırmak River at Kesikköprü, 38°57'39"N-34°11'57"E, Holotype: FFR 08811)

Distribution: Kızılırmak and Yeşilırmak River drainages in northern Anatolia.

Barbus ercisianus Karaman, 1971 [Ercis barbel/Bıyıklı balık] [DD]
Barbus plebeius ercisianus Karaman (1971): 204 [Ercis, Lake Van and road from Ercis to Patnos, Turkey; syntypes: ZMH H4208 and 3566 (5), H3567 (13)].
Distribution: Van Gölü tributaries, Van and Bitlis provinces.

Barbus escherichii (Steindachner, 1897) [Ankara barbel/Bıyıklı balık] [LC]
Barbus lacerta var. escherichii Steindachner (1897): 688 [4], pl. 2 (figs. 1-1a) [Ankara, Turkey; syntypes: NMW 54086-87 (4, 4), 54158 (7), 54232-33 (1, 3), 78221 (1)].
Barbus tauricus var. artvinica Kamensky 1899: 32 (Çoruh River basin, Turkey; holotype: ZIN 11530).
Distribution: Black Sea tributaries, Anatolia.

Barbus niluferensis Turan, Kottelat & Ekmekçi, 2009 [Nilüfer barbel/Bıyıklı balık] [NT]
Barbus niluferensis Turan et al. (2009a): 21, figs. 2b, 3b, 5 (Karaköprü Stream, entering Doganci Reservoir, Nilüfer River drainage, 40°04'N, 29°00'E, Orhangazi County, Bursa Province, Turkey; holotype: FFR 381).
Distribution: Marmara Sea tributaries, Nilüfer River basin, Bursa Province.

Barbus oligolepis Battalgil, 1941 [Marmara barbel/Bıyıklı balık] [LC]
Barbus tauricus oligolepis Battalgil (1941): 178 (Simav River at Bursa, Turkey; no types known).
Distribution: Marmara Sea tributaries, Bursa Province.

Genus ***Garra*** Hamilton, 1822 (2 species)
Garra kemali (Hankó, 1925) [Eregli minnow/Galyon balığı] [EN]
Varicorhinus kemali Hankó (1925): 149, pl. 3 (fig. 4) [Eregli, Turkey; syntypes: (5) MNHN 1928-0219 (1)].
Tylognathus (Neotylognathus) klatti Kosswig 1950: 409, fig. 4 (Egridir, Turkey; holotype: ZMUI uncat.).
Distribution: Central Anatolian lake tributaries, Isparta and Konya provinces.

Garra menderesensis (Küçük, Bayçelebi, Güçlü & Gülle, 2015) [Menderes minnow/Galyon balığı] [NE]
Hemigrammocapoeta menderesensis Küçük et al. (2015): 360, figs. 1, 2, 4 (Denizli, Lake Işıklıl, Büyük Menderes River, Turkey; holotype: IFC-ESUF 03-1300a).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Genus ***Luciobarbus*** Heckel, 1843 (3 species)
Luciobarbus kottelati Turan, Ekmekçi, Ilhan & Engin, 2008 [Menderes barbel/Bıyıklı balık] [VU]
Luciobarbus kottelati Turan et al. (2008a): 40, fig. 3b, 5 (River Büyük Menderes, Dandalas Stream, Karacasu, 90 kilometres south of Aydin, Aydin Province, Turkey; holotype: IUSHM 27300-879).
Distribution: Aegean Sea tributary, Büyük Menderes River, Aydın Province.

Luciobarbus lorteti (Sauvage, 1882) [Lortet's barbel/Maya balığı] [DD]
Barbus lorteti Sauvage (1882): 165 (Asih Nehri at Hatay, 36°12'N, 36°13'E, Turkey; lectotype: MNHN A-3935; lectotype designated by Krupp 1985: 64).
Distribution: Mediterranean tributary, Asi Nehri basin [Orontes], Hatay Province.

Luciobarbus lydianus (Boulenger, 1896) [Lydian barbel/Bıyıklı balık] [LC]
Barbus lydianus Boulenger (1896): 153 [Gediz River, Izmir Province, Turkey; syntypes: BMNH 1893.1.14.9-12 (4), 1895.12.28.18 (1)].
Distribution: Aegean Sea tributary, Gediz River, Izmir Province.

Genus ***Schizothorax*** Heckel, 1838 (1 species)
Schizothorax prophylax Pietschmann, 1933 [Egirdir marinka/-] [NE]
Schizothorax prophylax Pietschmann (1933): [2] 21 [Egirdir Lake. Syntypes: (4) whereabouts unknown].
Distribution: Eğirdir Gölü, Isparta Province.

Genus ***Gobio*** Cuvier, 1816 (11 species)
Gobio artvinicus Turan, Japoshvili, Aksu & Bektaş, 2016 [Artvin gudgeon/Dere kaya balığı] [NE]
Gobio artvinicus Turan et al. (2016b): 6, Figs. 3b, 5 (Artvin Province, Aralık Stream, a drainage of Çoruh River, Black Sea basin, Turkey; holotype: FFR 2507).
Distribution: Black Sea tributary, Çoruh River basin, Artvin Province.

Gobio baliki Turan, Kaya, Bayçelebi & Bektaş, 2017 [Gudgeon/Dere kaya balığı] [NE]
Gobio baliki Turan et al. (2017): 285, Figs. 1-2, Stream Asar at Kaynaşlı, Düzce province, Turkey, 40°46'52"N, 31°16'37"E. Holotype: FFR 05966)
Distribution: Büyük Melen drainage, southern Black Sea basin.

Gobio battalgilae Naseka, Erk'akan & Küçük, 2006 [Eyilikler gudgeon/Kaya balığı] [DD]
Gobio battalgilae Naseka et al. (2006): 187, figs. 3, 5a (Eyilikler Deresi, northern Beysehir Lake basin, Turkey; holotype: HUICNN KKB-7).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Gobio gymnostethus Ladiges, 1960 [Cappadocian gudgeon/Derekayası] [CR]
Gobio gobio gymnostethus Ladiges (1960): 137, fig. 9 (Kizilcak creek, Nigde, Turkey; holotype: ZMH H1131).
Distribution: Eastern Tuz Gölü basin.

Gobio hettitorum Ladiges, 1960 [Anatolian gudgeon/Derekayası balığı] [CR]
Gobio hettitorum Ladiges (1960): 137, fig. 10 (Gök dere, Karaman, Turkey; holotype: ZMH H1129).
Distribution: Southern Tuz Gölü basin.

Gobio insuyanus Ladiges, 1960 [Cihanbeyli gudgeon/Derekayası] [CR]
Gobio gobio insuyanus Ladiges (1960): 136, fig. 8 [Insuyu creek, Cihanbeyli, Turkey; holotype: ZMH H1133 (missing)].
Distribution: Western Tuz Gölü basin.

Gobio intermedius Battalgil, 1944 [Eber gudgeon/Derekayası] [EN]
Gobio gobio intermedius Battalgil (1944): 130, fig. 3 (Eber Lake, Vilâyet Afyon Karahisar, western central Turkey; lectotype: ZMH H1135; lectotype designated by Bănărescu & Nalbant 1973: 119).
Distribution: Eber Gölü and Akşehir Gölü basins, Afyonkarahisar and Konya provinces.

Gobio kizilirmakensis Turan, Japoshvili, Aksu & Bektaş, 2016 [Kizilirmak gudgeon/Dere kaya balığı] [NE]
Gobio kizilirmakensis Turan et al. (2016b): 3, figs. 1-2, 3a (Çankırı Province, Ulusu Stream, Kızılırmak River drainage, Turkey, 40°48'N, 32°53'E; holotype: FFR 05930).
Distribution: Black Sea tributary, Kızılırmak River basin.

Gobio maeandricus Naseka, Erk'akan & Küçük, 2006 [Isikli gudgeon/Kaya balığı] [EN]
Gobio maeandricus Naseka et al. (2006): 188, fig. 8 (Büyük Menderes River, Işıklı, Denizli Province, Turkey; holotype: ZMH 1132).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Gobio microlepidotus Battalgil, 1942 [Beysehir gudgeon/Yağlıca, derekayası] [VU]
Gobio gobio microlepidotus Battalgil (1942): 294, fig. 5 (Beysehir Gölü, Turkey; lectotype: ZMH H1127; lectotype designated by Naseka et al. 2006: 189).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Gobio sakaryaensis Turan, Ekmekçi, Luskova & Mendel, 2012 [Sakarya gudgeon/Dere kaya balığı] [LC]
Gobio sakaryaensis Turan et al. (2012a): 57, figs. 1-2 (Tozman Stream, 40°04'N, 30°30'E, Bilecik Province, Turkey; holotype: FFR 2504).
Distribution: Black Sea tributaries, Sakarya River basin and Tozman Stream.

Genus ***Acanthobrama*** Heckel, 1843 (2 species)
Acanthobrama orontis Berg, 1949 [Orontes bream/Akçapak] [NE]
Acanthobrama marmid orontis Berg (1949): 839 [Lake Antioch, Hatay, Turkey; syntypes: ZIN 6720 (1)].
Distribution: Mediterranean tributary, Asi Nehri basin [Orontes], Hatay Province.

Acanthobrama thisbeae Freyhof & Özuluğ, 2014 [Ceyhan bream/Akçapak, Takta balığı] [NE]
Acanthobrama thisbeae Freyhof and Özuluğ (2014): 2, figs. 1-3 (Adana Province, Ceyhan River north of Sakarcalik, 37°11'36"N, 36°04'58", Turkey; holotype: IUSHM 2010-992).
Distribution: Mediterranean tributary, Ceyhan River basin, Adana Province.

Genus ***Alburnoides*** Jeitteles, 1861 (8 species)
Alburnoides diclensis Turan, Bektaş, Kaya & Bayçelebi, 2016 [Dicle spirlin/Noktalı inci balığı] [NE]
Alburnoides diclensis Turan et al. (2016a): 81, fig. 2 (Eziki stream, Tigris River drainage, Hakkari Province, Turkey, 37°40'38"N, 43°51'84"E; holotype: FFR01118).
Distribution: Persian Gulf tributary, upper Tigris River [Dicle Nehri] basin.

Alburnoides emineae Turan, Kaya, Ekmekçi & Doğan, 2014 [Beyazsu spirlin/Noktalı inci balığı] [NE]
Alburnoides emineae Turan et al. (2014b): 103, fig. 2 (Mardin Province, Beyazsu Stream, Euphrates River drainage, Turkey, 37°10'30"N, 41°16'13"E; holotype: FFR 01026).
Distribution: Persian Gulf tributary, Euphrates River [Firat Nehri] basin, Mardin Province.

Alburnoides freyhofi Turan, Kaya, Bayçelebi, Bektaş & Ekmekçi, 2017 [Spirlin/Noktalı inci balığı] [NE]
Alburnoides freyhofi Turan et al. (2017): 569, Figs. 2e, 4, Stream Delice southeast of Yerköy, Yozgat Province, southern Black Sea basin, Turkey, 39°37'19"N, 34°29'23"E; holotype: FFR 01065)

Distribution: Kızılırmak River drainage, southern Black Sea basin.

Alburnoides kosswigi Turan, Kaya, Bayçelebi, Bektaş & Ekmekçi, 2017 [Spirlin/Noktalı inci balığı] [NE]
Alburnoides koswigi Turan et al. (2017): 573, Figs. 2f, 5, Stream Porsuk about 3 km south of Hacıazizler, Kütahya Province, southern Black Sea basin, Turkey, 39°20'59"N, 30°02'17"E. Holotype: FFR 01064)
Distribution: Sakarya River drainage, southern Black Sea basin.

Alburnoides kurui Turan, Kaya, Bayçelebi, Bektaş & Ekmekçi, 2017 [Spirlin/Noktalı inci balığı] [NE]
Alburnoides kurui Turan et al. (2017): 567, Figs. 2a, 3, Stream Tifi at Gökçebayır, Ordu Province, southern Black Sea basin, Turkey, 40°47'57"N, 36°43'50"E. Holotype: FFR 01041)
Distribution: Yeşilırmak River drainage, southern Black Sea basin.

Alburnoides manyasensis Turan, Ekmekçi, Kaya & Güçlü, 2013 [Manyas spirlin/Noktalı inci balığı] [LC]
Alburnoides manyasensis Turan et al. (2013a): 88, figs. 2-3 (Lake Manyas drainage, Koca Stream at outlet of Manyas Dam Lake, Balikesir Province, Turkey, 39°59'26"N, 27°47'58"E; holotype: FFR 01069).
Distribution: Marmara Sea tributaries, Balıkesir Province.

Alburnoides smyrnae Pellegrin 1927 [Izmir spirlin/Noktalı inci balığı] [NE]
Alburnoides bipunctatus smyrnae Pellegrin (1927): 37 (Mélèl stream=Kemer Çayı, near Smyrna, Turkey. Syntypes: BMNH 1927.5.7.6 (1) [ex MNHN]; MNHN 1927-0064 (16); MSNM 6 [ex MSNM 4412 and ex MNHN]).
Distribution: Büyük Menderes basin.

Alburnoides velioglui Turan, Kaya, Ekmekçi & Doğan, 2014 [Velioglu's chub/Noktalı inci balığı] [NE]
Alburnoides velioglui Turan et al. (2014b): 106, fig. 3 (Erzurum Province, Sirli Stream, Euphrates River drainage, 40°12'34"N, 41°4'30"E, Turkey; holotype: FFR 01094).
Distribution: Persian Gulf tributary, Euphrates River [Firat Nehri] basin, Erzurum Province.

Genus ***Alburnus*** Rafinesque, 1820 (18 species)
Alburnus adanensis Battalgazi, 1944 [Adana bleak/Inci balığı] [NE]
Alburnus sellal adanensis Battalgazi (1944): 302 (Lower Seyhan River, near Adana, southern Turkey. Syntype: IUSHM 2017-1368).
Distribution: Seyhan basin.

Alburnus akili Battalgil, 1942 [Beysehir bleak/Gövce] [EX]
Alburnus akili Battalgil (1942): 288, fig. 2 (Beyşehir Gölü, Turkey; holotype: ZMH H1107).
Distribution: Beyşehir Gölü, Isparta and Konya provinces.

Alburnus attalus Özuluğ & Freyhof, 2007 [Bakir shemaya/Gümüş balığı] [EN]
Alburnus attalus Özuluğ and Freyhof (2007): 235, figs. 1-3 (River Bakir at Karadere, 39°06.033'N, 27°24.027'E, Izmir Province, Turkey; holotype: ZMB 33733).
Distribution: Aegean Sea tributary, Bakırçay, Izmir Province.

Alburnus baliki Bogutskaya, Küçük & Ünlü, 2000 [Antalya bleak/Inci balığı] [EN]
Alburnus baliki Bogutskaya et al. (2000): 57, fig. 1 (Manavgat Reservoir, Manavgat River, Antalya, Turkey; holotype: DUM 63).
Distribution: Mediterranean Sea tributary, Manavgat River, Antalya Province.

Alburnus battalgilae Özuluğ & Freyhof, 2007 [Gediz shemaya/Inci balığı] [VU]
Alburnus battalgilae Özuluğ and Freyhof (2007): 238, figs. 4-6 (Lake Gölmarmara at outlet, 38°35.437'N, 28°02.965'E, Turkey; holotype: ZMB 33735).
Distribution: Aegean Sea tributary, Gediz River basin, Manisa Province.

Alburnus carianorum (Mangit & Yerli, 2018) [Antalya bleak/Inci balığı] [NE]
Alburnus kurui Mangit & Yerli (2018): 303, Fig. 6, Dalaman River, 4 km SE of Ortaca, 1 km W of bridge D400, Mugla, Turkey, 36°48.880'N, 28°47.607'E. Holotype: HUSal 480301).
Distribution: Lower Dalaman and Büyük Menderes River drainages, Turkish Aegean Sea basin, southwest Turkey.

Alburnus carinatus Battalgil, 1941 [Manyas shemaya/Inci balığı] [EN]
Alburnus (Chalcalburnus) chalcoides carinatus Battalgil (1941): 179 (Lake Manyas, Turkey; syntypes: whereabouts unknown).
Distribution: Marmara Sea tributaries, Manyas Gölü and Ulubat Gölü, Balıkesir and Bursa provinces.

Alburnus demiri Özuluğ & Freyhof, 2008 [Eastern Aegean bleak/Inci balığı] [VU]
Alburnus demiri Özuluğ and Freyhof (2008b): 308, figs. 1-2 (Stream Tahtah at Saşal village, 38°11.948'N, 27°08.148'E, Izmir Province, Turkey; holotype: ZMB 33768).
Distribution: Aegean Sea tributary, Tahtahçay, Izmir Province.

Alburnus escherichii Steindachner, 1897 [North Caucasian bleak/Inci balığı] [LC]
Alburnus escherichii Steindachner (1897): [8] 692, pl. 4 (fig. 3) [Tabakane Su and Çibuk Çai, Turkey; syntypes: NMW 55517-18 (3, 8), 55520-21 (3, 3)].
Distribution: Black Sea tributaries, Sakarya and Kızılırmak basins, Anatolia.

Alburnus goekhani Özuluğ, Geiger & Freyhof, 2018 [Bleak/Inci balığı] [NE]
Alburnus goekhani Özuluğ et al. (2018): 34, Figs. 3-5, Kızılırmak River at Ortatopaç northwest of Şarkışla, Sivas Province, Turkey, 39.381N, 36.250E. Holotype: IUSHM 2017-1375).
Distribution: Catchments of the Rivers Kızılırmak and Yeşilırmak in the southern Black Sea basin.

Alburnus heckeli Battalgil, 1944 [Hazer bleak/Hazar inci balığı] [LC]
Alburnus heckeli Battalgil (1944): 128, fig. 2 [Hazer Gölü, near Elazig, upper Tigris River system, eastern central Turkey; syntypes: ? ZMH H1109 (1)].
Distribution: Persian Gulf tributaries, Hazer Gölü, Tigris River [Dicle Nehri] basin.

Alburnus istanbulensis Battalgil, 1941 [Thracian shemaya/Inci balığı] [LC]
Alburnus (Chalcalburnus) chalcoides istanbulensis Battalgil (1941): 180 (Kagithane stream, draining to Bosphorus River, near Istanbul, Turkey; syntypes: whereabouts unknown).

Distribution: Marmara Sea and Black Sea tributaries, coastal streams of eastern Thrace.

Alburnus kotschyi Steindachner, 1863 [Arsuz bleak/Inci balığı] [LC]
Alburnus kotschyi Steindachner (1863): 193 [Arsuz, Turkey, Mediterranean watershed; syntypes: (many): not yet found at NMW].
Distribution: Mediterranean Sea tributaries, Hatay Province.

Alburnus kurui (Bogutskaya, 1995) [Tigris bleak/Inci balığı] [NE]
Leuciscus kurui Bogutskaya (1995); 150, Fig. 1, Yüksekova Suyu in Upper Tigris River [Dicle Nehri] basin, east of Hakkâri, Hakkâri Province, southeastern Turkey. Holotype: ZMH 7361. Paratypes: ZMH 8413).
Distribution: Yüksekova wetland, Upper Tigris River basin.

Alburnus nasreddini Battalgil, 1944 [Eber bleak/Inci balığı] [CR]
Alburnus nasreddini Battalgil (1944): 126, fig. 1 (Eber Lake, Vilâyet Afyon Karahisar, western central Turkey; no types known).
Distribution: Eber Gölü, Afyonkarahisar Province.

Alburnus nicaeensis Battalgil, 1941 [Iznik shemaya/Inci balığı] [EX]
Alburnus (Chalcalburnus) chalcoides nicaeensis Battalgil (1941): 179 (Lake Iznik, Turkey; syntypes: whereabouts unknown).
Distribution: Marmara Sea region, Iznik Gölü, Bursa Province.

Alburnus tarichi (Güldenstädt in Pallas, 1814) [Van bleak/Inci kefali] [NT]
Alburnus tarichi Güldenstädt in Pallas (1814): 335 (Lake Gotscha, Armenia/erroneous, is Lake Van, Turkey; no types known).
Leuciscus vanensis Günther 1868: 236 (Lake Van, Turkey; holotype: BMNH 1976.10.5.1).
Distribution: Van Gölü, Van and Bitlis provinces.

Alburnus timarensis Kuru, 1980 [Karasu Sha Kuli/Inci kefali] [NT]
Alburnus timarensis Kuru (1980): 97, fig. 1 (Karasu River, Yumrutepe-Timar, Lake Van tributary, Turkey; holotype: ZMHACU 1).
Distribution: Van Gölü tributary, Karasu, Van Province.

Genus ***Chondrostoma*** Agassiz, 1832 (8 species)
Chondrostoma angorense Elvira, 1987 [Ankara nase/Kababurun] [LC]
Chondrostoma nasus angorensis Elvira (1987): 117 (Eskisehir, Turkey; holotype: NMW 52234:1).
Distribution: Black Sea tributaries, Sakarya and Kızılırmak basins, Anatolia.

Chondrostoma beysehirense Bogutskaya, 1997 [Beysehir nase/Kababurun balığı] [EN]
Chondrostoma beysehirense Bogutskaya (1997a): 153, fig. 1 (Beyşehir Gölü. Holotype: ZMH 8812).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Chondrostoma ceyhanensis Küçük, Turan, Güçlü, Mutlu & Çiftçi, 2017 [Nase/Kababurun balığı] [NE]
Chondrostoma ceyhanensis Küçük et al. (2017): 798, Figs. 4b, 5c, 6b, 7, 8, Sır Dam Lake, Ceyhan River,

Kahramanmaraş Province, Turkey, 38°32.239'N, 33°10.887'E. Holotype: IFC-ESUF 03-1555).
Distribution: Ceyhan, Seyhan and Berdan River basins.

Chondrostoma fahirae (Ladiges, 1960) [Tefenni nase/Incilevrek balığı] [EN]
Phoxinellus fahirae Ladiges (1960): 141, fig. 14 (Kirkpinar, near Tefenni, southwestern Burdur Province, Turkey; holotype: ZMH H1104).
Distribution: Burdur Gölü tributary, Kirkpinar, Burdur Province.

Chondrostoma holmwoodii (Boulenger, 1896) [Izmir nase/Kababurun balığı] [VU]
Capoeta holmwoodii Boulenger (1896): 153 (between north coast of Izmir and Troia, Turkey; syntypes: BMNH 1893.1.14.7-8 (2)].
Distribution: Aegean Sea tributaries, western Anatolia.

Chondrostoma meandrense Elvira, 1987 [Menderes nase/Kababurun balığı] [VU]
Chondrostoma holmwoodii meandrensis Elvira (1987): 20 (Isikli, Turkey; holotype: ZMH 6720).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Chondrostoma toros Küçük, Turan, Güçlü, Mutlu & Çiftçi, 2017 [Nase/Kababurun balığı] [NE]
Chondrostoma toros Küçük et al. (2017): 796, Figs. 2-3, 4a, 5a, 6a, Göksu River, Hamamköy Village, Mut County, Mersin (İçel) Province, Turkey, 38°32.239'N, 33°10.887'E. Holotype: IFC-ESUF 03-1555).
Distribution: Göksu River drainage.

Chondrostoma turnai Güçlü, Çiftçi, Küçük, Turan & Mutlu, 2018 [Nase/Kababurun balığı] [NE]
Chondrostoma turnai Güçlü et al. (2018): Figs. 1-2, Çine Stream, Büyük Menderes River, 37°45′47″N, 27°50′03″E. Holotype: IFC-ESUF 03-1557).
Distribution: Büyük Menderes basin, Turkey.

Genus ***Ladigesocypris*** Karaman, 1972 (1 species)
Ladigesocypris mermere (Ladiges, 1960) [Izmir minnow/Galyon balığı] [DD]
Leucaspius irideus mermere Ladiges (1960): 139, fig. 12 (Gediz, Turkey; holotype: ZMH H1087).
Distribution: Aegean Sea tributary, Gediz River, Izmir Province.

Genus ***Petroleuciscus*** Bogutskaya, 2002 (1 species)
Petroleuciscus ninae Turan, Kalaycı, Kaya, Bektaş & Küçük 2018 [Chub/-] [NE]
Petroleuciscus ninae Turan et al. (2018): 877 [3], Fig. 2, Akçay stream, 3 km west of Begerli, Aydin Province, Turkey, 37°45'34"N, 28°20'07"E. Holotype: FFR 03856).
Distribution: Büyük Menderes River drainage, southwest Turkey.

Genus ***Pseudophoxinus*** Bleeker, 1860 (21 species)
Pseudophoxinus alii Küçük, 2007 [Pamphylian spring minnow/Yağ balığı] [EN]
Pseudophoxinus alii Küçük (2007): 2, figs. 1, 3 (Ilica Stream Manavgat, Antalya, Turkey; holotype: ESFM-PISI/2005-015).
Distribution: Mediterranean Sea tributary, Manavgat River basin, Antalya Province.

Pseudophoxinus anatolicus (Hankó, 1925) [Anatolian minnow/Yağ balığı] [EN]
Acanthorutilus anatolicus Hankó (1925): 141, pl. 3 (fig. 2) [Eregli, probably Lake Ak [Akgöl], Turkey; syntypes (21): MNHN 1928-0221 (1)].
Distribution: Akgöl, Karaman Province.

Pseudophoxinus antalyae Bogutskaya, 1992 [Antalya minnow/Yağ balığı] [VU]
Pseudophoxinus antalyae Bogutskaya (1992): 274, fig. 2b (Stream Kirkgöz near Antalya, Turkey; holotype: ZMH 1114).
Distribution: Mediterranean Sea tributaries, Antalya Province.

Pseudophoxinus battalgilae Bogutskaya, 1997 [Beysehir minnow/Yağ balığı] [NE]
Pseudophoxinus battalgilae Bogutskaya (1997b): 175 (Beyşehir Gölü basin, Kura River drainage, Turkey; holotype: AMH 8861).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Pseudophoxinus burduricus Küçük, Gülle, Güçlü, Çiftçi & Erdoğan, 2013 [Burdur spring minnow/Yağ balığı] [EN]
Pseudophoxinus burduricus Küçük et al. (2013): 32, figs. 2-3 (Burdur Province, Değirmendere Creek, Karamanlı, Lake Burdur drainage; 37°24'18"N, 29°49'06"E, Turkey; holotype: IFC-ESUF 0427).
Distribution: Burdur Gölü tributaries, Burdur Province.

Pseudophoxinus caralis (Battalgil, 1942) [Beysehir minnow/Yağ balığı] [NE]
Acanthorutilus anatolicus caralis Battalgil (1942): 288, fig. 1 (Beyşehir Gölü, Turkey; holotype: ZMH H1082).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Pseudophoxinus crassus (Ladiges, 1960) [Fat spring minnow/Yağ balığı] [EN]
Acanthorutilus crassus Ladiges (1960): 134, fig. 6 (Insuyu stream, near Cihanbeyli, Tuz Gölü basin, Turkey; holotype: ZMH H1149).
Distribution: Tuz Gölü tributary, Konya Province.

Pseudophoxinus egridiri (Karaman, 1972) [Egirdir minnow/Yağ balığı] [EN]
Phoxinellus egridiri Karaman (1972): 127 (Lake Egirdir, Turkey; holotype: ZMH H4633).
Distribution: Eğirdir Gölü and Eğirdir Gölü tributaries, Isparta Province.

Pseudophoxinus elizavetae Bogutskaya, Küçük & Atalay, 2006 [Sultan Swamp minnow/Yağ balığı] [CR]
Pseudophoxinus elizavetae Bogutskaya et al. (2006): 336, figs. 1, 4a [Kayseri Province, Sultansazligi (Sultan Swamps, 38.2°-36.6°, 35.2°-35.5°E), Turkey; holotype: SCFK-SDU 174].
Distribution: Sultan Sazlığı, Kayseri Province.

Pseudophoxinus evliyae Freyhof & Özuluğ, 2010 [Lycian spring minnow/Yağ balığı] [EN]
Pseudophoxinus evliyae Freyhof and Özuluğ (2010b): 310, figs. 1-3 (Small canal south of Kirkpinar, north of Kizilcadağ, 37°08.356'N, 29°55.083'E, Antalya Province, Turkey; holotype: IUSHM 37960).
Distribution: Yazir Gölü tributary, Antalya and Burdur provinces.

Pseudophoxinus fahrettini Freyhof & Özuluğ, 2010 [Pisidian spring minnow/Yağ balığı] [EN]
Pseudophoxinus fahrettini Freyhof and Özuluğ (2010c): 326, figs. 1-3 (Stream at Bağilli, 37°45.82'N, 31°02.01'E, upper Köprü River drainage, Isparta Province, Turkey; holotype: IUSHM 37970).
Distribution: Mediterranean Sea tributaries, upper Köprüçay basin, Isparta Province.

Pseudophoxinus firati Bogutskaya, Küçük & Atalay, 2006 [Euphrates spring minnow/Yağ balığı] [EN]
Pseudophoxinus firati Bogutskaya et al. (2006): 40, figs. 3, 4c [Euphrates River drainage, Tohma Çayi at Yazyurdu (38.80°N, 36.93°E), Turkey; holotype: SCFK-SDU 187].
Distribution: Persian Gulf basin, Euphrates River [Firat Nehri] drainage, Sivas Province.

Pseudophoxinus handlirschi (Pietschmann, 1933) [Handlirsch's minnow/Kavinne] [EX]
Acanthorutilus handlirschi Pietschmann (19339: [1] 21 [Lake Egirdir, Turkey; syntypes: MSNM 5 (1)].
Distribution: Eğirdir Gölü and Eğirdir Gölü tributaries, Isparta Province.

Pseudophoxinus hittitorum Freyhof & Özuluğ, 2010 [Hittitic spring minnow/Yağ balığı] [EN]
Pseudophoxinus hittitorum Freyhof and Özuluğ (2010a): 240, figs. 1-3 (Spring Eflatunpinar Sadikhaci, 37°49/51'N, 31°40,46'E, Lake Beyşehir basin, Konya Province, Central Anatolia, Turkey; holotype: IUSHM 37970-608).
Distribution: Beyşehir Gölü tributary, Konya Province.

Pseudophoxinus iconii Küçük, Gülle & Güçlü, 2016 [Minnow/Yağ balığı] [NE]
Pseudophoxinus iconii Küçük et al. (2016): 284, Figs. 2, 3, Drainage ditches and canals near Gölyazi Village, Cihanbeyli District, Konya Province, Turkey, 38°32.24'N, 33°10.89'E, elevation 919 meters. Holotype: IFC-ESUF 03-1022).
Distribution: Lake Tuz basin, Konya, Central Anatolia.

Pseudophoxinus maeandri (Ladiges, 1960) [Apamean spring minnow/Yağ balığı] [EN]
Pararhodeus maeandri Ladiges (1960): 140, fig. 13 (Headwaters of Menderes River near Isikli, Turkey; holotype: ZMH H1093).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Pseudophoxinus maeandricus (Ladiges, 1960) [Menderes brook minnow/Yağ balığı] [CR]
Acanthorutilus maeandricus Ladiges (1960): 133, fig. 5 (Menderes River near Isikli, Turkey; holotype: ZMH H1077).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Pseudophoxinus mehmeti Ekmekçi, Atalay, Yoğurtçuoğlu, Turan & Küçük, 2015 [Minnow/Yağ balığı] [NE]
Pseudophoxinus mehmeti Ekmekçi et al. (2015): 119, figs. 2-3, 4a, 5a, 6a (Burdur Province, Yeşilova District: Alanköy reservoir, 54 km southwest from Burdur, Turkey, 37°40'58"N, 29°50'46"E; holotype: FFR 03274).
Distribution: Akgöl tributary, Burdur Province.

Pseudophoxinus ninae Freyhof & Özuluğ, 2006 [Onac spring minnow/Yağ balığı] [CR]
Pseudophoxinus ninae Freyhof and Özuluğ (2006): 257, figs. 1-2 (Stream Onaç north of Bucak on main road to Burdur, 37°30.757'N, 30°32.456'E, Burdur Province, Turkey; holotype: ZMB 33740).

Distribution: Mediterranean tributary, upper Aksu Çayı basin, Burdur Province.

Pseudophoxinus turani Küçük & Güçlü, 2014 [Turan's minnow/Yağ balığı] [NE]
Pseudophoxinus turani Küçük and Güçlü (2014): 60, figs. 2-3 (Hatay Province, Hassa Country, Incesu Spring, Asi River drainage, 36°47.36'N, 36°30.48'E, Turkey; holotype: IFC-ESUF 03-1002).
Distribution: Mediterranean tributary, Asi Nehri basin [Orontes], Hatay Province.

Pseudophoxinus zekayi Bogutskaya, Küçük & Atalay, 2006 [Ceyhan spring minnow/Yağ balığı] [VU]
Pseudophoxinus zekayi Bogutskaya et al. (2006): 339, figs. 2, 4b (Ceyhan River drainage, Aksu River system east of Kahramanmaras, Kahramanmaras Province at Çöçelli, Turkey; holotype: SCFK-SDU 181).
Distribution: Mediterranean Sea tributary, Ceyhan River basin, Kahramanmaraş Province.

Genus ***Scardinius*** Bonaparte, 1837 (1 species)
Scardinius elmaliensis Bogutskaya, 1997 [Antalya rudd/Kızılkanat] [EN]
Scardinius erythrophthalmus elmaliensis Bogutskaya (1997b): 180 (Elmali, in Vilayet Antalya, southern Turkey; holotype: ZMH 8863).
Distribution: Karagöl tributary, Antalya Province.

Genus ***Squalius*** Bonaparte, 1837 (15 species)
Squalius adanaensis Turan, Kottelat & Doğan, 2013 [Adana chub/Tatlı su kefali] [NT]
Squalius adanaensis Turan et al. (2013b): 310, figs. 2, 3 (Üçürge Stream at Karaisalı, Seyhan River drainage, Adana Province, Turkey; holotype: FFR 1994).
Distribution: Mediterranean tributary, Seyhan River basin, Adana Province.

Squalius anatolicus (Bogutskaya, 1997) [Beysehir dace/Pullu] [LC]
Leuciscus lepidus anatolicus Bogutskaya (1997b): 173 (Beyşehir Gölü, central Turkey; holotype: ZMH 8864).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Squalius aristotelis Özuluğ & Freyhof, 2011 [Tuzla chub/Tatlı su kefali] [LC]
Squalius aristotelis Özuluğ and Freyhof (2011): 118, figs. 8-10 (Stream Behramkale north of Assos, Biga Peninsula, 39°29.91'N, 26°19.99'E, Çanakkale Province, Turkey; holotype: IUSHM 2009-944).
Distribution: Aegean Sea tributary, Çanakkale Province.

Squalius cappadocicus Özuluğ & Freyhof, 2011 [Cappadocian chub/Pullu] [CR]
Squalius cappadocicus Özuluğ and Freyhof (2011): 119, figs. 11-13 (Stream Melendiz at Ihlara, 38°14.15'N, 34°18.71'E, Aksaray Province, Turkey; holotype: IUSHM 2011-1035).
Distribution: Tuz Gölü tributary, Aksaray Province.

Squalius carinus Özuluğ & Freyhof, 2011 [Chocolate chub/Tatlı su kefali] [EN]
Squalius carinus Özuluğ and Freyhof (2011): 123, figs. 14-16 (Spring Işikli, 38°19.29'N, 29°51.07'E, Denizli Province, Turkey; holotype: IUSHM 20090-947).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Squalius cephaloides (Battalgil, 1942) [Thick lipped chub/Tatlı su kefali] [VU]
Leuciscus cephaloides Battalgil (1942): 298, fig. 8 (Armutlu, near Mudanya, northwestern Turkey; no types known).
Distribution: Marmara Sea tributary, Bursa Province.

Squalius fellowesii (Günther, 1868) [Lykian chub/Tatlı su kefali] [LC]
Leuciscus fellowesii Günther (1868): 224, fig. [Xanthos, Turkey; syntypes: BMNH 1845.7.9.58-59 (2)].
Distribution: Mediterranean Sea tributary, Eşen Çayı, Antalya Province.

Squalius irideus (Ladiges, 1960) [Anatolian ghizani/] [NT]
Leuciscus irideus Ladiges (1960): 138, fig. 11 (Marmaris Mugla-arasi, Turkey; holotype: ZMH H1085).
Distribution: Mediterranean Sea tributary, Muğla Province.

Squalius kosswigi (Karaman, 1972) [Striped chub/Tatlı su kefali] [EN]
Leuciscus kosswigi Karaman (1972): 146, fig. 12 (Gumuldur, south from Izmir, Turkey; holotype: ZMH H4555).
Distribution: Mediterranean Sea tributary, Izmir Province.

Squalius kottelati Turan, Yilmaz & Kaya, 2009 [Striped chub/Tatlı su kefali] [NT]
Squalius kottelati Turan et al. (2009b): 54, figs. 1, 2b (Tahtaköprü Reservoir, Orontes River drainage, Gaziantep Province, Turkey; holotype: FFR 1991).
Distribution: Mediterranean tributary, Asi Nehri tributary [Orontes], Gaziantep Province.

Squalius pursakensis (Hankó, 1925) [Sakarya chub/Tatlı su kefali] [LC]
Leuciscus orientalis var. *pursakensis* Hankó (1925): 140, pl. 3 (fig. 1) [Kara-Chehir, Kötschke-Kissik and Eski-Chehir, Turkey; syntypes: (2) lost].
Distribution: Black Sea tributaries, Sakarya River basin.

Squalius recurvirostris Özuluğ & Freyhof, 2011 [Aksehir chub/Tatlı su kefali] [VU]
Squalius recurvirostris Özuluğ and Freyhof (2011): 143, figs. 35-37 (Stream at Ortaköy, north of Akşehir, 38°26.84'N, 31°31.05'E, Konya Province, Turkey; holotype: IUSHM 2011-1012).
Distribution: Akhisar Gölü tributary, Konya Province.

Squalius semae Turan, Kottelat & Bayçelebi, 2017 [Dace/Tatlı su kefali] [NE]
Squalius semae Turan et al. (2017): 3, Fig. 1a-b, Serçeme Stream (tributary of Karasu Stream), Erzurum Province, Turkey, 39°56.85'N, 40°48.24'E. Holotype: FFR 724).
Distribution: Karasu Stream, Upper Euphrates.

Squalius seyhanensis Turan, Kottelat & Doğan, 2013 [Seyhan dace/Tatlı su kefali] [DD]
Squalius seyhanensis Turan et al. (2013b): 313, figs. 1, 3b, 5-6 (Satiz Stream, Seyhan River drainage, Kayseri Province, Turkey; holotype: FFR 1992).
Distribution: Mediterranean tributary, Seyhan River basin, Kayseri Province.

Squalius turcicus De Filippi, 1865 [Transcaucasian chub/Tatlı su kefali] [LC]
Squalius turcicus De Filippi (1865): 359 (River Aras near Erzurum, Turkey; holotype: wherebouts unknown).
Distribution: Caspian Sea tributary, Aras Nehri basin, Erzurum Province.

Genus *Vimba* Fitzinger, 1873 (1 species)
Vimba mirabilis (Ladiges, 1960) [Menderes bream/Ulubat balığı] [LC]
Acanthobrama mirabilis Ladiges (1960): 132, fig. 4 (Menderes River at Sarayköyn [Saraköy], Denizli Province, Turkey; holotype: ZMH H1085).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Family Cobitidae Swainson 1838
Genus *Cobitis* Linnaeus, 1758 (14 species)
Cobitis battalgili Băcescu, 1962 [Battalgil spined loach/Taşyiyen balığı] [EN]
Cobitis battalgili Băcescu (1962): 437, Fig. 1b (Turkey; holotype: ZMH 4744).
Distribution: [Unknown], central Anatolia.

Cobitis bilseli Battalgil, 1942 [Beysehir spined loach/Koca taşyiyen balığı] [EN]
Cobitis bilseli Battalgil (1942): 292, fig. 4 (Beyşehir Gölü, Turkey; no types known).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Cobitis damlae Erk'akan & Özdemir, 2014 [Dalaman spined loach/Taşyiyen balığı] [NE]
Cobitis damlae Erk'akan and Özdemir (2014): 275, figs. 1, 3-4, 8 (Dalaman Stream, Burdur Province, 37°08'55.66"N, 29°39'42.57"E, Turkey; holotype: HUIC 1).
Distribution: Mediterranean tributary, Dalaman Çayı basin, Burdur Province.

Cobitis doradem iri Özdemir, Erk'akan & Özeren, 2017 [Spined loach/Taşyiyen balığı] [NE]
Cobitis doradem iri Özdemir et al. (2017): 83, Fig. 1, Balıklı stream, Köyceğiz Basin, Muğla province, Turkey. Holotype: HUIC-AKDY1).
Distribution: Köyceğiz Basin, Muğla province, southern Turkey.

Cobitis elazigensis Coad & Sarieyyüpoglu, 1988 [Tigris spined loach/Taşyiyen balığı] [LC]
Cobitis elazigensis Coad and Sarieyyüpoglu (1988): 426, figs. 1-2 (Creek at Cip, drainage of Murat Nehri, tributary of Euphrates River, Elazig Province, Turkey, 38°42'N, 39°05'E; holotype: NMC 85-0679A).
Distribution: Persian Gulf tributary, Euphrates River [Firat Nehri] basin, Elazig Province.

Cobitis evreni Erk'akan, Özeren &Nalbant, 2008 [Ceyhan spined loach/Taşyiyen balığı] [EN]
Cobitis evreni Erk'akan et al. (2008a): 112, figs. 1-2 (Kömür Stream - Göksun-Kahramanmaras, Turkey, 38°00'52.24"N, 36°30'31.11"E; holotype: HUIC-CEY-2).
Distribution: Mediterranean tributary, Ceyhan River basin, Kahramanmaraş Province.

Cobitis fahireae Erk'akan, Atalay-Ekmekçi & Nalbant, 1998 [Kücük Menderes spined loach/Taşyiyen balığı] [LC]
Cobitis fahireae Erk'akan et al. (1998): 10, figs. 2 A-E (Küçük Menderes River, Selçuk-Aydin, Turkey; holotype: HUIC uncat.; spelled both *fahirae* and *fahireae* in original description, Kottelat 2012: 25 selected

fahireae).
Distribution: Aegean Sea tributary, Küçük Menderes River, Aydın Province.

Cobitis kellei Erk'akan, Atalay-Ekmekçi & Nalbant, 1998 [Göksü spined loach/Taşyiyen balığı] [CR]
Cobitis kellei Erk'akan et al. (1998): 10, figs. 1 A-E (Göksu stream, Tigris catchment, Cinar, Diyarbakir, Turkey; holotype: ISBB 4682).
Distribution: Persian Gulf tributary, upper Tigris River [Dicle Nehri] basin, Diyarbakır Province.

Cobitis phrygica Battalgazi, 1944 [Aci spined loach/Taşyiyen balığı] [EN]
Cobitis phrygica Battalgazi (1944): 300, figs. 1-2 (Vilâyet Afyonkarahisar, Aci göl, western central Turkey; no types known).
Distribution: Aegean region, Acıgöl, western Anatolia.

Cobitis sipahilerae Özdemir, Erk'akan & Özeren, 2017 [Spined loach/Taşyiyen balığı] [NE]
Cobitis sipahilerae Özdemir et al. (2017): 85, Fig. 2, Yediarıklar stream, Aksu River, Topçular District, Antalya province, Turkey. Holotype: HUIC-AKD1).
Distribution: Aksu River basin, Antalya, southern Turkey.

Cobitis puncticulata Erk'akan, Atalay-Ekmekçi & Nalbant, 1998 [Spotted spined loach/Taşyiyen balığı] [EN]
Cobitis puncticulata Erk'akan et al. (1998): 12, figs. 4 A-E (Karadere Stream, at the outlet of Manyas (Kus) Lake, Turkey; holotype: HUIC uncat.).
Distribution: Aegean Sea tributaries.

Cobitis simplicispina Hankó, 1925 [Sakarya spined loach/Taşyiyen balığı] [LC]
Cobitis simplicispina Hankó (1925): 153, fig. 4; pl. 3 (fig. 7) (Eminekin village, Porsuk River basin, Sakarya River system, Eskisehir, Turkey; neotype: ISBB 4694; neotype designated by Erk'akan et al. 1999: 24).
Distribution: Central Anatolia.

Cobitis splendens Erk'akan, Atalay-Ekmekçi & Nalbant, 1998 [Splendid spined loach/Taşyiyen balığı] [CR]
Cobitis splendens Erk'akan et al. (1998): 11, figs. 3 A-E (small stream tributary to the Black Sea, about 200 meters from sea border, 16 kilometres east of Akçakoca, and about 30 kilometres southwest of Eregli (Black Sea), Turkey; holotype: HUIC uncat.).
Distribution: Western Anatolia.

Cobitis turcica Hankó, 1925 [Turkish spined loach/Taşyiyen balığı] [EN]
Cobitis taenia turcica Hankó (1925): 154, fig. 3; pl. 3 (fig. 8) [Eregli, Turkey; syntypes: MNH (2)].
Distribution: Mediterranean Sea tributaries, southern Anatolia.

Family Nemacheilidae Regan, 1911
Genus *Oxynoemacheilus* Bănăraescu & Nalbant, 1967 (26 species)
Oxynoemacheilus anatolicus Erk'akan, Özeren & Nalbant, 2008 [Burdur loach/Çamur balığı] [EN]
Oxynoemacheilus anatolica Erk'akan et al. (2008b): 117, figs. 4-6 (input of Karamanli Dam Lake, Burdur, southwestern Turkey; holotype: HUIC-AKD-13).
Distribution: Karataş Gölü tributaries, Burdur Province.

Oxynoemacheilus angorae (Steindachner, 1897) [Angora loach/Çamur balığı] [LC]
Nemacheilus angorae Steindachner (1897): 693 [9], Pl. 4 (fig. 4a-c) (Tabakane-Sir and Tschibuk-Tschai, Turkey; Syntypes: (16) NMW).
Distribution: Central, northwestern Anatolia.

Oxynoemacheilus araxensis (Bănărescu & Nalbant, 1978) [Angora loach/Çamur balığı] [DD]
Orthrias angorae araxensis Bănărescu and Nalbant in Bănărescu et al. (1978): 259, fig. 2; pl. 20 (figs. 1-4) (Kandili Karassu, upper Araxes basin, eastern Turkey; holotype: ZMH 4827).
Distribution: Upper Euphrates, Erzurum Province.

Oxynoemacheilus atili Erk'akan, 2012 [Lake Beysehir loach/Çöpçü balığı] [NT]
Oxynoemacheilus atili Erk'akan (2012): 99, fig. 3-4 (Eflatun pinari - Beyşehir Gölü, 37°49'30.95"N, 31°40'29.08"E, Turkey; holotype: HUIC uncat.).
Distribution: Beyşehir Gölü and Beyşehir Gölü tributaries, Isparta and Konya provinces.

Oxynoemacheilus banarescui (Delmastro, 1982) [Paphlagonian sportive loach/Çamur balığı] [NT]
Orthrias brandti banarescui Delmastro (1982): 53, fig. 1 (Devrekani creek near Devrekani, Anatolia, Turkey; holotype: MCSNC uncat.).
Distribution: Black Sea tributaries, Kastamonu Province.

Oxynoemacheilus ceyhanensis (Erk'akan, Nalbant & Özeren, 2007) [Elbistan loach/Çöpçü balığı] [DD]
Schistura ceyhanensis Erk'akan et al. (2007): 80, fig. 10 (Yalak Village-Elbistan-Khramanmaras, 38°39'N, 36°37'E, Turkey; holotype: HUIC CEY-1).
Distribution: Mediterranean Sea tributary, Ceyhan River basin, Kahramanmaraş Province.

Oxynoemacheilus ciceki Sungur, Eagderi & Jalili, 2017 [Sultan loach/Çöpçü balığı] [NE]
Oxynoemacheilus ciceki Sungur et al. (2017): 376, Figs. 1-5, Sultan Marsh, Kayseri Province, Turkey, 38°23'23.53"N, 35°21'54.52"E. Holotype: NHVUIC 2017-03-15-h).
Distribution: Sultan Marsh, Kayseri Province.

Oxynoemacheilus cinicus (Erk'akan, Nalbant & Özeren, 2007) [Cin loach/Çöpçü balığı] [DD]
Barbatula cinicus Erk'akan et al. (2007): 73, fig. 4 (Road of Kütahya to Denizli, Cin Stream, 39°40'N, 29°30"E, Turkey; holotype: HUIC BM-3).
Distribution: Aegean Sea tributary, Kütahya Province.

Oxynoemacheilus cyri (Berg, 1910) [Göle loach/Çöpçü balığı] [LC]
Nemacheilus tigris cyri Berg (1910): 170 [upper reaches of the Kura River (Göle depression), near Okam village, Turkey; syntypes: ZIN 13291 (6+), 16885 (2)].
Distribution: Caspian Sea tributary, Kura Nehri basin, Ardahan Province.

Oxynoemacheilus ercisianus (Erk'akan & Kuru, 1986) [Van loach/Çöpçü balığı] [EN]
Orthrias angorae ercisianus Erk'akan and Kuru (1986): 161, fig. 1a (Ercis stream, Lake Van basin. Holotype: HUIC uncat.).
Distribution: Van Gölü tributary, Van Province.

Oxynoemacheilus erdali (Erk'akan, Nalbant & Özeren, 2007) [Murat loach/Çöpçü balığı] [NE]
Barbatula erdali Erk'akan et al. (2007): 78, fig. 8 (Murat River-Agri, 39°40'N, 43°44'E, Turkey; holotype: HUIC F12).
Distribution: Balık Gölü tributary, Ağri Province.

Oxynoemacheilus eregliensis (Bănărescu & Nalbant, 1978) [Central Anatolian loach/Çöpçü balığı/] [VU]
Orthrias angorae eregliensis Bănărescu and Nalbant in Bănărescu et al. (1978): 258, fig. 1 (Eregli, southwestern central Turkey; holotype: ZMH 1921).
Distribution: Central Anatolian lake tributaries.

Oxynoemacheilus evreni (Erk'akan, Nalbant & Özeren, 2007) [Ceyhan sportive loach/Çöpçü balığı] [LC]
Schistura evreni Erk'akan et al. (2007): 82, fig. 12 (Tekir Stream, Göksu Basin, 38°39'N, 36°37'E, Turkey; holotype: SEY-3).
Distribution: Mediterranean Sea tributary, Ceyhan River basin, Kayseri Province.

Oxynoemacheilus germencicus (Erk'akan, Nalbant & Özeren, 2007) [Carian loach/Çöpçü balığı] [VU]
Barbatula germencica Erk'akan et al. (2007): 70, fig. 2 (Aydin, Germencik, 15th kilometre, 37°38'N, 27°18'E, Turkey; holotype: HUIC BM-1).
Distribution: Aegean Sea tributary, Büyük Menderes River, Aydın Province.

Oxynoemacheilus hazarensis Freyhof & Özuluğ, 2017 [Hazar loach/Hazar çöpçü balığı] [NE]
Oxynoemacheilus hazarensis Freyhof and Özuluğ (2017): 380-384, figs. 1-6 (Lake Hazar, Elazig, Euphrates River Basin, 38°28.398N, 39°18.093E, Turkey; holotype: IUSHM 2017-1171).
Distribution: Upper Euphrates River Basin, Elazığ Province.

Oxynoemacheilus kaynaki Erk'akan, Özeren & Nalbant, 2008 [Melid loach/Çöpçü balığı] [LC]
Oxynoemacheilus kaynaki Erk'akan et al. (2008b): 115, figs. 1-3 (Goksu River, Nurhak, Elbistan, Firat basin, 37°53'22.82"N, 37°22'19.99"E, Turkey; holotype: HUIC-F-20).
Distribution: Persian Gulf tributary, Euphrates River [Firat Nehri] basin, Kahramanmaraş Province.

Oxynoemacheilus kosswigi (Erk'akan & Kuru, 1986) [Paphlagonian loach/Çöpçü balığı] [LC]
Orthrias angorae kosswigi Erk'akan and Kuru (1986): 160 (Yildiz çayi, Yildizeli, Sivas. Holotype: HUIC uncat.).
Distribution: Black Sea tributary, Kızılırmak River basin, Sivas Province.

Oxynoemacheilus mediterraneus (Erk'akan, Nalbant & Özeren, 2007) [Pamphylian loach/Çöpçü balığı] [LC]
Barbatula mediterraneus Erk'akan et al. (2007): 4, fig. 5 (Egirdir, Çandir, Aksu Stream, 37°38'N, 30°31'E, Turkey; holotype: HUIC AAKD-2a).
Distribution: Eğirdir Gölü tributary, Burdur Province.

Oxynoemacheilus mesudae Erk'akan, 2012 [Isikli loach/Çöpçü balığı] [EN]
Oxynoemacheilus mesudae Erk'akan (2012): 98, fig. 1-2 (Büyük Menderes river, Dinar, Civril, 38°07'366"N, 30°05'723"E, western Turkey; holotype: HUIC uncat.).
Distribution: Aegean Sea tributary, Büyük Menderes River, Denizli Province.

Oxynoemacheilus paucilepis (Erk'akan, Nalbant & Özeren, 2007) [Mancilik dwarf loach/Çöpçü balığı] [EN]
Oxynoemacheilus paucilepis Erk'akan et al. (2007): 79, Fig. 9 (Sivas, Mancilik Stream, Gürün, 38°39'N, 37°38'E, Turkey. Holotype: HUIC F2. Paratypes: HUIC F2 (7)).
Distribution: Some tributaries in Kangal and Gürün, Sivas Province.

Oxynoemacheilus phoxinoides (Erk'akan, Nalbant & Özeren, 2007) [Iznik loach/Çöpçü balığı] [CR]
Oxynoemacheilus phoxinoides Erk'akan et al. (2007): 75, fig. 6 (Iznik, 40°41'N, 29°30'E, Turkey; holotype: HUC MAR-7g).
Distribution: Marmara Sea tributary, Bursa Province.

Oxynoemacheilus samanticus (Bănărescu & Nalbant, 1978) [Samanti sportive loach/Çöpçü balığı] [LC]
Orthrias brandti samantica Bănărescu and Nalbant in Bănărescu et al. (1978): 263, fig. 4 (tributary to Samanti, between Pinarbsi and Sarizi, Seyhan basin, southern Turkey; holotype: ZMH 3633).
Distribution: Mediterranean tributary, Seyhan River basin.

Oxynoemacheilus seyhanensis (Bănărescu, 1968) [Seyhan loach/Çöpçü balığı] [CR]
Noemacheilus (Paracobitis) tigris seyhanensis Bănărescu (1968): 355, pl. 3 (figs. 2-3) (between Viransehir and Kazancik, Turkey; holotype: ZMH H4014).
Distribution: Mediterranean tributary, Seyhan River basin.

Oxynoemacheilus seyhanicola (Erk'akan, Nalbant & Özeren, 2007) [Cilician loach/Çöpçü balığı] [EN]
Schistura seyhanicola Erk'akan et al. (2007): 81, fig. 11 (Dam Bridge, near Adana, Seyhan River basin, 38°39'N, 36°37'E, Turkey; holotype: HUIC SEY-1).
Distribution: Mediterranean tributary, Seyhan River basin, Adana Province.

Oxynoemacheilus simavicus (Balik & Bănărescu, 1978) [Simav loach/Çöpçü balığı] [NE]
Orthrias brandti simavicus Balik and Bănărescu in Bănărescu et al. (1978): 261, fig. 3 (Simav stream, Balikesir. Turkey; holotype: ISBB 2976).
Distribution: Marmara Sea tributary, Balıkesir Province.

Oxynoemacheilus veyseli Cicek, Eagderi & Sungur, 2018 [Serhat loach/Serhat çöpçü balığı] [NE]
Oxynoemacheilus veyseli Cicek et al. (2018): 232, figs. 1-6 (Bozkuş Creek, Selim, Kars, Turkey; Holotype: NHVUIC 17005-h).
Distribution: Aras River.

Genus ***Schistura*** McClelland, 1838 (1 species)
Schistura chrysicristinae Nalbant, 1998 [Batman crested loach/Çöpçü balığı] [CR]
Schistura chrysicristinae Nalbant (1998): 372, Fig. 1 (Batman River, a tributary of upper Tigris at Catalköprü, about 18 kilometres east from Silvan. Holotype: ISBB uncat. Paratypes: ISBB uncat. (2), MGAB (1)).
Distribution: Persian Gulf tributary, upper Tigris River [Dicle Nehri] basin, Diyarbakır Province.

Genus ***Seminemacheilus*** Bănărescu & Nalbant, 1995 (3 species)
Seminemacheilus ahmeti Sungur, Jalili, Eagderi & Çiçek, 2018 [Sultan crested loach/Sultan Çöpçüsü] [NE]
Seminemacheilus ahmeti Sungur et al. (2018): 467, Figs. 1-4, 5b, 6b, 7b, Sultan Marshes near Yeşilova Village,

Kızılırmak Basin, Kayseri Province, Turkey, 38°12'05.26"N, 35°13'19.76"E. Holotype: NHVUIC 2017-06-17).
Distribution: Sultan Marshes, Kızılırmak Basin, Kayseri Province.

Seminemacheilus ispartensis Erk'akan, Nalbant & Özeren, 2007 [Southern pond loach/Çöpçü balığı] [VU]
Seminemacheilus ispartensis Erk'akan et al. (2007): 76, fig. (Isparta Creek, Egirdir-Isparta Road, 1st railway pass, 37°38'N, 30°31'E, Turkey; holotype: HUIC AD-1).
Distribution: Eğirdir Gölü tributary, Isparta Province.

Seminemacheilus lendlii (Hankó, 1925) [Anatolian loach/Çöpçü balığı] [VU]
Nemachilus lendlii Hankó (1925): 155, pl. 3 (fig. 9) [Eski-Chehir, Turkey; syntypes: (10, lost)].
Distribution: Western central Anatolia.

Genus ***Turcinoemacheilus*** Bănărescu & Nalbant, 1964 (1 species)
Turcinoemacheilus minimus Esmaeili, Sayyadzadeh, Özulug, Geiger & Freyhof, 2014 [Ceyhan loach/] [NE]
Turcinoemacheilus minimus Esmaeili et al. (2014): 265, figs. 7b, 9-11 (Adıyaman province: Upper Göksu, 5 km northeast of Gölbası, 37°50.22'N, 37°41.09'E, Turkey; holotype: IUSHM 2013-1050).
Distribution: Persian Gulf tributary, upper Euphrates River [Firat Nehri] basin, Adıyaman Province.

Order Salmoniformes
Family Salmonidae Cuvier, 1816
Genus *Salmo* Linnaeus, 1758 (12 species)
Salmo abanticus Tortonese, 1954 [Abant trout/Abant alası] [NE]
Salmo trutta abanticus Tortonese (1954): 19, pl. 1 (fig. 3); figs. 2, 3a-b (Lake Abant, northern Anatolia, Asiatic Turkey; holotype: MSNM 1).
Distribution: Abant Gölü, Bolu Province, northwestern Anatolia.

Salmo chilo Turan, Kottelat & Engin, 2012 [Chilo trout/Alabalık] [NE]
Salmo chilo Turan et al. (2012b): 224, fig. 2b, 5 (Akdere Stream at Gürün county, Euphrates River [Firat Nehri] drainage, Sivas province, Turkey; holotype: FFR 3054).
Distribution: Persian Gulf tributary, upper Euphrates River [Firat Nehri] basin, Sivas Province.

Salmo coruhensis Turan, Kottelat & Engin, 2010 [Coruh trout/Alabalık] [NE]
Salmo coruhensis Turan et al. (2010): 345, figs. 4b, 5b, 7, 8, 14b (Çoruh River drainage, Pehlivanli Stream at Pehlivanli village, 40°30.42'N, 41°29.17'E, Erzurum Province, Turkey; holotype: FFR 3036).
Distribution: Black Sea tributary, Çoruh Nehri basin, Erzurum Province.

Salmo euphrataeus Turan, Kottelat & Engin, 2014 [Euphrates trout/Kırmızı benekli alabalık] [NE]
Salmo euphrataeus Turan et al. (2014c): 281, fig. 4 (Erzurum Province, Kuzgun Stram, Euphrates River dainage, 40°13'11.1"N, 41°0618.3"E, Turkey; holotype: FFR 1219).
Distribution: Persian Gulf tributary, upper Euphrates River [Firat Nehri] basin, Erzurum Province.

Salmo kottelati Turan, Doğan, Kaya & Kanyılmaz, 2014 [Antalya trout/Kırmızı benekli] [NE]
Salmo kottelati Turan et al. (2014a): 38, fig. 1 [Antalya Province: Altınyaka village; Alakır Stream (40°35.32'N, 40°51.50'E), Turkey; holotype: FFR 03180].

Distribution: Mediterranean Sea tributaries, Alakır Stream, Antalya Province.

Salmo labecula Turan, Kottelat & Engin, 2012 [Seyhan trout/Kırmızı benekli] [NE]
Salmo labecula Turan et al. (2012b): 226, fig. 2c, 6 (Nigde province, Ecemis Stream at Çamardı county, Seyhan River drainage, Turkey; holotype: FFR 3056).
Distribution: Mediterranean tributary, Seyhan River basin, Nigde Province.

Salmo munzuricus Turan, Kottelat & Kaya, 2017 [Munzur trout/Munzur alası] [NE]
Salmo munzuricus Turan et al. (2017): 56, Figs. 1-2, Munzur stream, Ovacik village, Tunceli province, Turkey, 39°20'50"N, 39°08'03"E. Holotype: FFR 03161).
Distribution: Munzur stream, Euphrates River drainage.

Salmo okumusi Turan, Kottelat & Engin, 2014 [Okumus trout/Kırmızı benekli alabalık] [NE]
Salmo okumusi Turan et al. (2014c): 277, fig. 1 (Malatya Province, Sürgü Stream, Euphrates River drainage, 37°59'51.1"N, 37°57'29.9"W, Turkey; holotype: FFR 1251).
Distribution: Persian Gulf tributary, upper Euphrates River [Firat Nehri] basin, Malatya Province.

Salmo opimus Turan, Kottelat & Engin, 2012 [Opimus trout/Kırmızı benekli alabalık] [NE]
Salmo opimus Turan et al. (2012b): 230, fig. 2d, 7 (Antalya province: Alara Stream at Gündogmus, Turkey; holotype: FFR 3047).
Distribution: Mediterranean Sea tributaries, Alara Stream, Antalya Province.

Salmo platycephalus Behnke, 1968 [Flathead trout/Zamantı alası] [CR]
Salmo (Platysalmo) platycephalus Behnke (1968): 2, figs. 1-2 (tributary of Seyhan River basin, about 30 kilometres south of Pinarbasi, Turkey; holotype: ZMH H4089).
Distribution: Mediterranean tributary, Seyhan River basin.

Salmo rizeensis Turan, Kottelat & Engin, 2010 [Rize trout/Kırmızı benekli] [NE]
Salmo rizeensis Turan et al. (2010): 338, figs. 2, 3, 4a, 5a, 14a (stream at Ovit Mountain, Çoruh River drainage, 40°35.32'N, 40°51.50'E, Erzurum Province, Turkey; holotype: FFR 3000).
Distribution: Black Sea tributary, Çoruh basin.

Salmo tigridis Turan, Kottelat & Bektaş, 2011 [Tigris trout/Kırmızı benekli alabalık] [NE]
Salmo tigridis Turan et al. (2011): 24, fig. 1 (Çatak Stream, Tigris River drainage, Van Province, Turkey; holotype: FFR 1250).
Distribution: Persian Gulf tributary, upper Tigris River [Dicle Nehri] basin, Van Province.

Order Cyprinodontiformes
Family Aphaniidae Scheel, 1968
Genus *Aphanius* Nardo, 1827 (18 species)
Aphanius alexandri Akşiray, 1948 [Killifish/Dişli sazancık] [NE]
Aphanius cypris alexandri Akşiray (1948): (Coastal creek near İskenderun, 36°35'N; 36°10'E; no types known).
Distribution: Mediterranean costal region of Ceyhan River basin.

Aphanius anatoliae (Leidenfrost, 1912) [Anatolian giant killifish/Dişli sazancık balığı] [NT]
Cyprinodon anatoliae Leidenfrost (1912): 159, fig. 1 (near the village Jazla Jayla, near the Kradzsa Da mountain, Turkey; no types known).
Distribution: Central Anatolia.

Aphanius asquamatus (Sözer, 1942) [Scaleless killifish/Dişli sazancık balığı] [LC]
Kosswigichthys asquamatus Sözer (1942): 308, fig. 2 [Lake Hazer, Elazig District (38°30'N, 39°25'E), Anatolia.Syntypes: MSNG 36472 (3)].
Distribution: Persian Gulf tributaries, Hazer Gölü, Tigris River [Dicle Nehri] basin.

Aphanius danfordii (Boulenger, 1890) [Danford's killifish/Dişli sazancık] [CR]
Cyprinodon danfordii Boulenger (1890): 169 (Albistan [=Elbistan-Kahramanmaras], Turkey; lectotype: BMNH 1879.6.7.5; lectotype designated by Wildekamp et al. 1999: 34).
Distribution: Sultaz Marsches, Kayseri.

Aphanius fontinalis Akşiray, 1948 [Burdur killifish/Dişli sazancık] [NE]
Aphanius chantrei fontinalis Akşiray (1948): 128, pl. 3 (figs. 28-32) (spring near Lake Yarisli, 37°34'N 29°53'E, southwest of Lake Burdur, Turkey; no types known).
Distribution: Burdur Gölü tributary, Burdur Province.

Aphanius iconii Akşiray, 1948 [Konya killifish/Dişli sazancık] [NE]
Aphanius burduricus iconii Akşiray (1948): 134, pl. 4 (figs. 43-46) (Spring Karaot at shore of Lake Eğirdir, about 4 km north of Yenice, Isparta province, Turkey, 38°08.094'N, 30°54.443'E; Neotype: IUSHM 2017-1272).
Distribution: Eğirdir Gölü tributaries, Isparta Province.

Aphanius irregularis Yoğurtcuoğlu & Freyhof, 2018 [Killifish/Dişli sazancık] [NE]
Aphanius irregularis Yoğurtcuoğlu and Freyhof (2018): 319-330, figs. 1-4, (the spring Kaklık in the Büyük Menderes River drainage in southwestern Anatolia, 37°51.36'N 29°23.11'E, Holotype. FFR 08653Paratype. FFR 08654)
Distribution: Büyük Menderes River drainage.

Aphanius maeandricus Akşiray, 1948 [Maeander killifish/Dişli sazancık] [NE]
Aphanius chantrei maeandricus Akşiray (1948): 125, pl. 3 (figs. 35-37); figs. 20-21 (springs of the Büyük Menderes River, near Isikli, 38°19'N 29°50'E, and Karakuyu, 38°11'N 29°55'E, Dinar, Turkey; no types known
Distribution: Aegean Sea tributary, Büyük Menderes River basin, Denizli Province.

Aphanius marassantensis Pfleiderer, Geiger & Herder, 2014 [Kizilirmak killifish/Dişli sazancık] [NE]
Aphanius marassantensis Pfleiderer et al. (2014): 571, figs. 2-4, 5F, 6G (Ankara Province, Hirfanı Reservoir, 39°11'19"N, 33°34'45'E, Turkey; holotype: ZFMK 66342).
Distribution: Black Sea tributary, Kızılırmak River basin, Ankara Province.

Aphanius mentoides Akşiray, 1948 [Killifish/Dişli sazancık] [NE]
Aphanius sophia mentoides Akşiray (1948): (Kırk Göz, nortiwest of Antalya" 37°06'N; 30°35'E, Turkey; no

types known).
Distribution: Antalya Province.

Aphanius meridionalis Akşiray, 1948 [Killifish/Dişli sazancık] [NE]
Aphanius meridionalis Akşiray (1948): (Lake Söğüt, Burdur, Turkey; no types known)
Distribution: Lake Söğüt, Burdur.

Aphanius orontis Akşiray, 1948 [Killifish/Dişli sazancık] [NE]
Aphanius cypris orontis Akşiray (1948): (Small ditches near Lake Amik near Antakya 36°17'N; 36°20'E, Turkey; no types known).
Distribution: Amik plate channels, Antakya.

Aphanius saldae Akşiray, 1955 [Salda killifish/Dişli sazancık] [NE]
Anatolichthys splendens saldae Akşiray (1955): 58, pl. 1 (figs. 1-2); figs 1-2 (Lake Salda near Yesilova, 37°31'N, 29°39'E, Burdur District, Turkey; holotype: whereabouts unknown).
Distribution: Salda Gölü, Burdur Province.

Aphanius similis Akşiray, 1948 [Killifish/Dişli sazancık] [NE]
Aphanius sophia similis Akşiray (1948): (Akgöl between Konya and Ereglisi, Turkey (37°31'N, 33°45'E), Turkey; no types known).
Distribution: Akgöl, Konya province.

Aphanius splendens (Kosswig & Sözer, 1945) [Splendid killifish/Dişli sazancık] [EX]
Anatolichthys splendens Kosswig and Sözer (1945): 77, fig. 2 (Lake Gölçük, west of Isparta (37°44'N, 30°30'E), central Anatolia, Turkey; syntypes: (28) whereabouts unknown).
Distribution: Lake Gölcük, Isparta Province.

Aphanius sureyanus (Neu, 1937) [Sureyan killifish/Dişli sazancık] [EN]
Cyprinodon sureyanus Neu (1937): 109 (Lake Burdur, 37°45'N 30°15'E, southwestern Turkey; no types known).
Distribution: Burdur Gölü, Burdur Province.

Aphanius transgrediens (Ermin, 1946) [Acipinar killifish/Dişli sazancık] [CR]
Turcichthys transgrediens Ermin (1946): 244, figs. 38-45 (stream, fed by the Acipinar spring at the west end of Lake Aci, Denizli District, 37°49'N 29°43'E, Turkey; no types known).
Distribution: Acıgöl tributary, Denizli Province.

Aphanius villwocki Hrbek &Wildekamp, 2003 [Villwock's killifish/Dişli sazancık] [LC]
Aphanius villwocki Hrbek and Wildekamp (2003): 138, figs. 1-2 (Pinarbasi, about 10.5 kilometres east of Emirdag, drainage canal of small spring pond, 39°02'53"N, 31°19'38"E, Turkey; holotype: MRAC A1-30-P-1).
Distribution: Akgöl tributary, Afyonkarahisar Province.

Order Gobiiformes
Family Gobiidae Cuvier, 1816
Genus *Knipowitschia* Iljin, 1927 (5 species)

Knipowitschia ricasolii (Di Caporiacco, 1935), [Goby/Kaya balığı] [NE]
Gobius ricasolii Di Caporiacco (1935): 258 ([Monitore Zoologico Italiano v. 46 (no. 8); Syntypes: MZUF 5551-55 (5). Small lake named Kuyuncu, near Aya Soluq (Selçuk), Maendri valley, Izmir, Turkey).
Distribution: Kuyuncu Lake, near Aya Selçuk, Maendri valley, Izmir Province.

Knipowitschia byblisia Ahnelt, 2011 [Byblis goby/Kaya balığı] [LC]
Knipowitschia byblisia Ahnelt (2011): 23, fig. 1 (Lake Köycegiz, 36°55'N, 28°40'E; western Anatolia, Turkey; holotype: ZMH 2175:1).
Distribution: Mediterranean Sea tributary, Köyceğiz Gölü, Muğla Province.

Knipowitschia caunosi Ahnelt, 2011 [Caunos goby/Kaya balığı] [LC]
Knipowitschia caunosi Ahnelt (2011): 25, figs. 1, 3 (Lake Köycegiz, 36°55'N, 28°40'E; western Anatolia, Turkey; holotype: ZMH 25904).
Distribution: Mediterranean Sea tributary, Köyceğiz Gölü, Muğla Province.

Knipowitschia ephesi Ahnelt, 1995 [Ephesus goby/Kayabalığı] [CR]
Knipowitschia ephesi Ahnelt (1995): 56, fig. 1 (Ephesus, western Anatolia, Turkey, 37°58'N, 27°17'E; holotype: ZMH 2177.1).
Distribution: Aegean Sea tributary, Izmir Province.

Knipowitschia mermere Ahnelt, 1995 [Marmara goby/Mermer kayabalığı] [VU]
Knipowitschia mermere Ahnelt (1995): 160, fig. 3 [Marmara Sea, western Anatolia, Turkey, holotype: ZMH 2176.1].
Distribution: Marmara Sea tributary, northwestern Anatolia.

Genus ***Ponticola*** Iljin, 1927 (2 species)
Ponticola rizensis (Kovačić & Engin, 2008) [Iyidere goby/Kayabalığı] [EN]
Neogobius rizensis Kovačić and Engin (2008): 74, figs. 2-3 (Rize, the Iyidere stream, northeastern Turkey; holotype: FFR 1014).
Distribution: Black Sea tributary, Rize Province.

Ponticola turani (Kovačić & Engin, 2008) [Aksu goby/Kayabalığı] [VU]
Neogobius turani Kovačić and Engin (2008): 77, figs. 4-5 (Giresun, Aksu stream, northeastern Turkey; holotype: FFR 1017).
Distribution: Black Sea tributary, Giresun Province.

Discussion

Based on the recent findings, a total of 409 freshwater fish species (including 29 exotic species) are found within the political boundaries of Turkey (Çiçerk et al. 2015, 2016; Emiroğlu et al. 2016; Yoğurtçuoğlu et al. 2018). Among these, 186 species (45.5%) are native, 29 species (7.1%) exotics, and 194 species (47.4%) endemic, showing 51.1% of total native species. These endemic fishes belong to the orders of Petromyzontiformes, Clupeiformes, Cypriniformes, Cyprinodontiformes, Salmoniformes, Perciformes, Mugiliformes, Blenniiformes and Gobiiformes. At the family-level, the Cyprinidae has the greatest endemicity (110 species; or 56.7% of the endemics), followed by the Nemacheilidae (31 species; 16.0%), Cobitidae (14 species; 7.2%), Cyprinodontidae

(18 species; 9.3%), Salmonidae (12 species; 6.2%), Gobiidae (7 species; 3.6%), and the families Petromyzontidae and Clupeidae with 1 species each (0.5% of the endemics) (Fig. 2). At the genus-level, *Oxynoemacheilus* has the greatest endemicity (26 species) followed by *Pseudophoxinus* (21 species), *Aphanius* and *Alburnus* (18 species each), *Squalius* (15 species), *Cobitis* (14 species), *Capoeta* and *Salmo* (12 species each), *Gobio* (11 species) and other genera which are below the 10 species.

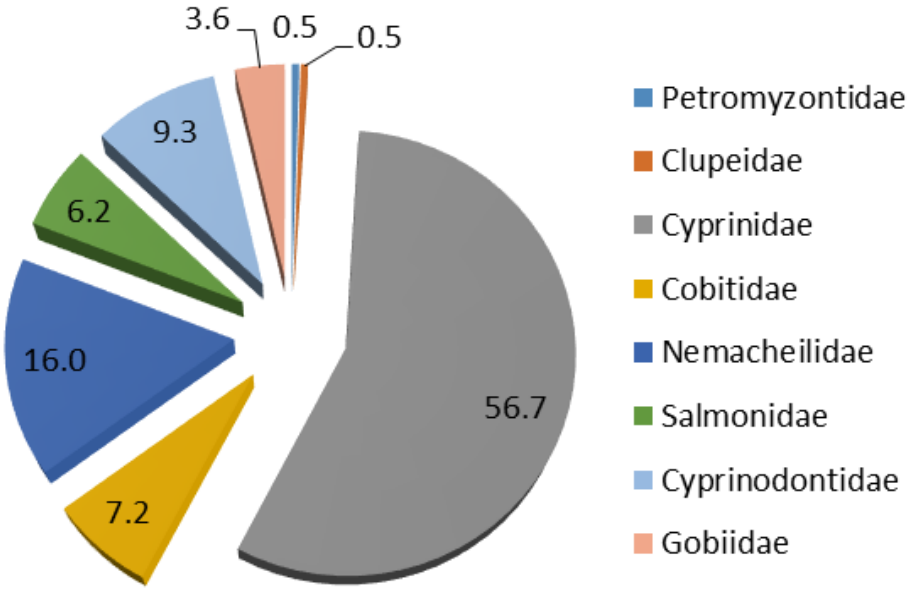

Figure 2. Occurrence of endemic species (%) in each family.

As a result of increasing studies regarding the taxonomy of the fishes from poorly known habitats and regions (Coad and Sarıeyüpoğlu 1988), half of the endemic species were described during past three decades. In addition, more species expected to be described by further studies, especially using new data e.g. molecular and osteological ones. However, some of the newly described species, particularly those described solely based on morphological traits, need further studies e.g. *C. turani* and *C. erhani*, described from the Seyhan and Ceyhan rivers, respectively, claimed to be junior synonym of *C. barroisi* without providing any explanation by Erk'akan and Özdemir (2011). In addition, based on the morphometric and meristic data, no differences found among *C. tinca*, *C. baliki* and *C. banarescui* (Özdemir 2013, 2015). Additionally, the genetic distances (based on COI gene) among these species are lower than 1.0%, suggesting *C. baliki* and *C. banarescui* are junior synonyms of *C. tinca* (Özdemir 2013, 2015). Furthermore, based on the genetic data, *C. angoare* has been treated as a synonym of *C. damascina* (Alwan et al. 2016). Hence, *C. angoare*, *C. baliki* and *C. banarescui* are excluded from the Turkish ichthyofauna.

Another example is 12 endemic salmonid species of which 10 have been described during past decade (Turan et al. 2014a, 2010, 2011, 2012b, 2014c, 2017). They described based on those morphometric and meristic characters that reported to be phenotypic plasticities e.g. body coloration (Sköld et al. 2012) as results of environmental conditions (Westley 2012). The phenotypic appearance of trout varies largely with the habitat and to some degree also their ecology (Pakkasmaa and Piironen 2001; Klemetsen et al. 2003) that is well-documented within trout of the Mistassini Lake, Québec, Canada (Marin 2015). In addition, these recently described *Salmo* species e.g. *Salmo coruhensis* and *S. rizeensis* from eastern Black Sea Basin, *S. euphrataeus, S. munzuricus* and *S. okumusi* from the Tigris-Euphrates Basin, *S. chilo* and *S. opimus* from the Ceyhan Basin, and *S. plathycephalus* and *S. labecula* from the Seyhan Basin are sympatric and probably synonyms due to low genetic distances (Bardakcı et al. 2006).

Ninua et al. (2018) pointed out there is no sufficient evidence of morphological and molecular separation

between *S. labrax* and *S. coruhensis*. Hence, they suggest to use the priority name of *S. labrax* (Black Sea salmon). In addition, the mitochondrial haplogroup of *S. rizeensis* was considered as a purely riverine form from Turkish Black Sea coast that never found in fish caught of the Black Sea (Ninua et al. 2018). They could not explain the reason of such situation, since these rivers drain to Black Sea. It needs to be mentioned that described species as *S. rizeensis* was probably introduced to some rivers of the eastern Black Sea basin for stock enhancement purposes by Turkish government. Hence, they could be synonym of those cultured species (*S. trutta* or its hybrids). Consequently, families Salmonidae and Cyprinidae are in urgent need of revision.

Akşiray (1948) described *Aphanius burduricus* as new species along with 15 subspecies (*A. burduricus, A. burduricus iconii, A. chantrei aksaranus, A. chantrei altus, A. chantrei flavianalis, A. chantrei fontinalis, A. chantrei litoralis, A. chantrei maeandricus, A. chantrei meridionalis, A. chantrei obrukensis, A. chantrei parvus, A. cypris alexandri, A. cypris boulengeri, A. cypris orontis, A. sophiae mentoides* and *A. sophiae similis*). However, none of these species were accepted as valid (Villwock 1958, 1964; Wildekamp 1993; Wildekamp et al. 1999). Later some of described subspecies i.e. *A. burduricus, A. iconii, A. fontinalis, A. maeandricus* and *A. meridionalis*, ranked to species level by Fricke et al. (2007), Pfleiderer et al. (2014), and Freyhof (2017).

Hrbek et al. (2002) and Geiger et al. (2014) demonstrated molecular distance of Anatolian *Aphanius* species. Consequently, Geiger et al. (2014) suggested treating *A. iconii*, *A. fontinalis*, *A. maeandricus* and *A. meridionalis* as valid species, a view accepted by Pfleiderer et al. (2014). In addition, other described subspecies by Akşiray (1948) including *A. alexandri, A. orontis, A. mentoides* and *A. similis* shown to be distance based on molecular data (Geiger et al. 2014), with genetic distance of about 4.3, 6.4, 5.6 and 3.9% compared to *A. mento*, respectively. Since provided molecular data by Geiger et al. (2014) provide molecular evidences in addition to those of morphological pattern provided by Akşiray (1948), therefore, they are considered as valid species ranked to species level here.

Due to low genetic differences between members of the *Aphanius* of the Menderes river basin and in line with species genetic distance criteria provided by Geiger et al. (2014) (about 2%), genetic distance between *A. irregularis* (Yoğurtçuoğlu and Freyhof 2018) and *A. maeandricus* do not support its definition as valid species based on molecular data (K2P distance of 0.7%). In addition, *A. irregularis* has been distinguished from males of other species of the *A. anatoliae* group solely by colour patterns that vary based on habitat type, vegetation, season etc. (Price 2008) as result of phenotypic plasticity (Ghalambor et al. 2007). Furthermore, four local endemic species, including *A. fontinalis, A. sureyanus, A. saldae* and *A. transgrediens* inhabiting the Burdur basin (Pfleiderer et al. 2014) that their separation from *A. fontinalis, A. sureyanus* and *A. saldae* as a distinct species seems not to be logic because of low genetic distances of 0.5-2.0% (Geiger et al. 2014). Therefore, it is suggested their conspecifity by priority name of *A. sureyanus*. In the light of the above mentioned issues, along with misinformation and ignorance to historical data, a review to solve the taxonomic statues of Turkish *Aphanius* is suggested.

Based on recent finding (Birecikligil et al. 2017; Freyhofet al. 2018), *A. recepi* and *A. selcuklui* are junior synonyms of *A. caeruleus*, and *A. sellal*. Consequenlty, *A. recepi* and *A. selcuklui* are excluded from the Turkish ichthyofauna. We also recognize a previously described but unrecognised Gobiid species namely *K. ricasolii*. In addition, *K. ephesi* is possibly a junior synonym of *K. ricasolii* (Under revision by authors).

A total of 297 fish species were listed from Iranian inland waters with 95 endemic species (Esmaili et al. 2018). Greece, another well-documented neighbouring country, has 160 freshwater fish species, including 47 endemics (Barbieri et al. 2015). In comparison, Turkey is extraordinarily rich in terms of the freshwater fishes, especially due to greater endemicity. Anatolia has well-diversified freshwater ichthyofauna, resulting from a long history of complex climatic and geological events compared to neighbour countries. It should be noted that

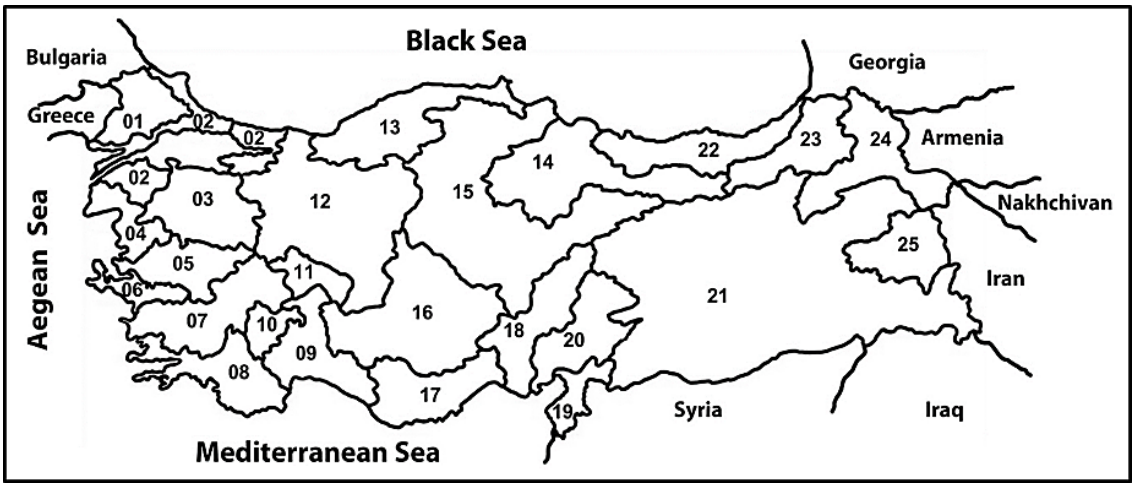

Figure 3. Map of the river basins of Turkey (1: Meriç-Ergene; 2: Marmara; 3: Susurluk; 4: Kuzey Ege; 5: Gediz; 6: Küçük Menderes; 7: Büyük Menderes; 8: Batı Akdeniz; 9: Antalya; 10: Burdur; 11: Akarçay; 12: Sakarya; 13: Batı Karadeniz; 14: Yeşilırmak; 15: Kızılırmak; 16: Konya Endorheic; 17: Doğu Akdeniz; 18: Seyhan; 19: Asi; 20: Ceyhan; 21: Fırat-Dicle; 22: Doğu Karadeniz; 23: Çoruh; 24: Aras; 25: Van Lake).

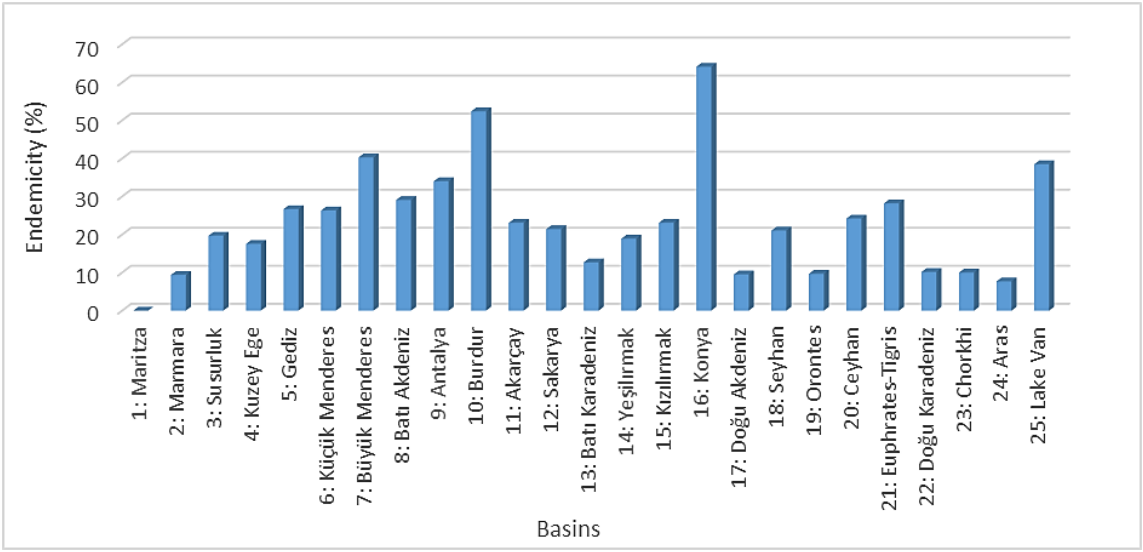

Figure 4. Occurrence of Endemic freshwater fish species in each river basins of Turkey.

endemism in Turkey mainly has occurred in species (154 species, 79.8%) of the order Cypriniformes, mostly within the families of Cyprinidae, Nemacheilidae and Cobitidae.

Ichthyogeography: Turkey's territory is divided into 25 basins of which four basins cross the boundaries to neighbouring countries (Fig. 3). Based on Figure 3, the Büyük Menderes (29 species) is the richest basin of Turkish inland waters followed by Konya endorheic (25 species) and Euphrates-Tigris (22 species) basins. However, in terms of proportion, the highest endemism is found in Konya basin (64.10%) followed by Burdur (52.38%), Büyük Menderes (40.28%), Van Gölü (38.46%) and Antalya (34.00%) basins. The Meriç-Ergene basin, which is part of the eastern Peri-Mediterranean region as defined by Reyjol et al. (2007), does not have any endemic fish species (Fig. 4). Features of the basins in Turkey exhibit a large variation in average annual precipitation, evaporation and surface run-off parameters. These species are often local endemics in very small regions. Among them, 143 species (out of 194, i.e. 73.71%) are found in single basin.

Ecology: The bioecological characteristics of Turkish endemic fishes have been poorly studied, therefore, their environmental requirements, habitat preferences, reproduction, food and feeding are either poorly known or unknown. Statements can here only be of a general nature, merely based on the family and generic characteristics

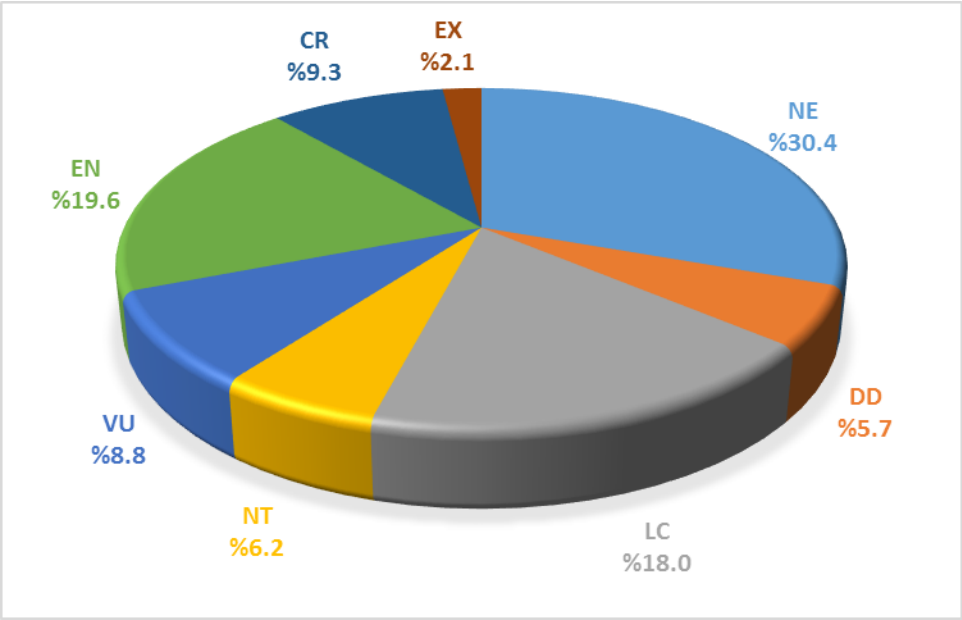

Figure 4. The IUCN Red List Category classifications (%) of 194 endemic freshwater fish species of Turkey.

than on specific studies of the species.

For examples it is reported that the cobitids and nemacheilids that usually found under stones or in gravel or mud, feed principally on small invertebrates (Coad 2006). The cyprinids are predominately bottom feeders, judging from the ventrally positioned mouths of more than two-thirds of the species, and those with known diets. Most species have predominant carnivorous diets (e.g. chironomid larvae/invertebrates) and secondary feed on benthic algae and other plants (Akin et al. 2016). The diet of cyprinodontids mainly consists of filamentous algae and associated invertebrates despite the upturned mouth which might suggest surface feeding (Coad 2006). Indeed, it is reported that aquatic insects, amphipods (*Gammarus pulex*) and Bacillariophyta are the major food resources for *A. anatoliae* (Güçlü 2012). Salmonid fishes mainly feed on invertebrates under rocks or among pebbles, and bigger specimens are piscivores (Saymour 2007).

Exotic Species: With globalisation, intentional or non-intentional introduction of fishes from one water body to another one has been facilitated by anthropological activities. Aquatic communities have altered by invasive species, impacting on native biodiversity, ecosystem function (Carey and Wahl 2010) and economic development. Adverse effects of invasive fishes on the ecosystem have been documented in several studies (Lintermans 2004; Cucherousset and Olden 2011). The introduction, distribution and translocation of exotic fishes in freshwater habitats of Turkey has been evaluated in recent studies and a total of 29 exotic species has been reported (Çetinkaya 2006, Innal and Erk'akan 2006, Innal 2012, Tarkan et al. 2014, 2015; Emiroğlu et al. 2016; Yoğurtçuoğlu and Ekmekçi, 2018). Some of these exotics e.g. *C. gibelio* and *P. parva*, have dispersed further to new localities, and some even have failed to establish self-sustaining populations e.g. *Salvelinus alpinus*, *Coregonus macrophthalmus*, *C. wartmanni* and *Hypophthalmichthys molitrix*.

When an indigenous predators or successful competitors are not present, an alien species can successfully adapt to new environment, reproduce and multiply in short period of time, establishing local populations that may disperse over wider regions. Then it can alter the biotic and abiotic structure of that ecosystem by (Ekmekçi et al. 2013). The endemic fishes of Turkey are generally small-sized and only locally distributed, therefore more easily affected than other bigger-sized and more widespread native species. For example, the introduction of *S. lucioperca* were stocked into the lakes to improve fisheries yields was found to be responsible for extinction of the endemic species such as *P. handlirschi* in Lake Eğirdir, and *A. akili* in Lake Beyşehir, *A. splendens* in

Lake Gölcük and *A. nicaeensis* in Lake Iznik (Küçük 2012) (Freyhof 2014a, 2014b).

Threats: The IUCN Red List criteria and threats for the endemic fish species argued in the present study (Fig. 5). Among 194 endemic species, 73 species (37.6%, the rate is 54.1% in consider 135 assesed species) are categorized as threatened with extinction, out of them 18 species (9.3%) Critically Endangered (CR), 38 species (19.6%) Endangered (EN) and 17 species (8.8%) Vulnerable (VU). Of the total number of taxa assessed, 6.2% (12 species) is Near Threatened (NT), and 18.0% (35 species) Least Concern (LC) (Fig. 1). In total, 4 of the species (2.1%) which are endemic to Turkey are already extinct. A relatively high percentage of species (70 species, 36.3%) are classified as Data Deficient (DD) with 11 species (5.7%) with no insufficient knowledge and 59 species (30.4%) not assigned (Not Evaluated) to any of the Red List Categories. These species might qualify for a threatened category when more data become available. Therefore, the evaluation of these species are classified as DD or were not assigned (NE), must be done inevitablely as soon as possible.

Freshwater ecosystems are world widely subjected to a variety of anthropogenic threats (Malmqvist and Rundle 2002), effecting directly or indirectly biological diversity. Inappropriate land use practices, pollutants, overexploitation, and overpopulation have simplified/fragmented aquatic habitats and degraded biodiversity and water quality. Recent estimates suggest that the 'human footprint' has significantly influenced more than 83% of the land surface surrounding freshwater systems (Vörösmarty et al. 2010). In fluvial systems, human threats result from relatively slight use, such as sports activities to severe pollution of water quality that damage stream morphology (e.g. channelization and straightening) and flow continuum (e.g. impoundment by large dams and weirs). Thus, conserving and reviving freshwater health and biodiversity are increasingly becoming global aims to ensure ecosystem integrity and freshwater ecosystem sustainability (Hwang et al. 2014).

While Turkey's rich biodiversity is unique, it has remained unknown in terms of many aspects despite growing threats. Across Anatolia, rivers, lakes and wetlands are among most important aquatic ecosystems de facto wildlife refuges, often the best places to observe large vertebrates. Since much of the surrounding landscapes are heavily altered and utilised by human activity, such systems provide a relatively high level of protection to migratory and resident wildlife that are obligate or facultative wetland species (Şekercioğlu et al. 2011).

The social and environmental impacts of dams have attracted considerable concerns (McCully 2001; Scudder 2005). Dams create calm bodies of water, changing overall temperature regimes and sediment transport, leading to conditions which tend to favour generalist species. Loss of specialist species, particularly endemics, changes the community structure and leads to biotic homogenization. The competition between resident species for food and breeding sites will increase as damming isolates populations, and perhaps more importantly, damming completely restricts migratory fish species. Isolation may lead to decreases in genetic diversity as well. Overall, damming river flow will lead to loss of native species and increasing exotic species which are more likely to become established in degraded habitats. For this reason, dams are one of the greatest global threats to freshwater biodiversity. A lack of data on global freshwater fish distributions has restricted a thorough investigation of the dam-related threats to fish species (Anonymous 2012). There is strong evidence that dams on the Mekong stream main stem will stop a significant portion of the longitudinal fish migration required to sustain the river's fisheries at present levels (Dugan et al. 2010).

Biological Monitoring: The Index of Biotic Integrity (IBI) provides a technique for evaluating the biological condition of the water resource as a multi-metric tool to evaluate aquatic ecosystem health and water quality (Karr 1981). The assessment of river health using a fish IBI, as a holistic method, consider characterises of the whole waterway (both upstream and downstream) since the fish species are mostly migratory (Joy and Death 2004). Both the species number and rate of endemic fish species in any area are important sign for the biological health status. Recently, the National Biodiversity Inventory and Monitoring Project has been carried out in

whole Turkey by Ministry of Forestry and Water Affairs, General Directorate of Nature Protection and National Parks, and gathered data deposited in Noah's Ark (National Biodiversity Data Base). The results of this project may provide more data Turkish inland water ichthyofaunal.

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