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Monograph

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Freshwater fishes (Petromyzonti, Elasmobranchii, and Actinopteri) of Bosnia and Herzegovina: an updated inventory on the biodiversity and distribution

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Abstract. In terms of ichthyology, Bosnia and Herzegovina (BiH) is one of the most interesting parts of Southeast Europe, due to its rich biodiversity and high level of endemism. Despite its relevance, the entire territory has been poorly explored. Here, we provide an updated inventory of the current state of knowledge on fishes, including lampreys, from the freshwaters of BiH by hydrographic basin, with recent distributional data and updated taxonomic status reviewed and compared with previous lists. The checklist was compiled based on the existing scientific and grey literature, technical reports, scientific congresses, academic dissertations, and unpublished/personal observations. In total, 123 species including diadromous and euryhaline fishes have been documented in BiH freshwaters to date. Of these, 110 are primarily freshwater. In comparison to the last published monography (Sofradžija 2009), we present a 9% increase in species number (11 species), resulting mainly from taxonomic re-evaluations of existing taxa on the basis of new information and the adoption of a new changes in the taxonomic status of several species. Among the valid primarily freshwater species, 87 are native and 23 are non-native. A total of 38 endemic species have restricted distribution, and are threatened by numerous anthropogenic pressures. Four species are considered endemic only to BiH: *Cobitis herzegoviniensis* Buj & Šanda, 2014; *Phoxinellus pseudalepidotus* Bogutskaya & Zupančič, 2003; *Telestes dabar* Bogutskaya, Zupančič, Bogut & Naseka, 2012; and *T. metohiensis* (Steindachner, 1901). In total, 75 genera and 34 families are represented: Leuciscidae is represented by 37 species, the Salmonidae by 13, followed by the Cyprinidae, Cobitidae and Percidae, each with eight species. The native species richness follows a pattern similar to that observed in other southern European countries. A national list of endangered species has not yet been proposed to BiH and management strategies for their protection or conservation are also not implemented. Hopefully, this updated checklist will serve as a basis for future research aimed at understanding the origin and status of conservation of the BiH fishes diversity, and supporting effective management and conservation programmes.

Keywords. Adriatic Basin, Danube River Basin, endemic species, ichthyofauna, Southeast Europe.

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Introduction

Southeast Europe hosts a unique freshwater ichthyofauna strikingly different from the rest of Europe. The majority of species are endemic to small sections of the Mediterranean catchments, while most of the species native to the non-Mediterranean basins of Europe are nor present in Mediterranean freshwaters (Bianco 1990; Economidis & Bănărescu 1991; Bănărescu 1992; Bohlen & Ráb 2001; Bobori & Economidis 2006; Kottelat & Freyhof 2007; Geiger *et al.* 2014; Oikonomou *et al.* 2014). The geographic isolation of the Southeast Europe region from other European basins by the Alps and Dinaric Mountain range, together with catchment discreteness, climatic conditions, and the complex geologic history of the area appear to be the main reasons for this distinctiveness (Bianco 1990, 1995; Bănărescu 1992; Hewitt 1999; Šlechtová *et al.* 2004). One country that stands out at the crossroads of the Danube and Adriatic Basins is Bosnia and Herzegovina (hereinafter referred to as BiH). In BiH, like in several other circum-Mediterranean countries, an exceptional level of freshwater fishes fauna richness and diversity is present, with many endemic species with restricted distributional ranges (Vuković 1977a; Vuković & Sofradžija 1987; Crivelli 1996; Smith & Darwall 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Darwall *et al.* 2014; Tutman *et al.* 2017a, 2017b, 2020a, 2020b), largely due to hydrographic isolation, and the occurrence of refuge areas during Pleistocene glaciations (Skoulikidis *et al.* 2022). However, despite the remarkable biodiversity present in both the Danube and Adriatic Basins, the BiH lamprey and other fishes fauna remains surprisingly poorly known and in need of a thorough revision (Tutman *et al.* 2009a, 2012b, 2013, 2017b, 2020a, 2020b).

Indeed, the state of knowledge of freshwater fishes of BiH lags far behind that of other countries of the Mediterranean Sea Basin (Koutsikos *et al.* 2012; Bianco 2014; Barbieri *et al.* 2015; Povž *et al.* 2015; Ćaleta *et al.* 2019; Marić 2019). Furthermore, zoogeographic analyses of the freshwater ichthyofauna are still incomplete, with large areas not covered by intensive surveys, and therefore the actual distribution ranges for many species remain to be determined properly (Tutman *et al.* 2017a, 2020a, 2020b). Even though some groups have been thoroughly revised (Tutman *et al.* 2017a, 2020a, 2020b), there has been a strong need for a thorough revision of the overall diversity of the ichthyofauna of the region, especially given recent advances in molecular tools applied to taxonomy (Buj *et al.* 2010, 2014, 2015a; Palandačić *et al.* 2010, 2015, 2017). However, with the exception of Dekić *et al.* (2024), no general review of the actual taxonomic status and geographic distribution of many species in BiH is available. Therefore, the knowledge of the distribution and current status of populations, including the precise taxonomic identity of species in particular regions is still insufficient (Tutman *et al.* 2009a, 2012b, 2013, 2017b, 2020a, 2020b). This is particularly significant since the advent of biomolecular research and biogeographical theories about the origins, especially of peri-Mediterranean endemics, have led to great shifts in many taxonomic aspects of European and BiH freshwater fishes over the past 20 years (e.g., Palandačić *et al.* 2010, 2015, 2017; Perea *et al.* 2010; Vucić *et al.* 2017; Sabolić *et al.* 2021; Buj *et al.* 2022; Lukač *et al.* 2023). These data provide the basic information for conservation management, while also contributing to more detailed knowledge of fishes distribution at the continental scale. Such a compilation is needed, since the general distribution patterns of species can profoundly impact conservation at both the national (BiH) and European scales (Geiger *et al.* 2014).

The need of a thorough revision of the ichthyofauna of BiH is especially noticeable considering significant advancements in recent research related to the phylogeny and distribution of species (Razpet *et al.* 2007; Snoj *et al.* 2002a, 2002b, 2010; Palandačić *et al.* 2015, 2024; Vucić *et al.* 2017; Sabolić *et al.* 2021; Tougard *et al.* 2021; Buj *et al.* 2022). One of the key tasks for national conservation and

management should be ensuring detailed knowledge of the lamprey and fishes diversity according to river catchments. Consequently, the periodic updating of checklists according to newly recorded changes in species composition and distribution is a necessary tool for national and regional fisheries management (Tutman *et al.* 2017b, 2020a, 2020b; Tutman & Glamuzina 2021).

Previous general checklists of freshwater lampreys and other fishes in BiH include several monographs: Vuković (1963a, 1977a), Vuković & Ivanović (1971), Bogut *et al.* (2006), Sofradžija (2009), and Hamzić (2024). The foundations of contemporary ichthyological knowledge in BiH were laid with the early works of Vuković (1963a), who listed 103 species and subspecies in 22 families and 45 genera, and Vuković (1977a), who reported 106 species and subspecies in 26 families and 64 genera. According to the two most recent reviews of the freshwater ichthyofauna of BiH (Sofradžija 2009; Hamzić 2024), 118 and 137 species were listed as the total number in the national freshwater ichthyofauna, respectively. With a more detailed analysis of both recent reviews, this discrepancy in the total number of species refers to numerous changes in systematics, taxonomy and nomenclature, as well as different interpretations on the validity of certain species. For example, Sofradžija (2009) did not fully accepted the proposed changes in the taxonomic status of certain species presented by Kottelat & Freyhof (2007). In recent years, several new distributional records, discoveries and descriptions of new species have been reported, increasing the knowledge about the biodiversity of freshwater fishes, including lampreys found in BiH (Šanda & Kovačić 2009; Buj *et al.* 2010, 2014; Tutman *et al.* 2009a, 2012b, 2013, 2017a, 2017b; Čolić *et al.* 2018). The lack of consensus over the exact number of freshwaters species of fish in BiH also hihghlights the need for a systematic review (Tutman *et al.* 2013, 2017a, 2017b).

History of ichthyological research in Bosnia and Herzegovina

Research on the ichthyofauna of BiH has a very long tradition that began in the mid-19th century (Heckel & Kner 1858). Since then, ichthyological research has been constant (Heckel & Kner 1858; Steindachner 1882a, 1882b, 1882c, 1883, 1901; Karaman 1928, 1938, 1963, 1972; Taler 1944, 1945a, 1945b, 1953a, 1953b; Vuković 1963a, 1977a, 1982b; Vuković & Ivanović 1971; Sofradžija 1977, 2009), although with varying intensity throughout the years.

The first list of freshwater species of fish of BiH was published by Heckel & Kner (1858), with the description of 11 new species. Later, Steindachner (1882a, 1882b, 1882c, 1883, 1901) and then Trgovčević (1905), Kolombatović (1907) and Heintz (1908) continued to explore the BiH freshwater ichthyofauna. The work of Heintz (1908) on local salmonids is particularly noteworthy. Research on the systematics of certain species of fishes of BiH, which was then a part of Yugoslavia, was also advanced by Karaman (1926, 1927, 1938), who described nine species, mostly salmonids. However, the taxonomic status of most of the species described by him is still controversial (Kottelat & Freyhof 2007, Georgiev 2011). In the same period, there were reports on the fishes from Sarajevo and its surroundings (Zaplata & Taler 1932), and on the Neretva River salmonids by Ćurčić (1938) and by Taler (1944, 1945a, 1945b).

After the Second World War, research intensified. Jedlička (1947) published a list of species of fish, which was soon followed by a monograph by Taler (1953a) entitled "*Distribution and List of Freshwater Fishes of Yugoslavia*". This study was particularly significant because it not only listed the species of fish but also considered the distribution and systematic relationships of freshwater fishes of the region. In the second half of the 20th century, especially in the 1960s and 1970s, the number of scientists engaged in the topic increased, resulting in a substantial advancement and increase of the ichthyologic knowledge in BiH (see references in Sofradžija 2009). The most notable were researchers of the period were Drs. Tonko Šoljan and Tihomir Vuković. Three published monographs, "*Fishes of Bosnia and Herzegovina*" in two editions (Vuković 1963a, 1977a) and "*Freshwater Fishes of Yugoslavia*" (Vuković & Ivanović 1971) presented detailed descriptions of the species and subspecies of freshwater fishes, including lampreys found in BiH.

In the 1970s and 1980s, several studies were published on freshwater fishes in BiH, including Aganović & Kapetanović (1970, 1971, 1978), Aganović & Vuković (1971), Aganović *et al.* (1974, 1976), Kosorić (1969, 1972a, 1972b, 1974, 1976, 1977a, 1977b, 1978, 1981), Sofradžija (1977, 1979, 1982a, 1982b), Mikavica (1987a, 1987b, 1988a, 1988b), Guzina & Vuković (1972, 1977, 1978, 1987), Berberović (1967, 1980), Vuković & Sofradžija (1987). Although the war in BiH (1992–1995) significantly hindered scientific ichthyological efforts, later studies resulted in remarkable progresses on the knowledge of the field (e.g., Korjenić 1998, 1999, 2003; Škrijelj & Mašović 2001; Škrijelj 2002; Hamzić 2002; Ivanković *et al.* 2011, 2017; Francuski *et al.* 2019; Markotić *et al.* 2018; Kalamujić Stroil *et al.* 2019, 2020, 2021; Pilić *et al.* 2020; Žujo-Zekić *et al.* 2020; Bajrić *et al.* 2021a). Particularly notable are monographs presented by Hamzić (2002) on aquaculture in BiH, Bogut *et al.* (2006), and Sofradžija (2009) and also Glamuzina *et al.* (2013), who revised the list of the ichthyofauna in BiH and adapted it to updated views on the freshwater lamprey and fishes systematics at that time. The publication provided by Drešković *et al.* (2011) supported government institutions in preparing BiH for the Natura 2000 network, and included 50 species of fish listed in Annex II of the Bern directive. Tutman *et al.* (2009a, 2012b, 2013) recorded new changes in the composition of the lower reaches of the Neretva River in BiH, also presenting a detailed inventory of the taxonomic status and distribution of loaches (Tutman *et al.* 2017a, 2017b), lampreys (Tutman *et al.* 2020a) and freshwater gobies (Tutman *et al.* 2020b). In a recent article, Dekić *et al.* (2024) emphasized the need for a thorough revision of the taxonomical state of the BiH ichthyofauna, as well as the need for more field expeditions and the use of molecular tools that might help to solve many taxonomic doubts and likely identification mistakes in previous studies present (Bogut *et al.* 2006; Sofradžija 2009). Dekić *et al.* (2024) also provide a taxonomic summary overview of the freshwater ichthyofauna of BiH but, in some cases, they did not consider the results of modern genetic, phylogenetic or phylogeographic studies.

Current state of the knowledge on the taxonomy and geographic distribution

The contemporary fishes fauna composition in BiH, especially endemic primary or near-primary freshwater species, is the result of long-term speciation related to numerous processes that took place during the Miocene to Pliocene (Perea *et al.* 2010; Lukač *et al.* 2023). The current distribution patterns and genetic diversity of many species in BiH have been contextualized in biogeographical hypotheses by Bănărescu (1989, 1992), and Bianco (1990), reflecting findings on evolutionary histories of fishes in neighbouring Croatia (Ćaleta *et al.* 2019). This valuable biodiversity is now under significant anthropogenic threat (e.g., pollution, habitat destruction, dams, introduction of non-native species) which has affected the fishes fauna (Hamzić 2024).

In terms of ichthyology, BiH is one of the most interesting parts of Southeast Europe due to the high number of endemic species. Despite its remarkable ichthyofaunistic importance, its fishes fauna is still poorly explored and known. The zoogeographical analysis of the BiH freshwater ichthyofauna is partial and incomplete, with large areas not covered by intensive surveys, and the actual distribution ranges for many species have not yet been clearly determined. The taxonomic status of several species remains disputed as they are currently the subject of research (e.g., Kottelat & Freyhof 2007), particulary within the genera *Salmo* Linnaeus, 1758 (Razpet *et al.* 2007; Snoj *et al.* 2010; Georgiev 2011); *Romanogobio* Bănărescu, 1961; *Scardinius* Bonaparte, 1837 (Freyhof *et al.* 2006; Sabolić *et al.* 2021); *Alburnus* Linnaeus, 1758 (Buj *et al.* 2010; Vucić *et al.* 2017); *Phoxinus* Rafinesque, 1820 (Bianco & De Bonis 2015; Palandačić *et al.* 2015; Vucić *et al.* 2017); *Squalius* Bonaparte, 1837 (Buj *et al.* 2020a); *Telestes* Bonaparte, 1837 (Buj *et al.* 2017, 2022); *Knipowitschia* Iljin, 1927 (Šanda & Kovačić 2009; Tougard *et al.* 2021). These genera encompass species with a narrow distribution range that are often under strong anthropogenic pressures and, consequently, high environmental risk. Therefore, elucidating their taxonomic status should be a primary task, especially considering their legal protection and associated potential risks of endangerment. Consequently, it is necessary to comprehensively collect and analyse literature data on freshwater fishes, including lampreys of BiH, revise some of the proposed taxonomic changes, and update regional lists with recently introduced species, while considering the latest scientific achievements.

The survival of the native freshwater fishes fauna in BiH and their natural habitats is threatened by a wide range of increasing anthropogenic factors, such as dam construction, pollution, habitat destruction, and the introduction of non-native species (Drešković *et al.* 2011; Tutman *et al.* 2012a; Hamzić 2024; Dekić *et al.* 2024). Therefore, to ensure the survival of endemic species, it is necessary to implement measures to protect and preserve the habitats and ecosystems where they live.

This study is a continuous effort to elucidate the taxonomic status of the freshwater fishes, including lampreys, in BiH that started in previous monographs and studies by Vuković (1963a, 1977a), Vuković & Ivanović (1971), Bogut *et al.* (2006), Sofradžija (2009), and Hamzić (2024). Furthermore, this contribution is complementary to Dekić *et al.* (2024), who presented a valuable overview of the freshwater ichthyofauna of BiH, but left somehow unsolved the taxonomic position of several species, particularly those with problems in taxonomy and systematics, which we tried to elucidate in this study.

Here, we present an updated annotated checklist of the currently known freshwater fishes, including lampreys, in BiH freshwaters by hydrographic catchments with clarified nomenclature and taxonomic status. This species list includes all recent data on distribution and taxonomic status, discussion about some questionable previously reported and recently described species. Considering the current state of ichthyological knowledge in BiH, the purpose is to critically analyse the distribution of previously reported species and clarify the current knowledge on them. This information will provide a scientific baseline for decision-makers and broader public interest regarding conservation requirements for these species in BiH.

Material and methods

Sources

The updated checklist of freshwater fishes of BiH is compiled based on data published in the recent scientific and grey literature, technical reports, conference proceedings from scientific congresses, academic dissertations, unpublished/personal observations and field sampling of all major catchments conducted since 1997 to present. Classification of orders and families follow Van der Laan *et al.* (2025).

Within each family and genus, species are listed in alphabetic order. Only those species considered as valid in the recent scientific literature are included. The designation of species in the checklist is arranged in a way that the ordinal numbers (1., 2., …), are used to designate only exclusively freshwater species. In addition to the exclusively freshwater species, data on euryhaline species that inhabit brackish and transitional waters and migratory species of fish are also provided. Species such as the mullets, seabasses and seabreams were not included in the list but were considered as occasional, with the abbreviation ME (Marine Euryhaline), with corresponding numbers (ME1, ME2,…). The list also includes species that are considered (RE) with corresponding numbers (RE1, RE2,…), and one marine species (M) with a very unusual record (*Raja miraletus* Linnaeus, 1758). Furthermore, the taxonomic status of some species mentioned in earlier lists (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009; Hamzić 2024) was re-examined, if their taxonomic status had changed.

After the scientific name, a common local name from Vuković (1977a) and Sofradžija (2009) is provided, followed by the common English name. After the common name, the distributional range for each species is provided, together with the source for considering the species as endemic, native or non-native. Endemic species are particularly highlighted. The occurrence in catchments (Danube River and Adriatic Basin) of each species is based on literature reviews and field knowledge. To complement this distribution and diversity data, the precise distribution of each endemic species regarding their known area is also provided, considering: Adriatic Basin Endemic (sensu lato, i.e., present in BiH, and also distributed in Italy, Slovenia, Croatia (CRO) or Montenegro) – (ABE); Neretva River Catchment Endemic (sensu stricto, i.e., distributed only in the Neretva River system in BiH and Croatia) – (NCE); and Danube

River Basin Endemic (DBE) and Cetina River Catchment Endemic (distributed only in the Cetina River system in BiH and Croatia) – (CCE). Species endemic only to BiH are marked with the abbreviation BiH, followed by the catchment distribution information. Several records on the checklist represent expansions of the known range or new records of the species in BiH. We considered a species as a new record in BiH when it was not listed either in Bogut *et al.* (2006) or Sofradžija (2009).

A list of all freshwater fish species recorded in the BiH according to literature to date is also presented in Supp. file 1. Their distribution across the basins and catchments according to literature and knowledge of the authors are presented in Table 1, and information on species conservation status according to IUCN is presented in Table 2 and in the species treatments, whenever appropriate.

Study area

Although its area of 51 209.20 km^2 makes BiH a territorially small country, the rivers of two large European catchments flow through it, the larger Danube (also called the Black Sea) (38 719 km^2 or 75.7% of total BiH surface area) and the smaller Adriatic Basin (12 410 km^2 or 24.3%), divided by the Dinaric Mountain range (Fig. 1). The Dinaric Mountains comprise the largest continuous karst area in Europe. They are parallel to the eastern Adriatic coast and have typical karst conditions, such as dolines and karst poljes above ground, sinkholes, caves, and underground streams below the ground, forming a complex water network connecting surface and underground water bodies into which certain species enters during the dry season (Palandačić *et al.* 2024).

The majority of the Danube River Basin is drained by the Sava River and its tributaries as far as the Croatian border to the north, while the Adriatic Basin is mostly drained by the Neretva River and its tributaries that drain into the Adriatic Sea in Croatia. Each catchment is characterised by a different ichthyofaunal composition: in general, the Danube River Basin has species present in other parts

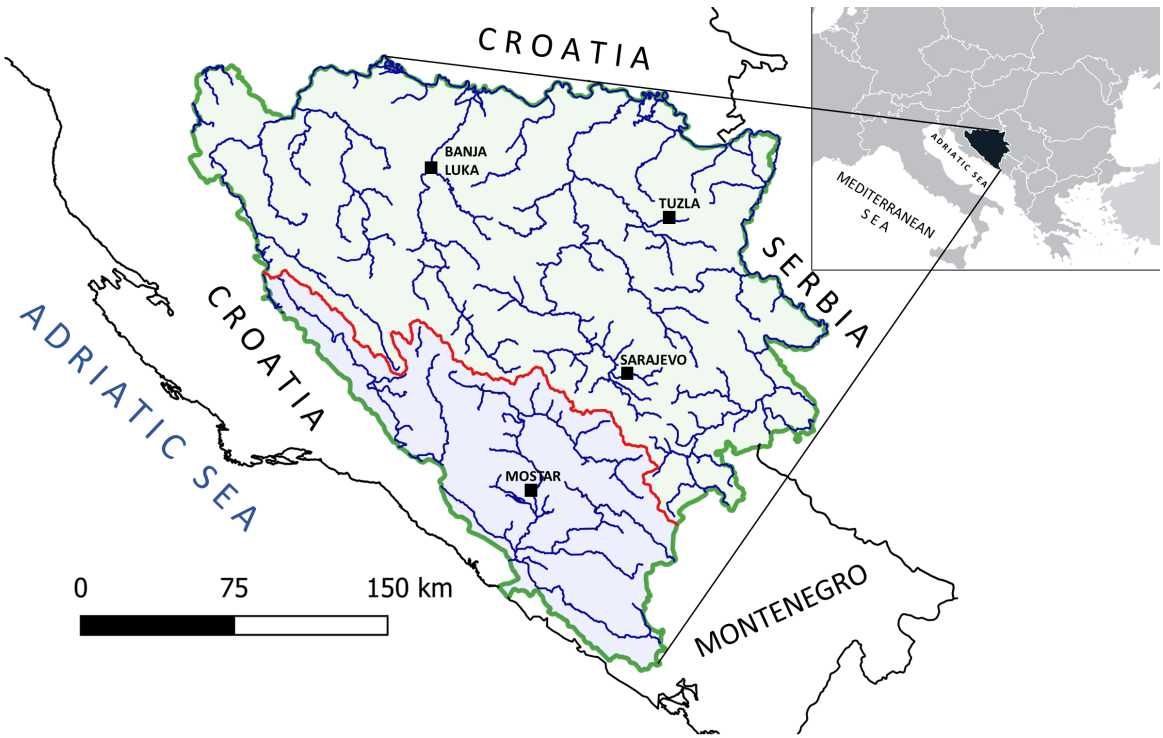

Fig. 1. Map of Bosnia and Herzegovina showing the two main basins, the Danube River Basin (green shaded) and the Adriatic Basin (blue shaded).

Table 1 (continued on the next 5 pages). List of all lampreys and other species of fish recorded in freshwaters of Bosnia and Herzegovina as well as their distribution across the basins and catchments according to literature and this study. Abbreviation: ME = Marine Euryhaline.

			Danube River Basin							Adriatic Sea Basin		
			Rivers catchments									
Family	**No.**	**Species**	**Sava**	**Una**	**Vrbas**	**Bosna**	**Drina**	**Ukrina**	**Korana and Glina**	**Neretva**	**Trebišnjica**	**Cetina**
Petromyzontidae	1.	*Eudontomyzon vladykovi*	+	+	+	+	+	+	+			
	2.	*Lampetra soljani*								+		
	ME1	*Petromyzon marinus*								+		
Rajidae	M1	*Raja miraletus*								+		
Acipenseridae	3.	*Huso ruthenus*	+	+	+	+	+					
Anguillidae	4.	*Anguilla anguilla*	+							+	+	+
Clupeidae	ME2	*Alosa fallax*								+		
Cobitidae	5.	*Cobitis elongata*	+	+	+	+	+	+	+			
	6.	*Cobitis elongatoides*	+	+	+	+	+	+	+			
	7.	*Cobitis herzegoviniensis*								+		
	8.	*Cobitis illyrica*								+		
	9.	*Cobitis narentana*								+	+	
	10.	*Misgurnus fossilis*	+	+	+	+	+	+	+		+	
	11.	*Sabanejewia balcanica*	+	+	+	+	+	+	+			
	12.	*Sabanejewia bulgarica*	+	+								
Nemacheilidae	13.	*Barbatula barbatula*	+	+	+	+	+	+	+	+		
Cyprinidae	14.	*Aulopyge huegelii*		+						+		+
	15.	*Barbus balcanicus*	+	+	+	+	+	+	+			
	16.	*Barbus barbus*	+	+	+	+	+	+	+			
	17.	*Carassius auratus*	+	+	+	+	+	+	+	+		
	18.	*Carassius carassius*	+	+	+	+	+	+	+	+	+	+
	19.	*Carassius gibbelio*	+	+	+	+	+	+	+	+	+	+
	20.	*Carassius langsdorfi*								+		
	21.	*Cyprinus carpio*	+	+	+	+	+	+	+	+	+	+

Table 1 (continued). List of all lampreys and other species of fish recorded in freshwaters of Bosnia and Herzegovina as well as their distribution across the basins and catchments according to literature and this study. Abbreviation: ME = Marine Euryhaline.

			Danube River Basin							Adriatic Sea Basin		
			Rivers catchments									
Family	**No.**	**Species**	**Sava**	**Una**	**Vrbas**	**Bosna**	**Drina**	**Ukrina**	**Korana and Glina**	**Neretva**	**Trebišnjica**	**Cetina**
Xenocyprididae	22.	*Ctenopharyngodon idella*	+	+	+	+	+	+	+	+	+	
	23.	*Hypophthalmichthys molitrix*	+	+	+	+	+	+	+	+	+	+
	24.	*Hypophthalmichthys nobilis*	+	+	+	+	+	+	+	+	+	
Tincidae	25.	*Tinca tinca*	+	+	+	+	+	+	+	+	+	+
Achielognathidae	26.	*Rhodeus amarus*	+	+	+	+	+	+	+	+		
Gobionidae	27.	*Gobio obtusirostris*	+	+	+	+	+	+	+	+		
	28.	*Pseudorasbora parva*	+	+	+	+	+	+	+	+	+	+
	29.	*Romanogobio carpathorossicus*	+	+	+	+	+	+	+			
	30.	*Romanogobio uranoscopus*	+	+	+	+						
	31.	*Romanogobio vladykovi*	+	+	+	+	+	+	+			
Leuciscidae	32.	*Abramis brama*	+	+	+	+	+	+	+	+		
	33.	*Alburnoides bipunctatus*	+	+	+	+	+	+	+	+	+	
	34.	*Alburnus alburnus*	+	+	+	+	+	+	+			
	35.	*Alburnus neretvae*								+	+	
	36.	*Alburnus sava*	+									
	37.	*Ballerus ballerus*	+	+	+	+	+	+	+			
	38.	*Ballerus sapa*	+	+	+	+	+	+	+			
	39.	*Blicca bjoerkna*	+	+	+	+	+	+	+			
	40.	*Chondrostoma knerii*								+		
	41.	*Chondrostoma nasus*	+	+	+	+	+	+	+			

Table 1 (continued). List of all lampreys and other species of fish recorded in freshwaters of Bosnia and Herzegovina as well as their distribution across the basins and catchments according to literature and this study. Abbreviation: ME = Marine Euryhaline.

			Danube River Basin							Adriatic Sea Basin		
			Rivers catchments									
Family	**No.**	**Species**	**Sava**	**Una**	**Vrbas**	**Bosna**	**Drina**	**Ukrina**	**Korana and Glina**	**Neretva**	**Trebišnjica**	**Cetina**
	42.	*Chondrostoma phoxinus*										+
	43.	*Delminichthys adspersus*								+		
	44.	*Delminichthys ghetaldii*									+	
	45.	*Leucaspius delineatus*	+	+	+	+	+	+	+	+		
	46.	*Leuciscus aspius*	+	+	+	+	+	+	+			
	47.	*Leuciscus idus*	+	+	+	+	+	+	+			
	48.	*Leuciscus leuciscus*	+	+	+	+	+	+	+			
	49.	*Leucos basak*								+	+	
	50.	*Pelecus cultratus*	+	+			+					
	51.	*Phoxinellus alepidotus*								+		+
	52.	*Phoxinellus pseudalepidotus*								+		
	53.	*Phoxinus karsticus*									+	
	54.	*Phoxinus lumaireul*	+	+	+	+	+	+	+	+	+	
	55.	*Rutilus rutilus*	+	+	+	+	+	+	+	+	+	
	56.	*Rutilus virgo*	+	+	+	+	+	+	+			
	57.	*Scardinius dergle*										+
	58.	*Scardinius erythrophthalmus*	+	+	+	+	+	+	+	+	+	
	59.	*Scardinius plotizza*								+	+	
	60.	*Squalius cephalus*	+	+	+	+	+	+	+		+	
	61.	*Squalius microlepis*								+		
	62.	*Squalius squalus*								+	+	+
	63.	*Squalius svallize*								+	+	

Table 1 (continued). List of all lampreys and other species of fish recorded in freshwaters of Bosnia and Herzegovina as well as their distribution across the basins and catchments according to literature and this study. Abbreviation: ME = Marine Euryhaline.

			Danube River Basin							Adriatic Sea Basin		
			Rivers catchments									
Family	**No.**	**Species**	**Sava**	**Una**	**Vrbas**	**Bosna**	**Drina**	**Ukrina**	**Korana and Glina**	**Neretva**	**Trebišnjica**	**Cetina**
	64.	*Squalius tenellus*										+
	65.	*Telestes dabar*									+	
	66.	*Telestes metohiensis*								+	+	
	67.	*Telestes souffia*					+					
	68.	*Vimba vimba*	+	+	+	+	+	+	+			
Siluridae	69.	*Silurus glanis*	+	+	+	+	+	+	+	+	+	+
Ictaluridae	70.	*Ameiurus melas*	+	+	+	+	+	+	+	+	+	+
	71.	*Ameiurus nebulosus*	+	+	+	+	+	+	+	+	+	+
Esocidae	72.	*Esox lucius*	+	+	+	+	+	+	+	+		
Umbridae	73.	*Umbra krameri*	+				+					
Salmonidae	74.	*Coregonus peled*								+		
	75.	*Hucho hucho*	+	+	+	+	+					
	76.	*Oncorhynchus mykiss*	+	+	+	+	+	+	+	+	+	+
	77.	*Salmo farioides*								+		+
	78.	*Salmo labrax*	+	+	+	+	+	+	+	+	+	
	79.	*Salmo letnica*								+		
	80.	*Salmo marmoratus*								+		
	81.	*Salmo montenigrinus*									+	
	82.	*Salmo obtusirostris*								+		
	83.	*Salmo trutta*	+	+	+	+	+	+	+	+	+	+
	84.	*Salvelinus alpinus*			+					+	+	
	85.	*Salvelinus fontinalis*			+	+				+	+	
	86.	*Thymallus thymallus*		+	+	+	+			+	+	
Lotidae	87.	*Lota lota*	+	+	+	+	+	+				
Syngnathidae	ME3	*Syngnathus abaster*								+		

Table 1 (continued). List of all lampreys and other species of fish recorded in freshwaters of Bosnia and Herzegovina as well as their distribution across the basins and catchments according to literature and this study. Abbreviation: ME = Marine Euryhaline.

			Danube River Basin							Adriatic Sea Basin		
			Rivers catchments									
Family	**No.**	**Species**	**Sava**	**Una**	**Vrbas**	**Bosna**	**Drina**	**Ukrina**	**Korana and Glina**	**Neretva**	**Trebišnjica**	**Cetina**
Odontobutidae	88.	*Perccottus glenii*	+									
Oxudercidae	89.	*Knipowitschia radovici*								+		
	90.	*Ninnigobius canestrinii*								+		
	91.	*Orsinigobius croaticus*								+	+	
Gobiidae	92.	*Babka gymnotrachelus*	+				+					
	93.	*Neogobius fluviatilis*	+	+	+	+	+	+				
	94.	*Neogobius melanostomus*	+	+	+		+					
	95.	*Ponticola kessleri*	+	+			+					
	96.	*Proterorhinus semilunaris*	+		+		+					
Pleuronectidae	ME4	*Platichthys flesus*								+		
Atherinidae	ME5	*Atherina boyeri*								+		
Poecilidae	97.	*Gambusia hoolbroki*								+	+	+
Mugilidae	ME6	*Chelon auratus*								+		
	ME7	*Chelon labrosus*								+		
	ME8	*Chelon ramada*								+		
	ME9	*Chelon saliens*								+		
	ME10	*Mugil cephalus*								+		
Bleniidae	98.	*Salariopsis fluviatilis*								+		

Table 1 (continued). List of all lampreys and other species of fish recorded in freshwaters of Bosnia and Herzegovina as well as their distribution across the basins and catchments according to literature and this study. Abbreviation: ME = Marine Euryhaline.

			Danube River Basin							**Adriatic Sea Basin**		
			Rivers catchments									
Family	**No.**	**Species**	**Sava**	**Una**	**Vrbas**	**Bosna**	**Drina**	**Ukrina**	**Korana and Glina**	**Neretva**	**Trebišnjica**	**Cetina**
Percidae	99.	*Gymnocephalus baloni*	+	+	+	+	+	+				
	100.	*Gymnocephalus cernua*	+	+	+	+	+	+	+	+	+	
	101.	*Gymnocephalus schraetser*	+		+	+		+				
	102.	*Perca fluviatilis*	+	+	+	+	+	+	+	+		
	103.	*Sander lucioperca*	+	+	+	+	+	+	+	+	+	+
	104.	*Sander volgensis*	+									
	105.	*Zingel streber*	+	+	+	+	+	+				
	106.	*Zingel zingel*	+	+	+	+	+	+				
Gasterosteidae	107.	*Gasterosteus aculeatus*								+		
Cottidae	108.	*Cottus gobio*	+	+	+	+	+	+	+	+		
Centrarchidae	109.	*Lepomis gibbosus*	+	+	+	+	+	+	+	+	+	+
	110.	*Micropterus salmoides*	+	+	+	+	+	+		+		
Moronidae	ME11	*Dicentrarchus labrax*								+		
Sparidae	ME12	*Sparus aurata*								+		
	123	**Total number of reported species (freshwater + euryhaline + marine)**	**71**	**65**	**65**	**62**	**66** **77**	**57**	**50**	**76**	**40** **83**	**22**

of Central Europe, while the Adriatic Basin area is characterised by a number of endemic forms (Vuković 1977a; Kottelat & Freyhof 2007; Sofradžija 2009; Buj *et al.* 2015a, 2017, 2020b).

The Sava River is the most prominent river connecting Croatia, BiH, and Serbia. Together with its tributaries, it constitutes one of the major catchments of Southeast Europe, covering a total area of approximately 97 713.20 km^2. The Sava River is also one of the largest catchments of the Danube River Basin, accounting for 12% of its catchment area in BiH (Jukić 2008). With the exception of the Neretva River, all the major rivers in BiH flow into the Sava River, the largest tributary of the Danube. The Drina River is the Sava River's largest and most important tributary. The Drina River catchments extend into four countries: Montenegro, BiH, Serbia, and a very small part extends into Albania. Other important catchments include the: Una, Vrbas, Bosna, Ukrina, Korana, and Glina Rivers. The Adriatic Basin area of BiH, in turn, consists of three catchments: Neretva, Trebišnjica and Cetina Rivers (Fig. 2). The Neretva River catchment has an area of 10 100 km² or 81.4% of the total Adriatic Basin area of BiH, the Trebišnjica River catchment area has 2250 km², while the Cetina River catchment spreads over 2310 km² (18.6% of the total Adriatic Basin area of BiH) (Hamzić 2024). The Neretva and Cetina rivers flow into the Adriatic Sea, while the Trebišnjica River

Fig. 2. Map of Bosnia and Herzegovina showing the main catchments. From: Hamzić A. 2024. *Biodiverzitet slatkovodnih riba Bosne i Hercegovine*. Buybook, Sarajevo.

is a complex of underground and above-ground watercourses that sinks in the western part of Popovo Polje in BiH, thus connecting with the Neretva River. In the Herzegovina region, there is a massive karst area (covering more than 4000 km^2) that contain numerous flowing underground rivers and streams, that rise as springs.

The freshwater fauna of the Adriatic Basin in BiH is separated from the Danube River Basin by the Dinaric Mountains and thus contributing to the isolation of the Adriatic freshwater fauna which contains many endemic forms and a few non-endemic species (Economidis & Bănărescu 1991; Oikonomou *et al.* 2014; Ludoški *et al.* 2021). In the overall structure of Southeast Europe and the ichthyogeographic provinces presented by Economidis & Bănărescu (1991), BiH is considered as part of the Dalmatian subdivision that extends from northern Slovenia to southern Montenegro. This area is a hotspot of ichthyological diversity for several cyprinid genera, like the unique *Delminichthys* Freyhof, Lieckfeldt, Bogutskaya, Pitra & Ludwig, 2006, followed by *Telestes*, *Squalius* or *Scardinius* (Kottelat & Freyhof 2007), which are primarly associated with the typical karst areas of groundwater. The Neretva River catchment deserves special attention, as this catchment contains a high number of unique endemic freshwater fishes (Mrakovčić *et al.* 1995; Economidis & Bănărescu 1991; Bănărescu & Herzig-Straschil 1998; Bogutskaya & Zupančič 1999; Zupančič & Bogutskaya 2002; Neuburg *et al.* 2023). It is noteworthy that several new species of fish have been described from this catchment in recent decades (Mrakovčić *et al.* 1996; Bogutskaya & Zupančič 2003; Kovačić 2005; Buj *et al.* 2010; Bogutskaya *et al.* 2012; Bianco & De Bonis 2015; Tutman *et al.* 2017a).

Results

Species account of the fishes, including lampreys, reported in freshwaters of BiH

Class Petromyzonti
Order Petromyzontiformes Berg, 1940

Family Petromyzontidae Bonaparte, 1831

Based on the available literature, lampreys are the least studied and most poorly known group of freshwater vertebrates in BiH, though the composition and geographical distribution of the group is better known following a recent revision (Tutman *et al.* 2020a). While eight species were previously reported as present in BiH (*Eudontomyzon danfordi* Regan, 1911; *E. mariae* (Berg, 1931); *E. vladykovi* Oliva & Zanandrea, 1959; *Lampetra fluviatilis* (Linnaeus, 1758); *L. planeri* (Bloch, 1784); *L. soljani* Tutman, Freyhof, Dulčić, Glamuzina & Geiger, 2017; *Lethenteron zanandreai* Vladykov, 1955; *Petromyzon marinus* Linnaeus, 1758) (Vuković 1977a; Sofradžija 2009; Tutman *et al.* 2009a), only three species (*E. vladykovi*, *L. soljani*, *P. marinus*) have recently been confirmed, with records in both the Danube and Adriatic Basins (Tutman *et al.* 2020a). Consequently, five species previously reported in BiH are not included in this checklist, since their occurrence in the region is dubious or not based on confirmed records (*E. danfordi*, *E. mariae*, *L. fluviatilis*, *L. planeri*, and *L. zanandreai*).

Genus *Eudontomyzon* Regan, 1911

Eudontomyzon danfordi Regan, 1911

Vernacular names

Dunavska paklara. Carpathian lamprey.

Previous names used for the species

Lampetra danfordi (Regan, 1911); *Lampetra danfordi danfordi* (Regan, 1911).

Remarks

Distribution of this species is limited to Tisza and Timis drainages in Romania, Slovakia, Ukraine and Hungary (Kottelat & Freyhof 2007). There are no reliable scientific records in BiH freshwaters (Tutman *et al.* 2020a), and all earlier literature that mention this species (Vuković 1963a, 1977a; Kosorić 1981; Šorić 1998) are most likely related to *Eudontomyzon vladykovi*. Therefore, this species is not included in the checklist.

Literature

See *Eudontomyzon vladykovi.*

Eudontomyzon mariae (Berg, 1931)

Vernacular names

Ukrajinska paklara. Ukrainian brook lamprey.

Previous names used for the species

Lampetra mariae Berg, 1931.

Remarks

This species seems to be restricted to Don and Volga basins (Levin *et al.* 2016). There is no scientific confirmation of its presence in BiH waters (Tutman *et al.* 2020a), and all earlier literature data that mention this species (Vuković 1963a, 1977a; Kosorić 1981; Šorić 1998) are most likely related to *E. vladykovi*. Therefore, it is not included in the checklist.

Literature

See *Eudontomyzon vladykovi.*

1. ***Eudontomyzon vladykovi*** Oliva & Zanandrea, 1959

Vernacular names

Dunavska paklara. Danube brook lamprey.

Previous names used for the species

Eudontomyzon danfordi vladykovi (Zanandrea, 1959).

Origin and geographic range in BiH

Endemic (DBE). Danube River Basins.

Remarks

Under the name of *Eudontomyzon vladykovi*, this species was recorded from several localities in BiH, scattered within the river systems of the Una (Šanda & Vukić 2009), Bosna (Golob *et al.* 2015) and Sava River (Golub *et al.* 2018a, 2018b; Ćaleta & Marčić, *unpublished data*). Recently, it was recorded in streams on Mt. Vranica (Golob *et al.* 2015) and in the Lašva River (Mustafić *et al.* 2015). Tutman *et al.* (2020a) presented an overview of its taxonomic status and distribution, confirming its presence in the BiH.

Literature

Anonymous 1886; Glowacki 1896; Ćurčić 1910; Zaplata & Taler 1932; Zanandrea 1959; Vuković 1963a, 1977a; Kosorić 1981; Šorić 1998; Holčik & Delić 2000; Mrakovčić *et al.* 2006; Skenderović *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Šanda & Vukić 2009; Drešković *et al.* 2011; Čičić-Močić 2014; Golob *et al.* 2015; Milanović *et al.* 2015; Mustafić *et al.* 2015; Simonović *et al.* 2015; Lukić *et al.* 2016; Adrović 2018; Golub *et al.* 2018a, 2018b; Memić 2018; Tutman *et al.* 2020a; Dekić *et al.* 2024; Hamzić 2024; Pleše & Buj 2024.

Genus *Lampetra* Gray, 1851

Lampetra fluviatilis (Linnaeus, 1758)

Vernacular names

Riječna paklara. European river lamprey.

Previous names used for the species

Petromyzon fluviatilis Linnaeus, 1758; *Petromyzon branchialis* Linnaeus, 1758.

Remarks

Reports of its presence in BiH appear to be wrong identification of specimens (Tutman *et al.* 2020a). It is unlikely that *Lampetra fluviatilis* inhabits BiH because its distribution range is restricted to northern and western Europe with extirpated populations in the western Mediterranean (Kottelat & Freyhof 2007). Previous reports of the species inhabiting the Adriatic Basin in BiH (Vuković 1963a, 1977a; Sofradžija 2009) are most likely misidentifications of *L. soljani* (Tutman *et al.* 2017a, 2020a). Therefore, it is not included in the checklist.

Literature

See *Lampetra soljani.*

Lampetra planeri (Bloch, 1784)

Vernacular names

Potočna paklara. European brook lamprey.

Previous names used for the species

Petromyzon planeri Bloch, 1784.

Remarks

Reports on its occurrence in BiH appear to be wrong identification of specimens (Tutman *et al.* 2020a). It is unlikely that *Lampetra planeri* inhabits BiH because its distribution range is restricted to northern and western Europe, with isolated populations in the western Mediterranean (Kottelat & Freyhof 2007). Previous reports from the Adriatic Basin in BiH (Vuković 1963a, 1977a; Sofradžija 2009) are most likely related to *L. soljani* (Tutman *et al.* 2017a), while those from Danube Basin (Vuković 1963a, 1977a; Kosorić 1976; Sofradžija 2009) are likely misindentifications of *E. vladykovi*. Therefore, it is not included in the checklist.

Literature

See *Eudontomyzon vladykovi* and *Lampetra soljani.*

2. ***Lampetra soljani*** Tutman, Freyhof, Dulčić, Glamuzina & Geiger, 2017

Vernacular names

Primorska paklara. Šoljan's brook lamprey.

Previous names used for the species

Lampetra zanandreai Vladykov, 1955; *Lethenteron zanandreai* (Vladykov, 1955).

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Lampetra soljani was described from the lower Neretva River in BiH and Croatia (Adriatic Basin) (Tutman *et al.* 2017a), with populations of this species previously regarded as *Lethenteron zanandreai* (Tutman *et al.* 2009a). This non-parasitic species is endemic with a geographic range restricted to the lower section of the Neretva River, from its mouth to about 30 km upstream to the Buna River and in the Neretva River tributaries: Tihaljina/Trebižat River catchment, Krupa River, Bregava River and the Hutovo Blato wetland (Tutman *et al.* 2017a, 2017b, 2020a).

Literature

Kottelat & Freyhof 2007; Tutman *et al.* 2009a, 2009b, 2012a, 2017a, 2020a; Drešković *et al.* 2011; Geiger *et al.* 2014; Milanović *et al.* 2015; Freyhof *et al.* 2020; Pereira *et al.* 2021; Rüber *et al.* 2023.

Lampetra zanandreai Vladykov, 1955

Vernacular names

Po brook lamprey.

Previous names used for the species

Lethenteron zanandreai (Vladykov, 1955).

Remarks

Lampetra zanandreai was considered as distributed in streams in the northern and western Adriatic basin with two disjunct distributional areas: one in streams of the Italian and Slovenian side of the Adriatic basin, and a second in the headwaters of the Neretva and Morača drainages in Croatia, BiH and Montenegro (Holčík & Mrakovčić 1997; Kottelat & Freyhof 2007; Tutman *et al.* 2009a). Recently, populations from the second distributional area were described as a different species, *L. soljani* (Tutman *et al.* 2017a), previously identified as *Lethenteron zanandreai* (Tutman *et al.* 2009a). Therefore, *L. zanandreai* is not included in the list.

Literature

See *Lampetra soljani.*

Genus *Petromyzon* Linnaeus, 1758

ME1 ***Petromyzon marinus*** Linnaeus, 1758.

Vernacular names

Morska paklara. Atlantic sea lamprey.

Previous names used for the species

Petromyzon fluviatilis Linnaeus, 1758; *Petromyzon lampetra* Pallas, 1814.

Origin and geographic range in BiH

Native, migratory, anadromous. Adriatic Basin.

Remarks

Vuković (1963a, 1977a) and Sofradžija (2009) reported the occurrence of this species in the lower reaches of the Neretva River. Nevertheless, only four records of adult *Petromyzon marinus* have been reported to date, one at Žitomislići approx. 50 km upstream (Holčík *et al.* 2004), one in 2013 near Gabela (city of Čapljina) approx. 25 km upstream, and another in 2014 in the same area (Bregava River, a tributary of the Neretva), approx. 27 km upstream (Tutman *et al.* 2020a), and the last one near Gabela (Glamuzina *et al.* 2019). The latter was a ripe adult male, the first mature individual caught in the eastern Adriatic Sea, indicating potential spawning activity not previously recorded (Holčik *et al.* 2004).

Literature

Vuković 1963a, 1977a; Holčik *et al.* 2004; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Tutman *et al.* 2012a, 2020a; Milanović *et al.* 2015; Glamuzina *et al.* 2019.

2. Class Elasmobranchii Bonaparte, 1838
Order Rajiformes Berg, 1940
Family Rajidae de Blainville, 1816
Genus *Raja* Linnaeus, 1758

M1 ***Raja miraletus*** Linnaeus, 1758

Vernacular names

Raža modropjega. Brown ray.

Origin and geographic range in BiH

Adriatic Basin.

Remarks

One specimen of *Raja miraletus* was caught in mid-March 2020 in the Neretva River about 25 km upstream of its mouth (Tutman *et al.* 2021). This collection is unusual since it is the first record of this marine species so far inland in the Neretva River, and a rare record in the Mediterranean Sea overall. This could indicate the expansion of saltwater intrusion deeper into the Neretva River. It may be linked to climate change or human activity (water level lowering in the upper areas of the Neretva River).

Literature

Tutman *et al.* 2021.

3. Class Actinopteri Cope, 1871
Order Acipenseriformes Berg, 1940

Family **Acipenseridae** Bonaparte, 1831

Recent literature data (Brownstein & Thomas 2025) suggests that according to molecular data, most European sturgeon species belong to genus *Huso*, except *Acipenser sturio* and *A. oxyrinchus*.

Genus *Acipenser* Linnaeus, 1758

RE1 ***Acipenser sturio*** Linnaeus, 1758

Vernacular names

Atlantska jesetra. Atlantic sturgeon.

Previous names used for the species

Sturio vulgaris Rafinesque, 1810.

Origin and geographic range in BiH

Native, migratory, anadromous. Danube and Adriatic Basins. Extinct (EX).

Remarks

Atlantic sturgeon used to occur in both the Danube River Basin and in the Adriatic Sea (Vuković 1963a, 1977a). Today, it is considered a regionally extinct species and all recent references (Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009) are based on historical literature.

Literature

Ćurčić 1910; Vuković 1963a, 1977a; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Freyhof *et al.* 2020; Dekić *et al.* 2024.

Genus *Huso* Brandt & Ratzeburg, 1833

RE2 ***Huso gueldenstaedtii*** Brandt & Ratzeburg, 1833

Vernacular names

Jesetra. Russian sturgeon.

Previous names used for the species

Acipenser güldenstädti Brandt, 1833; *Acipenser gueldenstaedtii* Brandt & Ratzeburg, 1833; *Acipenser aculeatus* Lovetsky, 1834; *Acipenser güldenstädti colchicus* Marti, 1940.

Origin and geographic range in BiH

Native, migratory, anadromous. Danube River Basin. Extinct (EX).

Remarks

Vuković (1963a, 1977a) mentioned the occurrence of the species in BiH because it was common in the rivers of the Danube River Basin in the past. Recently, however, there are no confirmed records of the species in the rivers of BiH.

Literature

Anonymous 1886; Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Vlasenko *et al.* 1989; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Freyhof *et al.* 2020; Dekić *et al.* 2024.

RE3 ***Huso huso*** (Linnaeus, 1758)

Vernacular names

Moruna. Beluga.

Previous names used for the species

Acipenser huso Linnaeus, 1758; *Acipenser beluga* Forster, 1767.

Origin and geographic range in BiH

Native, migratory, anadromous. Adriatic and Danube River Basins. Extinct (EX).

Remarks

Beluga used to occur in both the Danube River Basin and the Adriatic Sea (Vuković 1963a, 1977a). All recent references (Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009) are based on historical literature .

Literature

Anonymous 1886, 1909; Jurinac 1887; Glowacki 1896; Hirc 1896; Hawlitschek 1898; Medić 1901; Brusina 1902; Katurić 1903; Ćurčić 1910; Plančić 1923b; Taler 1953a; Vuković 1963a; Tadić 1966; Sabioncello 1967; Sofradžija & Hadžiselimović 1981b; Jardas 1996; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Freyhof *et al.* 2020; Dekić *et al.* 2024.

RE4 ***Huso naccarii*** Bonaparte, 1836

Vernacular names

Jadranska jesetra. Adriatic sturgeon.

Previous names used for the species

Acipenser aculeatus Lovetsky, 1834; *Acipenser naccarii* Bonaparte, 1836; *Acipenser nardoi* Heckel, 1851.

Origin and geographic range in BiH

Endemic (ABE), migratory, anadromous. Adriatic Basin. Extinct (EX).

Remarks

In the past, the species was present in the Adriatic Sea and occasionally entered the Neretva River (Vuković 1963a, 1977a; Vuković & Ivanović 1971). Currently, populations in the entire distribution area are extremely small and there is no accurate data on its presence along the eastern coast of the Adriatic Sea. All recent literature data (Crivelli 1996; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011) are based on old reports.

Table 2 (continued on the next 4 pages). List of all lampreys and other fish species reported from freshwaters of Bosnia and Herzegovina with IUCN categories. Abbreviations: CR = Critically Endangered; DD = Data Deficient; EN = Endangered; FbiH = Federation of Bosnia and Herzegovina; LC = Least Concern; ME = marine euryhaline; NE = Not Evaluated; NT = Near Threatened; RS = Republic of Srpska; * = listed by Regulation on the Red List of protected species of flora and fauna of the Republic of Srpska; VU = Vulnerable.

Family	No.	Species	IUCN assessment	Status in BiH		Protection on international level	
				FBiH	RS	Habitat directive	Bern Convention
Petromyzontidae	1.	*Eudontomyzon vladykovi*	LC	NE		Annex II	Appendix III
	2.	*Lampetra soljani*	NT	NE		Annex II, V	Appendix II, III
	ME1	*Petromyzon marinus*	LC	DD		Annex II	Appendix III
Acipenseridae	3.	*Huso ruthenus*	EN	VU	*	Annex V	Appendix III
Anguillidae	4.	*Anguilla anguilla*	CR	LC			
Clupeidae	ME2	*Alosa fallax*	NT	NE		Annex II, V	Appendix III
Cobitidae	5.	*Cobitis elongata*	LC	LC	*	Annex II	Appendix III
	6.	*Cobitis elongatoides*	LC	LC	*	Annex II	
	7.	*Cobitis herzegoviniensis*	EN	NE			
	8.	*Cobitis illyrica*	EN	NE			
	9.	*Cobitis narentana*	NT	VU			
	10.	*Misgurnus fossilis*	LC	LC	*	Annex II	Appendix III
	11.	*Sabanejewia balcanica*	LC	DD	*	Annex II	
	12.	*Sabanejewia bulgarica*	LC	NE			
Nemacheilidae	13.	*Barbatula barbatula*	LC	LC			
Cyprinidae	14.	*Aulopyge huegelii*	EN	EN		Annex II	
	15.	*Barbus balcanicus*	LC	LC	*	Annex II, V	Appendix III
	16.	*Barbus barbus*	LC	LC		Annex V	
	17.	*Carassius auratus*	LC	LC			
	18.	*Carassius carassius*	LC	LC	*		
	19.	*Carassius gibelio*	NE	LC			
	20.	*Carassius langsdorfii*	LC	NE			
	21.	*Cyprinus carpio*	NT	LC	*		
Xenocyprididae	22.	*Ctenopharyngodon idella*	LC	DD			
	23.	*Hypophthalmichthys molitrix*	NT	LC			

Table 2 (continued). List of all lampreys and other fish species reported from freshwaters of Bosnia in Herzegovina with IUCN categories. Abbreviations: ME = marine euryhaline; FbiH = Federation of Bosnia and Herzegovina, RS = Republic of Srpska; * = listed at Regulation on the Red List of protected species of flora and fauna of the Republic of Srpska); CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NT = Near Threatened; NE = Not Evaluated; VU = Vulnerable.

Family	No.	Species	IUCN assessment	Status in BiH		Protection on international level	
				FBiH	RS	Habitat directive	Bern Convention
	24.	*Hypophthalmichthys nobilis*	DD	LC			
Tincidae	25.	*Tinca tinca*	LC	LC	*		
Achielognathidae	26.	*Rhodeus amarus*	LC	LC	*	Annex II	Appendix III
Gobionidae	27.	*Gobio obtusirostris*	LC	LC	*		
	28.	*Pseudorasbora parva*	LC	LC			
	29.	*Romanogobio carpathorossicus*	LC	EN	*	Annex II	Appendix III
	30.	*Romanogobio uranoscopus*	LC	EN	*	Annex II	Appendix III
	31.	*Romanogobio vladykovi*	LC	NE		Annex II	Appendix III
Leuciscidae	32.	*Abramis brama*	LC	LC			
	33.	*Alburnoides bipunctatus*	LC	LC	*		Appendix III
	34.	*Alburnus alburnus*	LC	LC			
	35.	*Alburnus neretvae*	NT	NE			
	36.	*Alburnus sava*	LC	NE	*	Annex II	Appendix III
	37.	*Ballerus ballerus*	LC	LC	*		Appendix III
	38.	*Ballerus sapa*	LC	LC	*		Appendix III
	39.	*Blicca bjoerkna*	LC	LC			
	40.	*Chondrostoma knerii*	EN	EN		Annex II	Appendix III
	41.	*Chondrostoma nasus*	NT	LC	*		Appendix III
	42.	*Chondrostoma phoxinus*	EN	CR		Annex II	Appendix III
	43.	*Delminichthys adspersus*	EN	EN			Appendix III
	44.	*Delminichthys ghetaldii*	VU	EN	*		
	45.	*Leucaspius delineatus*	LC	VU	*		Appendix III
	46.	*Leuciscus aspius*	LC	LC	*	Annex II, V	Appendix III
	47.	*Leuciscus idus*	LC	LC	*		
	48.	*Leuciscus leuciscus*	LC	LC			

Table 2 (continued). List of all lampreys and other fish species reported from freshwaters of Bosnia in Herzegovina with IUCN categories. Abbreviations: ME = marine euryhaline; FbiH = Federation of Bosnia and Herzegovina, RS = Republic of Srpska; * = listed at Regulation on the Red List of protected species of flora and fauna of the Republic of Srpska); CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NT = Near Threatened; NE = Not Evaluated; VU = Vulnerable.

Family	No.	Species	IUCN assessment	Status in BiH		Protection on international level	
				FBiH	RS	Habitat directive	Bern Convention
	49.	*Leucos basak*	LC	EN		Annex II	
	50.	*Pelecus cultratus*	LC	LC	*	Annex II, V	Appendix III
	51.	*Phoxinellus alepidotus*	EN	EN		Annex II	
	52.	*Phoxinellus pseudalepidotus*	EN	NE		Annex II	
	53.	*Phoxinus karsticus*	NT	NE			
	54.	*Phoxinus lumaireul*	LC	LC			
	55.	*Rutilus rutilus*	LC	LC			
	56.	*Rutilus virgo*	LC	DD	*	Annex II, V	Appendix III
	57.	*Scardinius dergle*	NT	DD			
	58.	*Scardinius erythrophthalmus*	LC	LC			
	59.	*Scardinius plotizza*	NT	DD			
	60.	*Squalius cephalus*	LC	LC			
	61.	*Squalius microlepis*	EN	CR		Annex II	Appendix III
	62.	*Squalius squalus*	LC	LC	*		
	63.	*Squalius svallize*	NT	VU	*	Annex II	Appendix III
	64.	*Squalius tenellus*	EN	CR			Appendix III
	65.	*Telestes dabar*	EN	NE			
	66.	*Telestes metohiensis*	EN	CR	*		
	67.	*Telestes souffia*	LC	LC	*	Annex II	Appendix III
	68.	*Vimba vimba*	LC	LC	*		Appendix III
Siluridae	69.	*Silurus glanis*	LC	LC	*		Appendix III
Ictaluridae	70.	*Ameiurus melas*	LC	NE			
	71.	*Ameiurus nebulosus*	LC	LC			
Esocidae	72.	*Esox lucius*	LC	LC			
Umbridae	73.	*Umbra krameri*	VU	EN	*	Annex II	Appendix II

Table 2 (continued). List of all lampreys and other fish species reported from freshwaters of Bosnia in Herzegovina with IUCN categories. Abbreviations: ME = marine euryhaline; FbiH = Federation of Bosnia and Herzegovina, RS = Republic of Srpska; * = listed at Regulation on the Red List of protected species of flora and fauna of the Republic of Srpska); CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NT = Near Threatened; NE = Not Evaluated; VU = Vulnerable.

Family	No.	Species	IUCN assessment	Status in BiH		Protection on international level	
				FBiH	RS	Habitat directive	Bern Convention
Salmonidae	74.	*Coregonus peled*	LC	NE		Annex V	Appendix III
	75.	*Hucho hucho*	VU	EN	*	Annex II, V	Appendix III
	76.	*Oncorhynchus mykiss*	LC	LC			
	77.	*Salmo farioides*	NT	NE			
	78.	*Salmo labrax*	LC	NE			
	79.	*Salmo letnica*	EN	NE			
	80.	*Salmo marmoratus*	VU	CR		Annex II	
	81.	*Salmo montenigrinus*	NE	NE			
	82.	*Salmo obtusirostris*	VU	CR	*	Annex II	
	83.	*Salmo trutta*	LC	LC	*		
	84.	*Salvelinus alpinus*	LC	LC			
	85.	*Salvelinus fontinalis*	LC	LC			
	86.	*Thymallus thymallus*	LC	LC	*	Annex V	Appendix III
Lotidae	87.	*Lota lota*	LC	LC	*		
Syngnathidae	ME3	*Syngnathus abaster*	LC	DD			Appendix III
Odontobutidae	88.	*Perccottus glenii*	LC	NE			
Oxudercidae	89.	*Knipowitschia radovici*	EN	NE			
	90.	*Ninnigobius canestrinii*	LC	LC		Annex II	Appendix II
	91.	*Orsinigobius croaticus*	VU	NE			
Gobiidae	92.	*Babka gymnotrachelus*	LC	NE			
	93.	*Neogobius fluviatilis*	LC	LC			Appendix III
	94.	*Neogobius melanostomus*	LC	NE			
	95.	*Ponticola kessleri*	LC	DD			Appendix III
	96.	*Proterorhinus semilunaris*	LC	LC			
Pleuronectidae	ME4	*Platichthys flesus*	LC	LC			

Table 2 (continued). List of all lampreys and other fish species reported from freshwaters of Bosnia in Herzegovina with IUCN categories. Abbreviations: ME = marine euryhaline; FbiH = Federation of Bosnia and Herzegovina, RS = Republic of Srpska; * = listed at Regulation on the Red List of protected species of flora and fauna of the Republic of Srpska); CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NT = Near Threatened; NE = Not Evaluated; VU = Vulnerable.

Family	No.	Species	IUCN assessment	Status in BiH		Protection on international level	
				FBiH	RS	Habitat directive	Bern Convention
Atherinidae	ME5	*Atherina boyeri*	LC	LC			
Poecilidae	97.	*Gambusia holbrooki*	LC	DD			
Mugilidae	ME6	*Chelon auratus*	LC	LC			
	ME7	*Chelon labrosus*	LC	LC			
	ME8	*Chelon ramada*	LC	LC			
	ME9	*Chelon saliens*	LC	LC			
	ME10	*Mugil cephalus*	LC	LC			
Bleniidae	98.	*Salariopsis fluviatilis*	LC	VU			Appendix III
Percidae	99.	*Gymnocephalus baloni*	LC	NE	*	Annex II, IV	Appendix III
	100.	*Gymnocephalus cernua*	LC	LC			
	101.	*Gymnocephalus schraetser*	LC	LC	*	Annex II, V	Appendix III
	102.	*Perca fluviatilis*	LC	LC			
	103.	*Sander lucioperca*	LC	LC			
	104.	*Sander volgensis*	LC	LC	*		Appendix III
	105.	*Zingel streber*	LC	VU	*	Annex II	Appendix III
	106.	*Zingel zingel*	LC	VU	*	Annex V	Appendix III
Gasterosteidae	107.	*Gasterosteus aculeatus*	LC	EN			
Cottidae	108.	*Cottus gobio*	LC	LC		Annex II	
Centrarchidae	109.	*Lepomis gibbosus*	LC	NE			
	110.	*Micropterus salmoides*	LC	NE			
Moronidae	ME11	*Dicentrarchus labrax*	NT	DD			
Sparidae	ME12	*Sparus aurata*	LC	NE			

Literature

Vuković 1963a, 1977a; Vuković & Ivanović 1971; Crivelli 1996; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Freyhof *et al.* 2020; Dekić *et al.* 2024.

RE5 ***Huso nudiventris*** Lovetsky, 1828

Vernacular names

Sim. Ship sturgeon.

Previous names used for the species

Acipenser schypa Güldenstädt, 1772; *Acipenser nudiventris* Lovetsky, 1828; *Acipenser glaber* Fitzinger, 1832.

Origin and geographic range in BiH

Native, migratory, anadromous. Danube River Basin. Extinct (EX).

Remarks

In the past, the species inhabited the Danube River and its tributaries in former Yugoslavia, including BiH (Vuković 1963a, 1977a). However, today it is not present in the rivers of BiH and all recent references (Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009) are based on historical data.

Literature

Heckel & Kner 1858; Anonymous 1886; Brusina 1892; Glowacki 1896; Langhoffer 1904; Ćurčić 1910; Plančić 1923b; Tadić 1932; Vuković 1963a, 1977a; Sofradžija & Hadžiselimović 1981b; Sokolov & Vasil'ev 1989b; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Freyhof *et al.* 2020; Dekić *et al.* 2024.

3. ***Huso ruthenus*** (Linnaeus, 1758)

Vernacular names

Kečiga. Sterlet.

Previous names used for the species

Acipenser ruthenus Linnaeus, 1758; *Acipenser pygmaeus* Pallas, 1814; *Acipenser gmelini* Fitzinger, 1836; *Acipenser ruthenicus* Brusina, 1902.

Origin and geographic range in BiH

Native, migratory, potamodromous. Danube River Basin.

Remarks

Sterlet is the only species of sturgeon still present in the rivers of the Danube River Basin. Although its populations are small, it occurs in the Sava River and its tributaries (Hamzić 2024). Most literature references (Vuković 1963a, 1977a; Kosorić *et al.* 1980; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009) are based on catches by commercial and recreational fishermen.

Literature

Anonymous 1886, 1898; Ćurčić 1910; Plančić 1923a; Jedlička 1935; Taler 1948; Ristić 1963; Vuković 1963a, 1977a; Čanković 1964; Kiškarolj 1965; Čanković *et al.* 1968a, 1968b, 1968c; Munjko 1972; Kosorić *et al.* 1980; Bojčić *et al.* 1982; Obratil 1982; Veljović 1982, 1985; Delić 1984; Sokolov & Vasil'ev 1989a; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Suić *et al.* 2008; Sofradžija 2009; Freyhof 2012; Simonović *et al.* 2015; Kovačević *et al.* 2018; Freyhof *et al.* 2020; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

RE6 ***Huso stellatus*** Pallas, 1771

Vernacular names

Pastruga. Stellate sturgeon.

Previous names used for the species

Acipenser stellatus Pallas, 1771; *Acipenser rostratus* Brandt & Ratzeburg, 1833.

Origin and geographic range in BiH

Native, migratory, anadromous. Danube River Basin. Extinct (EX).

Remarks

In BiH, its occurrence was reported in the Danube River and its tributaries (Vuković 1963a, 1977a). However, today it is not present in the rivers of BiH and all references for the region (Jardas 1996; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009) are based on historical data.

Literature

Anonymous 1886; Glowacki 1896; Medić 1896, 1898; Mojsisovics 1897; Horvat 1901; Plančić 1923b; Tadić 1931, 1932; Vuković 1963a, 1977a; Shubina *et al.* 1989; Jardas 1996; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Freyhof *et al.* 2020; Dekić *et al.* 2024.

Order Anguilliformes Goodrich, 1909
Family Anguillidae Rafinesque, 1810
Genus *Anguilla* Garsault, 1764

4. ***Anguilla anguilla*** (Linnaeus, 1758)

Vernacular names

Jegulja. European eel.

Previous names used for the species

Anguilla vulgaris Shaw, 1803; *Anguilla fluviatilis* Heckel & Kner, 1858.

Origin and geographic range in BiH

Native migratory, catadromous. Adriatic and Danube Basin.

Remarks

Native to the Adriatic Basin, in 2004 it was found in Sava River (Danube River Basin) (Golub, unpublished data).

Literature

Horvat 1901; Anonymous 1914, 1965; Aganović 1952a; Vuković 1963a, 1977a; Kosorić & Vuković 1966a; Kaćanski *et al.* 1977; Gvozdenović *et al.* 1978; Kosorić 1978; Veljović 1982; Kosorić *et al.* 1983, 1989; Jardas 1996; Simonović 2001; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Tutman *et al.* 2007, 2012a; Glamuzina *et al.* 2008a, 2008b; Has-Schön *et al.* 2008; Muhamedagić *et al.* 2008; Šanda *et al.* 2008a, 2008b, 2009; Sofradžija 2009; Pavličević *et al.* 2016; Freyhof *et al.* 2020; Dekić *et al.* 2024.

Order Clupeiformes Goodrich, 1909
Family Clupeidae Cuvier, 1817
Genus *Alosa* Garsault, 1764

ME2 ***Alosa fallax*** (Lacepède, 1803)

Vernacular names

Čepa. Twaite shad.

Previous names used for the species

Clupea fallax Lacepède, 1803; *Alosa fallax nilotica* Geoffroy, 1827.

Origin and geographic range in BiH

Native, migratory, anadromous. Adriatic Basin.

Remarks

Alosa fallax is a migratory species that seasonally enters the Neretva River and its downstream tributaries about 45–50 km to the confluence with the River Buna (locality Bunski Kanali). Every year the species enters the Krupa River (connecting Hutovo Blato wetland with the Neretva River) for spawning in April and May.

Literature

Karaman 1928; Vuković 1961, 1962, 1963a, 1977a; Vuković & Ivanović 1971; Kosorić 1978; Kosorić *et al.* 1983, 1989; Jardas 1996; Mikavica 1998; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Muhamedagić *et al.* 2008; Sofradžija 2009; Drešković *et al.* 2011; Tutman *et al.* 2012a.

RE7 ***Alosa immaculata*** Bennet, 1835

Vernacular names

Crnomorska haringa. Pontic shad.

Previous names used for the species

Alosa pontica (Eichwald, 1838); *Alosa caspia* (Eichwald, 1838); *Alosa caspia nordmanni* (Antipa, 1906).

Origin and geographic range in BiH

Native, migratory, anadromous. Danube River Basin. Extinct (EX).

Remarks

Although considered as regionally extinct (Ćaleta *et al.* 2019), the western population of *Alosa immaculata* migrates from the Black Sea into the Danube River for spawning, with fish occasionally found near Đerdap in Serbia and Romania (Višnjić *et al.* 2010). Despite that, all recent references for

BiH are based on historical data, and therefore require confirmation. Sofradžija (2009) listed *A. pontica* (Eichwald, 1838), but this is a synonym of *A. immaculata*.

Literature

Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Lukić *et al.* 2016; Dekić *et al.* 2024.

Order Cypriniformes Goodrich, 1909

Family **Cobitidae** Swainson, 1838

Tutman *et al.* (2017b) critically assessed the current taxonomic status of this family and its geographic distribution. In the Danube River Basin, four species (*Cobitis elongata* Heckel & Kner, 1858; *C. elongatoides* Băcescu & Mayer, 1969; *Misgurnus fossilis* (Linnaeus, 1758), *Sabanejewia balcanica* (Karaman, 1922)) have been recorded, while in the Adriatic Basin three species (*C. narentana* Karaman, 1928, *C. illyrica* Freyhof & Stelbrink, 2007, *C. herzegoviniensis* (Buj & Šanda, 2014)) were recorded. *Cobitis elongatoides* is the most common and wideliest distributed across northern BiH, i.e., in the Sava, Drina, Bosna, Vrbas, and Una rivers (Danube River Basin). Cobitid species from the Adriatic Basin, in turn, are endemic, each with a very small distribution range. Based on available data, it is clear that reports of *C. taenia* Linnaeus, 1758 in BiH are the result of a misidentification, because its distribution range is restricted to northern Europe (Nalbant *ets al.* 2001). Therefore, it is not included in the BiH species checklist.

Genus *Cobitis* Linnaeus, 1758

Cobitis dalmatina Karaman, 1928

Remarks

Listed in Hamzić (2024) with the remark that its presence is yet to be confirmed. Considering that the species occurs only in the Cetina River catchment in Croatia and is not recorded in BiH (Buj *et al.* 2014, 2015a; Ćaleta *et al.* 2019), it is not included in the BiH species checklist.

5. ***Cobitis elongata*** Heckel & Kner, 1858

Vernacular names

Veliki vijun. Balkan spined loach.

Previous names used for the species

Cobitis taenia elongata Heckel & Kner, 1858.

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Literature

Brusina 1892; Medić 1901; Bănărescu & Nalbant 1957, 1998; Mrakovčić *et al.* 2000, 2002, 2006; Bogut *et al.* 2006; Adrović 2007; Kottelat & Freyhof 2007; Buj *et al.* 2008; Kopjar *et al.* 2008; Mrakovčić *et al.* 2008; Pavlović *et al.* 2009; Sofradžija 2009; Popović 2010; Drešković *et al.* 2011; Adrović 2012; Adrović *et al.* 2012; Jakovlić *et al.* 2013; Škrijelj *et al.* 2013; Čičić-Močić 2014, 2016, 2018; Delić *et al.* 2014; Pavličević *et al.* 2014; Hamzić *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Lukić *et al.* 2016; Tutman *et al.* 2017b; Kovačević *et al.* 2018; Memić 2018.

6. Cobitis elongatoides Băcescu & Mayer, 1969

Vernacular names

Vijun, badelj. Danube spined loach.

Previous names used for the species

Cobitis taenia var. *elongatoides* Bacescu, 1962; *Cobitis taenia elongatoides* Bacescu & Mayer, 1969; *Cobitis taenia danubialis* Nalbant, 1993.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin (Hamzić, unpublished data).

Remarks

In the older literature this species was mentioned as *C. taenia* (Vuković 1963a, 1977a; Vuković & Ivanović 1971; Sofradžija & Berberović 1978; Kosorić 1981; Kosorić *et al.* 1983; Korjenić 2004b) for the Sava River and its tributaries. Under the name of *C. taenia danubialis* it was mentioned by Mrakovčić *et al.* (2000) and Schneider *et al.* (2000a), while in Delić *et al.* (2003), Mrakovčić *et al.* (2008) and Dumbović *et al.* (2009) it is identified as *C. elongatoides*.

Literature

Anonymous 1886; Glowacki 1896; Ćurčić 1910; Zaplata & Taler 1932; Vuković 1963a, 1977a; Sofradžija & Berberović 1978; Kosorić *et al.* 1980; Habeković *et al.* 1981; Kosorić 1981; Veljović 1982; Sofradžija *et al.* 1984; Mikavica 1987b; Mikavica *et al.* 1991; Babić & Mikavica 1994; Mikavica & Savić 1999; Mrakovčić *et al.* 2000, 2002, 2006, 2008; Korjenić 2004b; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2020a; Kottelat & Freyhof 2007; Ovčina 2007; Adrović *et al.* 2008, 2012; Vuković *et al.* 2008; Sofradžija 2009; Zrnčić *et al.* 2009; Memić & Adrović 2010; Golub *et al.* 2012; Čičić-Močić 2014, 2019; Delić *et al.* 2014; Nedić *et al.* 2014a, 2014c, 2014d; Hamzić *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Golub *et al.* 2016b, 2017c, 2018a, 2018b; Škrijelj *et al.* 2013; Dekić *et al.* 2017b, 2020a, 2020b, 2024; Tutman *et al.* 2017b; Keško 2018; Kovačević *et al.* 2018; Memić 2018, 2020; Lolić *et al.* 2019; Cvijić *et al.* 2020.

7. *Cobitis herzegoviniensis* (Buj & Šanda, 2014)

Vernacular names

Hercegovački vijun. Herzegovinian spined loach.

Origin and geographic range in BiH

Endemic (NCE, BiH). Adriatic Basin.

Remarks

The species, tentatively classified as *Cobitis* sp., was firstly reported by Šanda *et al.* (2008a) in the tributary of the Neretva River (Lištica) and surrounding karstic field (Mostarsko Blato) from where spined loaches were not previously reported (Kosorić & Vuković 1966a; Aganović 1969; Kosorić 1974, 1977a, 1978; Kosorić *et al.* 1989). Later taxonomic analysis revealed that the population distributed in the Mostarsko Blato karstic field should be considered as a distinct species that has not been described to date (Buj *et al.* 2014). The population is critically endangered by the construction of the Mostarsko Blato hydropower plant, where a large part of the habitat was irreversibly destroyed (dried out), and non-native, invasive and predatory species (pumpkinseed, brown bullhead, and rainbow trout) were introduced into the habitat.

Literature

Šanda *et al.* 2008a, 2008b, 2009; Glamuzina *et al.* 2013; Buj *et al.* 2014, 2015a, 2015b; Tutman *et al.* 2017b; Freyhof *et al.* 2020.

8. ***Cobitis illyrica*** Freyhof & Stelbrink, 2007

Vernacular names

Ilirski vijun. Illyric spined loach.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Another relatively recently described species with a disjunctive distribution, endemic to both Croatia and BiH in the Neretva River catchment. It was first recorded from Prološko Blato lake, in the Imotsko Polje field in Croatia (Freyhof & Stelbrink 2007), while Šanda *et al.* (2008b) noted the presence of a possibly undescribed species in Lake Krenica, Bekijsko Polje field. Later, Buj *et al.* (2014) confirmed both findings, as the first record of *C. illyrica* in BiH. This species inhabits Prološko Blato lake, Baćinska Lakes and the Matica River in neighbouring Croatia, as well as Krenica in the Bekijsko Polje field in BiH.

Literature

Freyhof & Stelbrink 2007; Šanda *et al.* 2008a, 2008b; Glamuzina *et al.* 2013; Buj *et al.* 2014, 2015a, 2015b; Darwall *et al.* 2014; Geiger *et al.* 2014; Ćaleta *et al.* 2015; Tutman *et al.* 2017b; Freyhof *et al.* 2020.

9. ***Cobitis narentana*** Karaman 1928

Vernacular names

Neretvanski vijun. Neretva spined loach.

Previous names used for the species

Cobitis taenia narentana Karaman, 1928.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Endemic species distributed in the lower reaches of the Neretva River, its tributaries and channels and Lake Modro Oko in Croatia (Schneider *et al.* 2000b; Zanella *et al.* 2003; Buj *et al.* 2014, 2015a), as well as in the Trebišnjica River and Hutovo Blato wetland in BiH (Tutman *et al.* 2006, 2012a; Buj *et al.* 2014, 2015a, 2015b). It was first described as a subspecies (*C. taenia narentana* Karaman, 1928); later data include only general notes from the Neretva River catchment (Vuković 1963a, 1977a). Schneider *et al.* (2000b) redescribed it as a distinct species, *C. narentana*. Sofradžija (2009) considered the lower Neretva River from the town Čapljina as its distribution area in BiH, while Tutman *et al.* (2006, 2012a), Šanda *et al.* (2008a, 2008b), and Buj *et al.* (2015a, 2015b) found the species on the Hutovo Blato wetland area, in the Bregava and the Trebišnjica River, all in BiH.

Literature

Karaman 1928; Vuković 1963a, 1977a; Kottelat 1997; Mikavica 1998; Mrakovčić *et al.* 2000, 2006, 2008; Schneider *et al.* 2000b; Bogut *et al.* 2006; Tutman *et al.* 2006, 2012a, 2017b; Buj *et al.* 2007, 2014, 2015a, 2015b; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Zupančič 2008; Dulčić *et al.* 2009; Sofradžija 2009; Zanella *et al.* 2009; Glamuzina *et al.* 2008a, 2013; Buj *et al.* 2014, 2015a, 2015b; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Ćaleta *et al.* 2015; Milanović *et al.* 2015; Dekić *et al.* 2024.

Genus *Misgurnus* Lacepède, 1803

10. ***Misgurnus fossilis*** (Linnaeus, 1758)

Vernacular names

Čikov. Weather loach.

Previous names used for the species

Cobitis fossilis Linnaeus, 1758.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Historical data on its distribution in BiH are very scarce (Vuković 1963a, 1977a; Bogut *et al.* 2006); therefore, its actual distribution is dubious. According to the available data, it occurs in the Sava River with its tributaries of northern BiH (Sofradžija 2009). A report from the Adriatic Basin (Trebišnjica River catchment) indicates that it may have been translocated from the Danube River Basin (Šukalo *et al.* 2018). Therefore, additional research is necessary.

Literature

Anonymous 1886, 1909; Brusina 1892; Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Veljović 1982; Mikavica *et al.* 1991; Mikavica & Savić 1999; Mrakovčić *et al.* 2000, 2006, 2008; Radević 2000; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Vuković *et al.* 2008; Sofradžija 2009; Drešković *et al.* 2011; Jakovlić *et al.* 2013; Muhamedagić *et al.* 2013; Hamzić *et al.* 2015; Simonović *et al.* 2015; Lukić *et al.* 2016; Tutman *et al.* 2017b; Dekić *et al.* 2024.

Genus *Sabanejewia* Vladykov, 1929

11. ***Sabanejewia balcanica*** (Karaman 1922)

Vernacular names

Balkanski zlatni vijun. Balkan golden loach.

Previous names used for the species

Cobitis aurata (Filippi, 1865); *Cobitis aurata balcanica* Karaman 1922; *Cobitis aurata bosniaca* Karaman, 1963; *Sabanejewia aurata balcanica* (Karaman, 1922).

Origin and geographic range in BiH

Native. Danube River Basin.

Remarks

Sabanejewia balcanica was previously considered as a subspecies of *Cobitis aurata*, *C. aurata balcanica* Karaman, 1922, reported from waters of the Danube River Basin, whereas *C. aurata bosniaca* Karaman, 1963 was restricted to the Vrbas River and its tributaries Suturlija and Široka (Sava River catchment) (Karaman 1963; Vuković 1963a, 1977a; Sofradžija 2009). Later authors (Mrakovčić *et al.* 2000, 2006, 2008; Bogut *et al.* 2006; Sofradžija 2009; Drešković *et al.* 2011) simply followed previous reports without new, distributional data.

Literature

Karaman 1922, 1963; Zaplata & Taler 1932; Vuković 1963a, 1977a, Kottelat 1997; Mikavica 1998; Mrakovčić *et al.* 2000, 2006, 2008; Radević 2000; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Marešová *et al.* 2011; Adrović *et al.* 2012; Muhamedagić *et al.* 2013; Delić *et al.* 2014; Hamzić *et al.* 2015; Milanović *et al.* 2015; Simonović *et al.* 2015; Čičić-Močić 2016; Golub *et al.* 2016b; Tutman *et al.* 2017b; Adrović 2018; Memić 2018, 2020; Bajrić *et al.* 2018a, 2018b, 2021a, 2021b; Skenderović *et al.* 2020a; Dekić *et al.* 2024.

12. ***Sabanejewia bulgarica*** (Drensky, 1928)

Vernacular names

Dunavski zlatni vijun. Bulgarian golden loach.

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Remarks

Fedorčák *et al.* (2023) recently confirmed the presence of *Sabanejewia bulgarica* in several localities in BiH, in habitats with specific ecological characteristics.

Literature

Fedorčák *et al.* 2023.

Family Nemacheilidae Regan, 1911
Genus Barbatula Linck, 1790

13. *Barbatula barbatula* (Linnaeus, 1758)

Vernacular names

Brkica. Stone loach.

Previous names used for the species

Barbatula barbatulus (Linnaeus, 1758); *Cobitis barbatula* Linnaeus, 1758; *Nemacheilus barbatulus barbatulus* Linnaeus, 1758; *Nemachilus barbatulus* (Linnaeus, 1758); *Orthrias barbatulus barbatulus* (Linnaeus, 1758).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

First mentioned as *Cobitis barbatula* by Zaplata & Taler (1932) in the Bosna River, later as *Nemachilus barbatulus* (Vuković 1963a, 1977a) and *N. barbatulus* (Sofradžija 2009) in the small rivers of the Sava River watershed. Reported as *Barbatula barbatula* (Bogut *et al.* 2006) in the waters of the Danube River Basin without precise locations. The record in the upper Neretva River, Adriatic Basin, by Vegara *et al.* (2009) seems to be the result of accidental introduction during stocking of other fishes (Hamzić 2024). Calegari *et al.* (2025) designated neotype for *B. barbatula* and restricted the distribution of this species to a small region in the Mediterranean France, while many populations, including those from BiH, are currently of unknown taxonomic status, and will require further careful evaluation.

Literature

Heckel & Kner 1858; Anonymous 1886; Glowacki 1896; Zaplata & Taler 1932; Simić 1963; Vuković 1963a, 1977a; Sofradžija & Vuković 1979; Sofradžija *et al.* 1984; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Vegara *et al.* 2009; Golub *et al.* 2012, 2017c, 2018a, 2018b; Jakovlić *et al.* 2013; Čičić-Močić 2014, 2016, 2018; Nedić *et al.* 2014a, 2014c, 2014d; Hamzić *et al.* 2015; Simonović *et al.* 2015; Dekić *et al.* 2017b, 2020b; Tutman *et al.* 2017b; Adrović 2018; Memić 2018; Lolić *et al.* 2019; Neuburg *et al.* 2023; Calegari *et al.* (2025).

Family Cyprinidae Rafinesque, 1815
Genus *Aulopyge* Heckel, 1841

14. ***Aulopyge huegelii*** Heckel, 1843

Vernacular names

Oštrulj. Dalmatian barbel gudgeon.

Previous names used for the species

Aulopyge hugeli Heckel, 1841; *Aulopyge hügelii* Heckel, 1843.

Origin and geographic range in BiH

Endemic (ABE). Native to the Adriatic Basin, translocated to the Danube River Basin.

Remarks

Found in BiH and Croatia, where it inhabits the karst watercourses; occurs in some creeks in the Livanjsko Polje field, in the Cetina and Krka Rivers in Croatia, and was successfully introduced to Lake Blidinje (Ćurčić 1916), Buško Blato (Žujo-Zekić 2021) and Mostarsko Blato (Šanda *et al.* 2009) in the Adriatic Basin and Šator Lake (Delić *et al.* 2005) in the Danube River Basin (Una River catchment).

Literature

Heckel & Kner 1858; Ćurčić 1916; Karaman 1923, 1928; Protić 1924; Taler 1951a, 1951b, 1953a; Vuković 1963a, 1964, 1977a, 1982a; Aganović & Vuković 1966, 1967, 1968, 1971; Kapetanović *et al.* 1966; Pipić 1966; Berberović 1967; Vuković & žnidaršić-Krzyk 1969; Aganović 1969; Berberović *et al.* 1969c, 1971a; Guzina *et al.* 1971; Kaluđerčić *et al.* 1971; Miladinović *et al.* 1971; Vuković & Ivanović 1971; Winterhalter *et al.* 1971; Bozja & Švob 1974; Đurović & Vuković 1975; Korić 1975; Guzina & Vuković 1977, 1987; Kaćanski *et al.* 1978; Mijatović *et al.* 1982; Kekić *et al.* 1983; Jojić 1984; Volić 1984; Gvozdenović *et al.* 1985; Guzina *et al.* 1986; Howes 1987; Pešić 1987; Vuković & Sofradžija 1987; Sofradžija & Kundurović 1988; Ivanc *et al.* 1989; Povž *et al.* 1990; Economidis & Bănărescu 1991; Crivelli 1996; Freyhof 1997; Mikavica 1998; Šorić & Bănărescu 1999;

Delić *et al.* 2005; Guzina 2000, 2005; Bogut *et al.* 2006; Freyhof *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Muhamedagić *et al.* 2008; Nuhanović 1989; Šanda *et al.* 2008a, 2008b, 2009; Zupančič 2008; Sofradžija 2009; Ćaleta *et al.* 2009a; Hasković *et al.* 2010; Drešković *et al.* 2011; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Milanović *et al.* 2015; Mušović 2016; Dekić *et al.* 2016a, 2024; Benovics *et al.* 2017, 2019; Mustafić & Mrakovčić 2017; Mušović *et al.* 2018, 2020; Kalamujić Stroil *et al.* 2019; Freyhof *et al.* 2020; Buj *et al.* 2021; Ludoški *et al.* 2021; Žujo-Zekić 2021; Avdić *et al.* 2023; Lukač *et al.* 2023; Carosi *et al.* 2024.

Genus *Barbus* Cuvier & Cloquet, 1816

15. ***Barbus balcanicus*** Kotlík, Tsigenopoulos, Ráb & Berrebi, 2002

Vernacular names

Potočna mrena. Danube barbel.

Previous names used for the species

Barbus meridionalis petenyi Risso, 1826; *Barbus meridionalis* Risso, 1827; *Barbus caninus* (Bonaparte, 1839); *Barbus peloponnesius* Valenciennes, 1842; *Barbus peloponnesius petenyi* Heckel, 1852; *Barbus petenyi* Heckel, 1852.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the Adriatic Basin (Dreţanka River), as bait fish for pikeperch angling, also recorded in the Salakovac reservoir (Spasojević, unpublished data). All references of occurrences of *Barbus meridionalis petenyi* Heckel, 1852 (Vuković 1963a; Sofradžija 2009), *B. meridionalis* Riso, 1827 and *B. petenyi* Heckel, 1852 are erroneous since those species do not occur in BiH (Kottelat & Freyhof 2007).

Literature

Glowacki 1896; Karaman 1924; Zaplata & Taler 1932; Smlatić 1961; Vuković 1963a, 1963c, 1966a, 1977a; Šenk 1963; Šenk & Telalbašić 1963; Berberović 1967; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Šenk 1969; Aganović & Kapetanović 1973; Sofradžija & Berberović 1973; Kosorić *et al.* 1975, 1980; Berberović 1980; Omeragić *et al.* 1980; Kosorić 1981; Šolaja & Pocrnjić 1983a; Sofradžija *et al.* 1984; Mikavica 1987b, 1988a; Šorić & Janković 1989; Mikavica *et al.* 1991; Babić & Mikavica 1994; Proha 1997; Mikavica & Savić 1999; Radević 2000, 2002; Machordom & Doadrio 2001; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Skenderović *et al.* 2006, 2020a, 2020b; Škrijelj *et al.* 2006; Adrović 2007; Kottelat & Freyhof 2007; Skenderović & Adrović 2008b; Dekić *et al.* 2009a, 2013c, 2020a, 2020b, 2024; Kaltak 2009; Sofradžija 2009; Marková *et al.* 2010; Drešković *et al.* 2011; Ivanc *et al.* 2011; Adrović 2012, 2018; Golub *et al.* 2012, 2016a, 2017c, 2018a, 2018b; Ivanc & Dekić 2012; Čičić-Močić 2014, 2016, 2018, 2019; Delić *et al.* 2014; Milanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Adrović *et al.* 2018; Keško 2018; Kovačević *et al.* 2018; Lolić *et al.* 2019; Memić 2018, 2020; Cvijić *et al.* 2020.

16. ***Barbus barbus*** (Linnaeus, 1758)

Vernacular names

Mrena. Barbel.

Previous names used for the species

Cyprinus barbus Linnaeus, 1758; *Barbus barbus barbus* (Linnaeus, 1758); *Barbus vulgaris* Fleming, 1828; *Barbus fluviatilis* Fitzinger, 1832.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Zaplata & Taler 1932; Bek 1935; Aganović & Milošević 1959; Vuković 1963a, 1977a; Čanković 1967; Čanković *et al.* 1968a, 1968b, 1968c; Kiškarolj & Čanković 1968, 1969; Šenk & Aganović 1968; Šenk 1969; Aganović & Kapetanović 1973; Kosorić *et al.* 1975, 1980; Kosorić 1981; Habeković *et al.* 1981; Kaćanski *et al.* 1981; Obratil 1982; Veljović 1982, 1985; Delić 1984, Mikavica 1987b, 1988a; Mikavica *et al.* 1991, 1997; Babić & Mikavica 1994; Mikavica & Savić 1997, 1999; Radević 2000; Machordom & Doadrio 2001; Mrakovčić *et al.* 2002; Bogut *et al.* 2006; Korjenić *et al.* 2006; Škrijelj *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Ivanc & Dekić 2012; Muhamedagić & Habibović 2013; Čičić-Močić 2014, 2018, 2019; Delić *et al.* 2014; Simonović *et al.* 2015; Bećiraj *et al.* 2016; Golub *et al.* 2016a, 2017c, 2018a, 2018b; Nedić *et al.* 2016a, 2018; Kovačević *et al.* 2018; Lolić *et al.* 2019; Skenderović & Adrović 2019; Zuliani *et al.* 2019; Cvijić *et al.* 2020; Dekić *et al.* 2020a, 2024; Skenderović *et al.* 2020a, 2020b, 2021.

Barbus plebejus Bonaparte, 1839

Previous names used for the species

Barbus plebejus plebejus Bonaparte, 1839; *Barbus plebeius* Valenciennes, 1842.

Remarks

Listed in Vuković & Ivanović (1971) and Drešković *et al.* (2011), but as a result of taxonomic misidentification of specimens since the southernmost finding of the species in the Adriatic Basin is the Krka River in Croatia (Ćaleta *et al.* 2019). Therefore, it is not included in the checklist.

Literature

Vuković & Ivanović (1971); Drešković *et al.* (2011).

Carassius Jarocki, 1822

17. ***Carassius auratus*** (Linnaeus, 1758)

Vernacular names

Zlatni karaš. Goldfish.

Previous names used for the species

Carassius auratus auratus (Linnaeus, 1758).

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species from Asia. It is possible that some records of *Carassius auratus* result from misidentifications of specimens of *C. gibelio*.

Literature

Vuković 1963a, 1977a; Vuković & Ivanović 1971; Kosorić *et al.* 1980; Bogut *et al.* 2006; Adrović & Skenderović 2007; Glamuzina *et al.* 2008a; Sofradžija 2009; Mrdak & Milošević 2017.

18. ***Carassius carassius*** (Linnaeus, 1758)

Vernacular names

Karaš. Crucian carp.

Previous names used for the species

Cyprinus carassius Linnaeus, 1758; *Carassius vulgaris* Nordmann, 1840.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the Adriatic Basin (Hamzić, unpublished data).

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Aganović 1957, 1967; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Žitnan *et al.* 1969; Vuković & Ivanović 1971; Pikula 1977; Sofradžija *et al.* 1977, 1978a; Berberović 1980; Guzina *et al.* 1980; Nadaždin *et al.* 1980; Vuković *et al.* 1980; Obratil 1982; Veljović 1982, 1985; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Adrović 2007; Kottelat & Freyhof 2007; Sofradžija 2009; Adrović 2012; Čičić-Močić 2014; Simonović *et al.* 2015; Skenderović 2015; Kovačević *et al.* 2018; Memić 2018; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

19. ***Carassius gibbelio*** (Bloch, 1782)

Vernacular names

Babuška. Prussian carp.

Previous names used for the species

Carassius auratus gibelio (Bloch, 1783).

Origin and geographic range in BiH

Non-native. Danube and Adriatic Basin.

Remarks

Non-native species that originally occurs in Asia. It is a widespread species present in both Danube and Adriatic basins with a high impact on native species of fish (Glamuzina *et al.* 2017; Hamzić 2024).

Literature

Vuković 1963a, 1977a; Plančić 1967; Čanković *et al.* 1968a; Žitnan *et al.* 1969; Vuković & Ivanović 1971; Pikula 1977; Sofradžija *et al.* 1977, 1978a; Kosorić 1978; Vuković *et al.* 1979, 1980; Nadaždin *et al.* 1980; Delić 1984, 1985; Škrijelj 1991; Safin 1997; Leiner 1998; Radević 2000, 2002; Mrakovčić *et al.* 2002; Škrijelj *et al.* 2005a, 2005b; Bogut *et al.* 2006; Adrović 2007; Kottelat & Freyhof 2007; Has-Schön *et al.* 2008; Vuković *et al.* 2008; Muhamedagić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Sofradžija 2009; Skenderović *et al.* 2010, 2011a, 2011b, 2020b, 2021; Ivanc *et al.* 2011; Adrović 2012, 2018; Tutman *et al.* 2012a; Dekić *et al.* 2013d, 2020a, 2024; Golub *et al.* 2013, 2017b, 2018a, 2018b; Mikavica *et al.* 2013; Rylková *et al.* 2013; Čičić-Močić 2014, 2016; Nedić *et al.* 2014a, 2014c, 2014d, 2016b, 2018; Riđanović *et al.* 2015; Hajdarević *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Ćulibrk *et al.* 2016; Pavličević *et al.* 2016; Glamuzina *et al.* 2017; Kovačević *et al.* 2018; Memić 2018; Mušović *et al.* 2018, 2020; Žujo-Zekić 2021; Žujo-Zekić *et al.* 2018; Skenderović & Adrović 2019; Adrović *et al.* 2021; Halilović & Dekić 2022; Carosi *et al.* 2024.

20. ***Carassius langsdorfii*** Temminck & Schlegel, 1846

Vernacular names

Japanski karaš. Japanese silver crucian carp.

Origin and geographic range in BiH

Non-native. Adriatic Basin.

Remarks

Non-native species that originally occurs in Asia; several specimens were recorded in the Neretva River catchment based on molecular data (Kalous *et al.* 2012).

Literature

Kalous *et al.* 2012; Rylková *et al.* 2013; Piria *et al.* 2018.

Cyprinus Linnaeus, 1758

21. ***Cyprinus carpio*** Linnaeus, 1758

Vernacular names

Šaran. Common Carp.

Previous names used for the species

Cyprinus carpio carpio Linnaeus, 1758.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to several lakes and reservoirs in the Adriatic Basin (Glamuzina *et al.* 2017), where it is regularly stocked (Spasojević, unpublished data).

Literature

Anonymous 1886, 1909, 1947a, 1947b, 1948, 1959; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Trojanović 1934; Jedlička 1935; Taler 1951b; Aganović 1952a, 1957, 1967; Vuković 1963a, 1977a; Kosorić 1965, 1978; Čanković *et al.* 1968a, 1968b, 1968c, 1976; Aganović & Kapetanović 1973; Kaćanski *et al.* 1977; Vuković & Kosorić 1978; Berberović 1980; Grbelja *et al.* 1980; Kosorić *et al.* 1980, 1983, 1989; Nadaždin *et al.* 1980; Vuković *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982; Delić 1984; Ratković & Mikavica 1984; Mikavica *et al.* 1991; Pažur 1993; Leiner 1998; Mikavica & Savić 1999; Radević 2000, 2002; Korjenić *et al.* 2003; Mikavica & Vuković 2003; Škrijelj *et al.* 2003, 2005a, 2005b; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Adrović 2007; Glamuzina *et al.* 2008a, 2017; Kottelat & Freyhof 2007; Has-Schön *et al.* 2008; Muhamedagić *et al.* 2008; Suić *et al.* 2008; Šanda *et al.* 2008a, 2008b, 2009; Vuković *et al.* 2008; Sofradžija 2009; Skenderović *et al.* 2010, 2011b, 2015, 2020b, 2021; Ivanc *et al.* 2011; Tomljanović *et al.* 2011, 2013; Adrović 2012; Freyhof 2012; Skenderović & Adrović 2012, 2016; Tutman *et al.* 2012a; Golub *et al.* 2013, 2017c; Čičić-Močić 2014; Delić *et al.* 2014; Nedić *et al.* 2014c, 2016a, 2016b, 2018; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Pavličević *et al.* 2016; Piria 2016b; Džafić *et al.* 2018; Kovačević *et al.* 2018; Mušović *et al.* 2018, 2020; Piria *et al.* 2018; Žujo-Zekić *et al.* 2018; Žujo-Zekić 2021; Adrović *et al.* 2021; Dekić *et al.* 2024.

Family Xenocyprididae Günther, 1868
Ctenopharyngodon Steindachner, 1866

22. ***Ctenopharyngodon idella*** (Valenciennes, 1844)

Vernacular names

Bijeli amur. Grass carp.

Previous names used for the species

Ctenopharingodon idella (Valenciennes, 1844); *Ctenopharingodon idellus* (Valenciennes, 1844),.

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species that originally occurs in Asia, introduced for biomanipulation and control of algae and aquatic plants.

Literature

Vuković 1963a, 1977a; Žitnan *et al.* 1969; Veljović 1982; Radević 2000; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Muhamedagić *et al.* 2008; Sofradžija 2009; Tutman *et al.* 2012a; Nedić *et al.* 2014a, 2014c, 2014d, 2016b; Riđanović *et al.* 2015; Glamuzina *et al.* 2017; Golub *et al.* 2017c; Kovačević *et al.* 2018; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

Hypophthalmichthys Bleeker, 1860

23. ***Hypophthalmichthys molitrix*** (Valenciennes, 1844)

Vernacular names

Bijeli glavaš, bijeli tolstolobik. Silver carp.

Previous names used for the species

Aristichthys molitrix (Richardson, 1845).

Origin and geographic range in BiH

Non-native. Danube and the Adriatic Basin.

Remarks

Non-native species that originally occurs in Asia, introduced for biomanipulation and control of planktonic organisms.

Literature

Vuković 1963a, 1977a; Radević 2000; Bogut *et al.* 2006; Sofradžija 2009; Tutman *et al.* 2012a; Simonović *et al.* 2015; Glamuzina *et al.* 2017; Mušović *et al.* 2020; Žujo-Zekić 2021; Dekić *et al.* 2024.

24. ***Hypophthalmichthys nobilis*** (Richardson, 1845)

Vernacular names

Šareni glavaš, šareni tolstolobik. Bighead carp.

Origin and geographic range in BiH

Non-native. Danube and the Adriatic Basin.

Previous names used for the species

Aristichthys nobilis (Richardson, 1845).

Remarks

Non-native species from Asia introduced for biomanipulation and control of planktonic organisms.

Literature

Vuković 1963a, 1977a; Radević 2000; Sofradžija 2009; Glamuzina *et al.* 2017; Dekić *et al.* 2024.

Family Tincidae Jordan, 1878

3.4.5.1 Genus *Tinca* Cuvier, 1816

25. ***Tinca tinca*** (Linnaeus, 1758)

Vernacular names

Linjak. Tench.

Previous names used for the species

Cyprinus tinca Linnaeus, 1758; *Tinca vulgaris* Fleming, 1828.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the Adriatic Basin (Glamuzina *et al.* 2017).

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Aganović 1952a, 1957, 1967; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Žitnan *et al.* 1969; Vuković & Ivanović 1971; Juretić *et al.* 1977; Berberović *et al.* 1978; Kosorić 1978; Vuković & Kosorić 1978; Nadaždin *et al.* 1980; Vuković *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982; Mikavica 1987b; Mikavica *et al.* 1991; Leiner 1998; Mikavica & Savić 1999; Radević 2000; Škrijelj *et al.* 2005a, 2005b; Bogut *et al.* 2006; Adrović 2007; Hamzić & Lelo 2007; Kottelat & Freyhof 2007; Has-Schön *et al.* 2008; Suić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Vuković *et al.* 2008; Sofradžija 2009; Perea *et al.* 2010; Skenderović *et al.* 2010, 2011b, 2020a, 2020b; Adrović 2012, 2018; Tutman *et al.* 2012a; Hasković *et al.* 2013; Čičić-Močić 2014, 2019; Geiger *et al.* 2014; Simonović *et al.* 2015; Skenderović 2015; Glamuzina *et al.* 2008a, 2017; Mrdak & Milošević 2017; Kovačević *et al.* 2018; Memić 2018; Mušović *et al.* 2018, 2020; Nedić *et al.* 2018; Žujo-Zekić *et al.* 2018; Adrović *et al.* 2021, Dekić *et al.* 2024.

Family Acheilognathidae Bleeker, 1863
Genus *Rhodeus* Agassiz, 1832

26. ***Rhodeus amarus*** (Bloch, 1782)

Vernacular names

Gavčica. European Bitterling.

Previous names used for the species

Rhodeus sericeus (Pallas, 1776); *Cyprinus amarus* Bloch, 1782; *Rhodeus sericeus amarus* (Bloch, 1782).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Literature

Glowacki 1896; Jankelić 1963; Vuković 1963a, 1977a; Sofradžija *et al.* 1975; Kosorić *et al.* 1983, 1989; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002; Bogut *et al.* 2006; Skenderović *et al.* 2006; Adrović 2007; Kottelat & Freyhof 2007; Skenderović & Adrović 2008b; Vuković *et al.* 2008; Sofradžija 2009; Drešković *et al.* 2011; Adrović 2012, 2018; Bănăduc & Curtean-Bănăduc 2014; Čičić-Močić 2014, 2016, 2019; Delić *et al.* 2014; Simonović *et al.* 2015; Skenderović 2015; Lukić *et al.* 2016; Glamuzina *et al.* 2017; Golub *et al.* 2017c, 2018a, 2018b; Kovačević *et al.* 2018; Memić 2018; Lolić *et al.* 2019; Cvijić *et al.* 2020; Dekić *et al.* 2020a, 2020b, 2024; Skenderović *et al.* 2020a.

Family Gobionidae Bleeker, 1863

Genus ***Gobio*** Cuvier, 1816

Taxonomic status of the gudgeons of the genus *Gobio* from the Danube River Basin requires thorough revision (Takács *et al.* 2014; Zangl *et al.* 2020).

27. ***Gobio obtusirostris*** Valenciennes, 1842

Vernacular names

Obična ili Dunavska Krkuša. Danube gudgeon.

Previous names used for the species

Gobio gobio (Linnaeus, 1758); *Gobio vulgaris* Heckel, 1837; *Gobio fluviatilis* Cuvier, 1842; *Gobio gobio obtusirostris* Valenciennes, 1844.

Origin and geographic range in BiH

Endemic (DBE). Native to the Danube River, translocated to the Adriatic Basin.

Remarks

Previous literature (Vuković 1963a, 1977a) mentioned it as *Gobio gobio*, which was a result of misidentification of specimens, and likely refer to *G. obtusirostris* (Takács *et al.* 2014; Zangl *et al.* 2020).

Literature

Glowacki 1896; Medić 1896; Zaplata & Taler 1932; Aganović & Milošević 1959; Vuković 1963a, 1966a, 1977a, Šenk 1969; Šenk & Kaluđerčić 1963; Vuković & Seratlić-Savić 1970; Vuković & Ivanović 1971; Duran 1975; Kosorić *et al.* 1975, 1980; Medić-Žuljević 1975; Sofradžija & Berberović 1975; Uršić 1975; Habeković *et al.* 1981; Kapetina 1981; Kosorić 1981; Obratil 1982; Veljović 1982, 1985; Sofradžija *et al.* 1984; Mikavica 1987b; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002, 2006; Memić & Adrović 2005; Mustafić *et al.* 2005; Zorlak 2005; Bogut *et al.* 2006; Memić 2006; Skenderović *et al.* 2006, 2020a; Adrović 2007; Kottelat & Freyhof 2007; Muhamedagić *et al.* 2008; Skenderović & Adrović 2008b; Vuković *et al.* 2008; Sofradžija 2009; Adrović 2012, 2018; Golub *et al.* 2012, 2016a, 2017c, 2018a, 2018b; Ivanc & Dekić 2012; Čičić-Močić 2014, 2016, 2018, 2019; Simonović *et al.* 2015; Skenderović 2015; Dekić *et al.* 2017b, 2020a, 2020b; Keško 2018; Kovačević *et al.* 2018; Memić 2018, 2020; Paspalj *et al.* 2018; Lolić *et al.* 2019; Muhamedagić *et al.* 2019; Cvijić *et al.* 2020.

Genus *Pseudorasbora* Bleeker, 1860

28. ***Pseudorasbora parva*** (Temminck & Schlegel, 1846)

Vernacular names

Bezribica. Topmouth gudgeon.

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species that originally occurs in eastern Asia, spreading rapidly in BiH lakes and rivers; invasive and harmful alien species. According to EU Regulation, it is considered an invasive species of EU concern.

Literature

Bogut *et al.* 2006; Adrović & Skenderović 2007; Šanda *et al.* 2008a, 2008b; Vuković *et al.* 2008; Sofradžija 2009; Tutman *et al.* 2012a; Simonović *et al.* 2015; Adrović *et al.* 2017; Glamuzina et al. 2017; Golub *et al.* 2018b; Mušović *et al.* 2018, 2020.

Genus *Romanogobio* Bănărescu, 1961

29. ***Romanogobio carpathorossicus*** (Vladykov, 1925)

Vernacular names

Istočna govedarka, istočna krkuša. Romanian gudgeon.

Previous names used for the species

Gobio kessleri Dybowski, 1862; *Gobio kessleri kessleri* Dybowski, 1862.

Origin and geographic range in BiH

Native. Danube River Basin.

Remarks

Previously reported as *Gobio* (*Romanogobio*) *kessleri*, but according to new literature data (Friedrich *et al.* 2018; Freyhof 2024), *R. kesslerii* is distributed in the lower Danube River Basin and the Baltic Basin, while in the upper and middle Danube River Basin *Romanogobio carpathorossicus* (Vladykov, 1925) is present.

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Simonović *et al.* 2015; Friedrich *et al.* 2018; Kovačević *et al.* 2018; Lolić *et al.* 2019; Dekić *et al.* 2024; Freyhof 2024.

30. ***Romanogobio uranoscopus*** (Agassiz, 1828)

Vernacular names

Tankorepa krkuša. Stone gudgeon.

Previous names used for the species

Gobio uranoscopus (Agassiz, 1828).

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Literature

Seeley 1886; Glowacki 1896; Vuković 1963a, 1977a; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Golub *et al.* 2012; Milanović *et al.* 2015; Simonović *et al.* 2015; Dekić *et al.* 2024.

31. ***Romanogobio vladykovi*** (Fang, 1943)

Vernacular names

Dunavska bjeloperajna krkuša. Danube whitefin gudgeon.

Previous names used for the species

Gobio vladykovi Fang, 1943; *Romanogobio albipinnatus vladykovi* (Lukasch, 1933).

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Remarks

Mentioned by Sofradžija (2009) as *Romanogobio albipinnatus* (Lukasch, 1933), although this is possibly a result of misidentification, likely refering to specimens of *R. vladykovi*.

Literature

Naseka *et al.* 1999; Mrakovčić *et al.* 2002, 2006; Mustafić *et al.* 2005; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Simonović *et al.* 2015; Dekić *et al.* 2024.

Family Leuciscidae Bonaparte, 1835
Genus *Abramis* Cuvier, 1816

32. ***Abramis brama*** (Linnaeus, 1758)

Vernacular names

Deverika. Bream.

Previous names used for the species

Cyprinus brama Linnaeus, 1758; *Abramis vulgaris* Mauduyt, 1849; *Abramis brama danubii* Pavlov, 1956.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the Adriatic Basin (Glamuzina *et al.* 2017).

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Zaplata & Taler 1932; Vuković 1963a, 1977a; Čanković *et al.* 1968a, 1968b; Ristić 1972; Berberović 1980; Kosorić *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982, 1985; Delić 1984; Mikavica 1987b; Mikavica *et al.* 1991; Pažur 1993; Leiner 1998; Mikavica & Savić 1999; Radević 2000, 2002;

Simonović 2001; Mrakovčić *et al.* 2002; Đonko 2005; Škrijelj *et al.* 2005a, 2005b; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2010, 2011a, 2011b, 2015, 2020a, 2020b, 2021; Adrović 2007, 2012; Kottelat & Freyhof 2007; Skenderović & Adrović 2008a, 2008b, 2019; Suić *et al.* 2008; Vuković *et al.* 2008; Adrović *et al.* 2009a, 2009b; 2021; Sofradžija 2009; Ćemer 2010; Bartulović *et al.* 2011; Hajdarević 2011; Tutman *et al.* 2012a; Čičić-Močić 2014; Riđanović *et al.* 2015; Simonović *et al.* 2015; Bajrić *et al.* 2016; Ćulibrk *et al.* 2016; Nedić *et al.* 2014a, 2014c, 2014d; 2016a, 2018; Glamuzina *et al.* 2017; Golub *et al.* 2017c; Kovačević *et al.* 2018; Memić 2018, 2020; Dekić *et al.* 2020a, 2024; Kalamujić Stroil *et al.* 2021.

Genus *Alburnoides* Jeitteles, 1861

33. ***Alburnoides bipunctatus*** (Bloch, 1782)

Vernacular names

Dvoprugasta uklija, pliska. Spirlin.

Previous names used for the species

Alburnus bipunctatus bipunctatus (Bloch, 1782).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

It is possible that *Alburnoides bipunctatus* does not occur in the waters of BiH. The taxonomic status of this species needs revision, as three distinct genetic evolutionary lineages have been revealed in the Danube River Basin, with two recorded in BiH, both possibly representing new species still not described (Stierandová *et al.* 2016). Vukić *et al.* (2019) reports a record of astill unnamed *Alburnoides* sp. from the Neretva River basin. Based on the molecular analyses of cytochrome b gene this population belongs to *Alburnoides* sp. 1 sensu Stierandová *et al.* (2016) inhabiting the Sava River Basin (Danube River Basin).

Literature

Anonymous 1886; Glowacki 1896; Zaplata & Taler 1932, Vuković 1963a, 1977a; Berberović 1967; Vuković & Vuković 1968b, 1974; Žuljević 1970; Aganović & Kapetanović 1973; Martinović 1974; Kosorić *et al.* 1975, 1980; Đurović & Vuković 1975; Đurović 1979; Sofradžija *et al.* 1979, 1980, 1984; Kosorić 1981; Mikavica 1988a; Mikavica *et al.* 1991; Mikavica & Savić 1999; Babić & Mikavica 1994; Radević 2000; Treer *et al.* 2000; Korjenić 2005a; Sofradžija *et al.* 1979, 1980; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Skenderović *et al.* 2006, 2020b; Škrijelj *et al.* 2006; Kottelat & Freyhof 2007; Skenderović & Adrović 2008b; Sofradžija 2009; Golub *et al.* 2012, 2017c, 2018a, 2018b; Čičić-Močić 2014, 2016, 2018, 2019; Delić *et al.* 2014; Simonović *et al.* 2015; Skenderović 2015; Stierandová *et al.* 2016; Dekić *et al.* 2017b, 2020a, 2020b, 2024; Adrović 2018; Adrović *et al.* 2018; Keško 2018; Kovačević *et al.* 2018; Memić 2018, 2020; Lolić *et al.* 2019; Muhamedagić *et al.* 2019; Vukić *et al.* 2019; Cvijić *et al.* 2020.

Genus ***Alburnus*** Rafinesque, 1820

The taxonomic status of *Alburnus* in the Adriatic Basin has not been well studied and the systematics of many species require clearer resolution (Buj *et al.* 2010).

Alburnus albidus (Costa, 1838)

Previous names used for the species

Alburnus albidus alborella (Costa, 1838).

Remarks

Vuković (1963a) and Sofradžija (2009) reported *Alburnus albidus alborella* for the waters of the Adriatic Basin. According to Kottelat & Freyhof (2007), *A. albidus* is endemic to southern Italian rivers of the Adriatic, Ionian, and Tyrrhenian coast, and therefore is not included in the list of fishes of BiH.

34. ***Alburnus alburnus*** (Linnaeus, 1758)

Vernacular names

Zela, uklija. Bleak.

Previous names used for the species

Alburnus alburnus alburnus (Linnaeus, 1758); *Alburnus lucidus* Heckel, 1843.

Origin and geographic range in BiH

Native. Danube River Basin.

Remarks

Vuković (1963a), Vuković & Ivanović (1971) and Sofradžija (2009) reported it as *Alburnus alburnus* for the waters of the Danube River Basin; Vuković (1977a) and Bogut *et al.* (2006) reported the subspecies *A. alburnus alburnus* for the waters of the Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Medić 1901; RHZZM 1908; Ćurčić 1910; Plančić 1923b; Zaplata & Taler 1932; Aganović & Milošević 1959; Vuković 1963a, 1968a, 1977a; Kosorić & Vuković 1966a; Vuković & Seratlić-Savić 1967; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Vuković & Ivanović 1971; Vuković & Vuković 1974; Kosorić 1978; Orelj 1979; Sofradžija *et al.* 1979, 1980; Berberović 1980; Bianco 1980; Kosorić *et al.* 1980, 1983, 1989; Pejić *et al.* 1980; Sofradžija *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Mikavica 1987b; Economidis & Bănărescu 1991; Mikavica *et al.* 1991; Mrakovčić *et al.* 1995, 2006; Leiner 1998; Korjenić 1999; Mikavica & Savić 1999; Radević 2000; Simonović 2001; Škrijelj 2002; Škrijelj *et al.* 2003, 2005a, 2005b; Korjenić *et al.* 2003, 2005; Kadribašić 2005; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2010, 2011a, 2011b, 2015, 2020a, 2020b, 2021; Adrović 2007, 2012, 2018; Kottelat & Freyhof 2007; Skenderović & Adrović 2008b, 2012, 2019; Vuković *et al.* 2008; Zupančič 2008; Sofradžija 2009; Buj *et al.* 2010; Bećiraj & Šahinović 2012; Golub *et al.* 2012, 2013, 2016a, 2017c, 2018a, 2018b, 2019; Čičić-Močić 2014, 2016, 2019; Delić *et al.* 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2016b, 2018; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Bećiraj *et al.* 2016; Ćulibrk *et al.* 2016; Dekić *et al.* 2017b, 2020a, 2020b; Kovačević *et al.* 2018; Memić 2018; Lolić *et al.* 2019; Zuliani *et al.* 2019; Cvijić *et al.* 2020; Pilić *et al.* 2020.

Alburnus arborella (Bonaparte, 1841)

Vernacular names

Primorska uklija. Italian bleak.

Previous names used for the species

Alburnus alborella (De Filippi, 1844), *Alburnus alburnus alborella* (De Filippi, 1844).

Remarks

According to the literature (Kosorić & Vuković 1966a; Kosorić *et al.* 1989; Mrakovčić *et al.* 1995; Škrijelj 2002; Bogut *et al.* 2006), this species was reported in the middle and lower section of the Neretva River downstream to its mouth, and in the Tihaljina/Trebižat River catchment and Buna River in BiH. However, the population from the Neretva River catchment is now recognized as a different species, *Alburnus neretvae* (Buj *et al.*, 2010). Recent literature (Žujo-Zekić 2021; Žujo-Zekić *et al.* 2018, 2020) mentioned the presence of *A. arborella* in the Buško Lake, however, without providing diagnostic characters. *Alburnus arborella* is distributed in rivers which drain into the northern part of the Adriatic Sea from the Chienti drainage basin in Marche to Ancona Province (Slovenia, Switzerland, Italy) and the Tyrrhenian basin in the Arno drainage (Italy) (Kottelat & Freyhof 2007). The distribution and taxonomic status of the populations of *Alburnus* in the Adriatic Basin have not been fully resolved and require additional research (Geiger *et al.* 2014), and *A. arborella* is therefore not included in the checklist of BiH.

Literature

Kosorić & Vuković 1966a; Čanković 1967; Čanković *et al.* 1968a; Ivanović 1968; Vuković & Ivanović 1971; Kosorić *et al.* 1989; Mrakovčić *et al.* 1995; Škrijelj 2002; Bogut *et al.* 2006; Šanda *et al.* 2008a, 2008b; Buj *et al.* 2010; Perea *et al.* 2010; Žujo-Zekić 2021; Žujo-Zekić *et al.* 2018, 2020.

35. ***Alburnus neretvae*** Buj, Šanda & Perea, 2010

Vernacular names

Neretvanska uklija. Neretva bleak.

Previous names used for the species

Alburnus arborella (Bonaparte, 1841); *Alburnus alburnus alborella* (De Filippi, 1844).

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

The population from the Neretva River catchment previously identified as *Alburnus arborella* has been described as a different species, *A. neretvae* (Buj *et al.* 2010), endemic to the Neretva River catchment in Croatia and BiH, also recorded in waters of the karstic fields Rastoke and Jezero near Vrgorac, Kuti and Baćinska Lakes, and the lower Neretva River in Croatia. In BiH, it was recorded in the Bregava River, Hutovo Blato wetland, Mušnica River (Gatačko Polje field), Trebišnjica River (Popovo Polje field) (Buj *et al.* 2010), and previously under the name *A. arborela* in the Tihaljina/Trebižat River catchment, Buna River (Kosorić & Vuković 1966a) and in the lower and middle sections of the Neretva River, from the mouth of the Buna River downstream to the mouth of the Neretva River into the sea (Kosorić & Vuković 1966a; Kosorić *et al.* 1989; Mrakovčić *et al.* 1995). It was also recorded in the Salakovac reservoir, approximately 20 km upstream of Mostar (Škrijelj 2002). Pronounced genetic differentiation was revealed between most of the mentioned populations (Charmpila *et al.* 2025). As this species is very similar to the congeneric Italian bleak (*A. arborella*) in terms of anatomical characters, additional systematic research is recommended (Geiger *et al.* 2014).

Literature

Kosorić & Vuković 1966a; Žuljević 1967; Muhanović 1984; Burek 1985; Sadović 1986; Kosorić *et al.* 1989; Mrakovčić *et al.* 1995; Škrijelj 2002; Šanda *et al.* 2008a, 2008b; Buj *et al.* 2010; Perea *et al.* 2010; Tutman *et al.* 2012a; Darwall *et al.* 2014; Oikonomou *et al.* 2014; Mrdak & Milošević 2017; Benovics *et al.* 2019; Skenderović *et al.* 2020b; Charmpila *et al.* 2025.

36. ***Alburnus sava*** Bogutskaya, Zupančič, Jelić, Diripasko & Naseka, 2017

Vernacular names

Bucov. Sava bleak.

Previous names used for the species

Chalburnus chalcoides (Güldenstädt, 1772); *Chalchalburnus chalcoides mento* (Agassiz, 1832); *Alburnus mento* (Heckel, 1837); *Chalburnus chalcoides danubicus* (Antipa, 1909); *Alburnus sarmaticus* Freyhof & Kottelat, 2007.

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Remarks

Vuković (1963a) listed *Chalburnus chalcoides danubicus* in BiH for waters of the Danube River Basin, while Vuković (1977a), Bogut *et al.* (2006) and Sofradžija (2009) listed *C. chalcoides*. Kottelat & Freyhof (2007) considered the same species to be *Alburnus sarmaticus*. However, Bogutskaya *et al.* (2017) describe the population from the upper Sava River (Danube River Basin) as a different species (*A. sava*), but only individuals from the Kupa River (Croatia and Slovenia) were available for examination. Vucić *et al.* (2017) updated the distribution revealing a much more widespread occurrence in the Sava River and its catchment (Bosna River near Zenica), and also in the Drina River in BiH. Additional systematic research from the entire Sava catchment is recommended.

Literature

Anonymous 1886; Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Čanković *et al.* 1968a, 1968c; Vuković & Ivanović 1971; Obratil 1982; Veljović 1982; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Vuković *et al.* 2008; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Mustafić *et al.* 2015; Simonović *et al.* 2015; Bogutskaya *et al.* 2017; Golub *et al.* 2017c; Vucić *et al.* 2017; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

Genus *Ballerus* Heckel, 1843

37. ***Ballerus ballerus*** (Linnaeus, 1758)

Vernacular names

Kesega. Blue bream.

Previous names used for the species

Abramis ballerus (Linnaeus, 1758).

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Glowacki 1896; Medić 1902; Ćurčić 1910; Plančić 1923b; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Veljović 1982, 1985; Delić 1984; Radević 2000; Simonović 2001; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Simonović *et al.* 2015; Kovačević *et al.* 2018.

38. ***Ballerus sapa*** (Pallas, 1814)

Vernacular names

Crnooka deverika. White-eye bream.

Previous names used for the species

Abramis sapa (Pallas, 1811).

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Vuković 1963a, 1977a; Veljović 1982, 1985; Radević 2000, 2002; Simonović 2001; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Ćemer 2010; Čičić-Močić 2014, 2016, 2019; Simonović *et al.* 2015; Adrović 2018; Memić 2018; Skenderović & Adrović 2019; Skenderović *et al.* 2020a, 2020b, 2021; Dekić *et al.* 2024.

Genus *Blicca* Heckel, 1843

39. ***Blicca bjoerkna*** (Linnaeus, 1758)

Vernacular names

Krupatica. Silver bream.

Previous names used for the species

Abramis bjoerkna (Linnaeus, 1758); *Abramis bjoerkna bjoerkna* (Linnaeus, 1758); *Abramis björkna* (Linnaeus, 1758); *Abramis blicca* (Bloch, 1782); *Blicca argyroleuca* Heckel, 1843.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Berberović 1980; Obratil 1982; Veljović 1982, 1985; Delić 1984; Mikavica *et al.* 1991; Leiner 1998; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Vuković *et al.* 2008; Sofradžija 2009; Golub *et al.* 2013; Simonović *et al.* 2015; Nedić *et al.* 2016a, 2016b, 2018; Skenderović & Adrović 2019; Skenderović *et al.* 2020b, 2021; Dekić *et al.* 2024.

Genus *Chondrostoma* Agassiz, 1832

40. ***Chondrostoma knerii*** Heckel, 1843

Vernacular names

Podustva. Dalmatian nase.

Previous names used for the species

Chondrostoma kneri Heckel, 1843; *Chondrostomus knerii* Heckel, 1843.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Geographically restricted to the middle and lower Neretva River catchment in BiH and Croatia (Tutman *et al.* 2019); present up to the Grabovica hydropower plant, Hutovo Blato wetland, Buna and Trebižat Rivers (Hamzić 2024).

Literature

Aganović 1952a; Vuković 1963a, 1964, 1977a; Kosorić & Vuković 1966a; Čanković 1967; Čanković *et al.* 1968a; Berberović *et al.* 1970b, 1970c; Vuković *et al.* 1970b; Guzina *et al.* 1971; Kaluđerčić *et al.* 1971; Vuković & Ivanović 1971; Švob & Kilalić 1972; Vuković & Vuković 1974; Aganović & Kapetanović 1978; Guzina & Vuković 1978; Kosorić 1978; Seratlić *et al.* 1978; Vuković & Kosorić 1978; Kosorić *et al.* 1983, 1989; Elvira 1987; Vuković & Sofradžija 1987; Mikavica & Bošnjak 1989; Mikavica & Dizdarević 1990; Economidis & Bănărescu 1991; Crivelli 1996; Elvira 1997; Mikavica 1998; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Glamuzina *et al.* 2007, 2008a; Kottelat & Freyhof 2007; Robalo *et al.* 2007; Jelić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Tutman *et al.* 2008b, 2012a, 2019; Zupančič 2008; Dulčić *et al.* 2009; Sofradžija 2009; Perea *et al.* 2010; Drešković *et al.* 2011; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Milanović *et al.* 2015; Benovics *et al.* 2019; Freyhof *et al.* 2020; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

41. ***Chondrostoma nasus*** (Linnaeus, 1758)

Vernacular names

Podust, škobalj. Nase.

Previous names used for the species

Chondrostoma nasus nasus (Linnaeus, 1758); *Cyprinus nasus* Linnaeus, 1758.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Medić 1902; Langhoffer 1904; Ćurčić 1910; Plančić 1923b; Zaplata & Taler 1932; Taler 1945b; Kosorić & Kardoš 1955; Aganović & Milošević 1959; Smlatić 1961; Pavlović *et al.* 1960; Vuković 1963a, 1977a; Čanković 1964, 1968a; Čanković *et al.* 1968a, 1968b;Kekić 1968; Šenk & Aganović 1968; Kiškarolj & Čanković 1969; Šenk 1969; Vuletić 1969; Berberović *et al.* 1970c; Vuković & Ivanović 1971; Aganović & Kapetanović 1973; Hadžović 1975; Kosorić *et al.* 1975, 1980; Vuković & Kosorić 1978; Habeković *et al.* 1981; Kaćanski *et al.* 1981;

Kosorić 1981; Sofradžija & Hadžiselimović 1981b; Obratil 1982; Veljović 1982, 1985; Mikavica 1987b, 1988a; Bogićević 1988; Mikavica & Bošnjak 1989; Mikavica *et al.* 1989, 1991, 1997; Mikavica & Dizdarević 1990; Babić & Mikavica 1994; Elvira 1997; Mikavica & Savić 1999; Radević 2000, 2002; Mrakovčić *et al.* 2002; Alić *et al.* 2004; Škrijelj *et al.* 2005a, 2005b; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2010, 2011a, 2011b, 2015, 2020a, 2020b; Kottelat & Freyhof 2007; Mehanović 2007; Skenderović & Adrović 2008b, 2019; Vuković *et al.* 2008; Sofradžija 2009; Vujanović *et al.* 2011; Golub *et al.* 2012, 2017a, 2017c, 2018a, 2018b; Muhamedagić & Habibović 2013; Čičić-Močić 2014, 2016, 2018; Delić *et al.* 2014; Simonović *et al.* 2015; Bećiraj *et al.* 2016; Dekić *et al.* 2017b, 2020a, 2020b; 2024; Kovačević *et al.* 2018; Memić 2018; Nedić *et al.* 2018; Lolić *et al.* 2019; Cvijić *et al.* 2020.

42. ***Chondrostoma phoxinus*** Heckel, 1843

Vernacular names

Podbila. Livno nase.

Previous names used for the species

Chondrostomus phoxinus Heckel, 1843.

Origin and geographic range in BiH

Endemic (CCE). Adriatic Basin.

Remarks

Endemic to the Cetina River catchment in BiH and Croatia. Distributed in Western Bosnia, the catchment of the Cetina River, sinks and sources of Glamočko Polje, Livanjsko Polje, Duvanjsko Polje fields, as well as Buško Blato, Blidinjsko and Mandek lakes (Vuković 1977a, Hamzić 2024).

Literature

Heckel & Kner 1858; Ćurčić 1916; Karaman 1923, 1928; Taler 1951a, 1953a; Vuković 1963a, 1964, 1977a; Aganović 1969; Vuković & žnidaršić-Krzyk 1969; Berberović *et al.* 1970a, 1970b, 1970c; Lončar 1970; Vuković *et al.* 1970b; Kaluđerčić *et al.* 1971; Veledar 1971; Vuković & Ivanović 1971; Veledar & Kosorić 1972, 1974; Jerković *et al.* 1973; Vuković & Vuković 1974; Kaćanski *et al.* 1978; Berberović 1980; Mikavica & Kosorić 1986; Elvira 1987; Vuković & Sofradžija 1987; Ibrašimović 1988; Mikavica & Bošnjak 1989; Mikavica & Dizdarević 1990; Economidis & Bănărescu 1991; Elvira 1997; Kottelat 1997; Kerovec *et al.* 1998; Mikavica 1998; Žujo 2004; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Ćaleta *et al.* 2009b; Sofradžija 2009; Perea *et al.* 2010; Drešković *et al.* 2011; Žujo-Zekić 2012, 2013, 2021; Darwall *et al.* 2014; Geiger *et al.* 2014; Milanović *et al.* 2015; Mustafić & Mrakovčić 2017; Žujo-Zekić *et al.* 2016, 2018; Benovics *et al.* 2019; Freyhof *et al.* 2020; Mušović *et al.* 2020; Dekić *et al.* 2024; Hamzić 2024.

Genus *Delminichthys* Freyhof, Lieckfeldt, Bogutskaya, Pitra & Ludwig, 2006

43. ***Delminichthys adspersus*** (Heckel, 1843)

Vernacular names

Imotska gaovica. Spotted minnow.

Previous names used for the species

Leucos adspersus Heckel, 1843; *Paraphoxinus adspersus* Heckel, 1843; *Phoxinellus adspersus* (Heckel, 1843).

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Endemic to the Neretva River catchment in BiH and Croatia.

Literature

Seeley 1886; Kolombatović 1886; Kišpatić 1893; Sabioncello 1967; Berberović & Pavlović 1970; Berberović *et al.* 1970d, 1971b; Karaman 1972; Sofradžija & Berberović 1972; Bozja & Švob 1974; Vuković & Vuković 1974; Ristić 1977; Pavlović & Berberović 1978; Vuković 1982b; Vuković & Sofradžija 1987; Šorić 1992; Zupančič & Bogutskaya 2002; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Freyhof *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Sofradžija 2009; Perea *et al.* 2010; Drešković *et al.* 2011; Palandačić *et al.* 2012; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Milanović *et al.* 2015; Benovics *et al.* 2019; Freyhof *et al.* 2020; Reier *et al.* 2022, Dekić *et al.* 2024; Lukač *et al.* 2024.

44. ***Delminichthys ghetaldii*** Steindachner, 1882

Vernacular names

Popovska gaovica. Popovo minnow.

Previous names used for the species

Paraphoxinus ghetaldii Steindachner, 1882; *Phoxinellus ghetaldii* (Steindachner, 1882); *Paraphoxinus pstrosii* Steindachner, 1882; *Phoxinellus pstrossi* Steindachner, 1882.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

In earlier literature, the species was mentioned as *Paraphoxinus ghetaldi* (Vuković 1977a) and *Phoxinellus ghetaldii* in Sofradžija (2009). It is now considered as endemic to the Neretva River catchment in BiH and Croatia. However, due to the unresolved taxonomic status of related species, its occurrence in the Neretva River catchment is uncertain (Zupančič & Bogutskaya 2002). *Phoxinellus pstrossi* was mentioned by Vuković (1963a, 1977a) as occurring in the Trebišnjica River catchment, but according to Zupančič & Bogutskaya (2002), it is tentatively considered as a junior synonym of *Delminichtys ghetaldii*.

Literature

Steindachner 1882a, 1882b, 1882c, 1883; Kišpatić 1893; Ćurčić 1913, 1915a, 1915b; Taler 1951a, 1952, 1953a, 1953b; Vuković 1963a, 1967b, 1977a, 1977b, 1982b; Kosorić & Vuković 1966a; Sket 1967; Berberović *et al.* 1969b, 1970d; Vuković & Miladinović 1969; Aganović & Kapetanović 1970, 1971; Guzina & Vuković 1972; Vuković & Ivanović 1971; Karaman 1972; Sofradžija & Berberović 1972; Sofradžija *et al.* 1972; Vuković & Vuković 1974; Ristić 1977; Pavlović & Berberović 1978; Pocrnjić *et al.* 1979; Kosorić *et al.* 1983, 1989; Leiner 1984; Vuković & Sofradžija 1987; Povž *et al.* 1990; Šorić 1992; Crivelli 1996; Kottelat 1997; Mikavica 1998; Zupančič & Bogutskaya 2000, 2002; Bogut *et al.* 2006; Mrakovčić *et al.*

2006; Freyhof *et al.* 2006, 2020; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Muhamedagić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Pavlović *et al.* 2009; Sofradžija 2009; Palandačić *et al.* 2010; Dekić *et al.* 2011, 2012a, 2013a, 2014, 2016c, 2017a, 2024; Drešković *et al.* 2011; Darwall *et al.* 2014, Geiger *et al.* 2014; Oikonomou *et al.* 2014; Lolić *et al.* 2015; Milanović *et al.* 2015; Reier *et al.* 2022; Lukač *et al.* 2023, 2024.

Genus *Leucaspius* Heckel & Kner, 1858

45. ***Leucaspius delineatus*** (Heckel, 1843)

Vernacular names

Bjelica. Sun bleak.

Previous names used for the species

Squalius delineatus Heckel, 1843.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

It was translocated to the Adriatic Basin in Jablaničko Lake accidentally as bait for perch fishing (Pavličević *et al.* 2016; Glamuzina *et al.* 2017; Muhamedagić *et al.* 2019; Hamzić 2024).

Literature

Vuković 1963a, 1977a; Čanković *et al.* 1968a, 1968c; Veljović 1982, 1985; Radević 2000; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Pavličević *et al.* 2016; Glamuzina *et al.* 2017; Muhamedagić *et al.* 2019; Skenderović *et al.* 2020b; Dekić *et al.* 2024, Hamzić 2024.

Genus *Leuciscus* Cuvier, 1816

46. ***Leuciscus aspius*** (Linnaeus, 1758)

Vernacular names

Bolen. Asp.

Previous names used for the species

Aspius aspius (Linnaeus, 1758); *Aspius aspius aspius* (Linnaeus, 1758); *Cyprinus aspius* Linnaeus, 1758; *Aspius rapax* Agassiz, 1835.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Horvat 1901; Medić 1901; Ćurčić 1910; Plančić 1923b; Knop 1947; Vuković 1963a, 1977a; Žitnan *et al.* 1969; Berberović 1980; Habeković *et al.* 1981; Veljović 1982, 1985; Mikavica *et al.* 1991; Pažur 1993; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002, 2006; Adrović 2007, 2012; Kottelat & Freyhof 2007; Mateš 2008; Suić *et al.* 2008; Sofradžija 2009; Skenderović *et al.* 2010, 2011b, 2020b; Drešković *et al.* 2011; Čičić-Močić 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2018; Skenderović 2015; Riđanović

et al. 2015; Simonović *et al.* 2015; Lukić *et al.* 2016; Kovačević *et al.* 2018; Memić 2018; Dekić *et al.* 2024.

47. ***Leuciscus idus*** (Linnaeus, 1758)

Vernacular names

Jaz. Ide.

Previous names used for the species

Idus melanotus (Heckel, 1843).

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Sofradžija 1977; Berberović 1980; Kosorić *et al.* 1980; Obratil 1982; Veljović 1982; Delić 1984; Veljović 1985; Mikavica *et al.* 1991; Pažur 1993; Mikavica & Savić 1999; Radević 2000, 2002; Mrakovčić *et al.* 2002, 2006; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Suić *et al.* 2008; Sofradžija 2009; Simonović *et al.* 2015; Golub *et al.* 2017c; Kovačević *et al.* 2018; Skenderović *et al.* 2020b; Dekić *et al.* 2020a, 2024.

48. ***Leuciscus leuciscus*** (Linnaeus, 1758)

Vernacular names

Kljenić. Common Dace.

Previous names used for the species

Cyprinus dobula Linnaeus, 1758; *Cyprinus leuciscus* Linnaeus, 1758; *Leuciscus dobula* (Linnaeus, 1758); *Leuciscus vulgaris* Fleming, 1828; *Squalius lepusculus* Heckel, 1852.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Glowacki 1896; Vuković 1963a, 1977a; Šenk & Aganović 1968; Sofradžija 1977; Veljović 1982, 1985; Radević 2000, 2002; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Vuković *et al.* 2008; Sofradžija 2009; Simonović *et al.* 2015; Golub *et al.* 2017c; Dekić *et al.* 2024.

Genus *Leucos* Heckel, 1843

49. ***Leucos basak*** Heckel, 1843

Vernacular names

Gera, plotica. Dalmatian roach.

Previous names used for the species

Rutilus rubilio rubilio (Bonaparte, 1758); *Rutilus rubilio* (Bonaparte, 1837); *Sarmarutilus rubilio* (Bonaparte, 1837); *Rutilus basak* (Heckel, 1843).

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Endemic to BiH and Croatia; in BiH, it is recorded in the lower Neretva River catchment (Neretva and its tributaries: Tihaljina, Trebižat, Jasenica, Bregava, Buna and Hutovo Blato wetland), and upstream to the confluence with the Buna River (Tutman *et al.* 2018). In the older literature, it was mentioned as *Rutilus rubilio* (Vuković 1963a, 1977a; Kosorić & Vuković 1966a, 1966b; Vuković & Seratlić-Savić 1967; Vuković & Ivanović 1970; Vuković & Vuković 1970), in Bogut *et al.* (2006) and in Sofradžija (2009) as *R. basak*, for the lower Neretva River. Subsequently, Bianco & Ketmaier (2014) revised the taxonomy of the genus *Rutilus*, creating the genus *Leucos*, and the species in the Neretva River catchment was regarded as *Leucos basak*.

Literature

Heckel & Kner 1858; Karaman 1928; Aganović 1952a, 1967; Vuković 1963a, 1968a, 1970, 1977a; Kosorić & Vuković 1966a, 1966b; Vuković & Seratlić-Savić 1967; Vuković & Vuković 1968a, 1970, 1974; Berberović *et al.* 1970a; Vuković *et al.* 1970a; Vuković & Ivanović 1970, 1971; Seratlić-Savić & Vuković 1969, 1971; Guzina *et al.* 1971; Berberović & Sofradžija 1972; Knežević & Ivanović 1975; Knežević 1977; Aganović & Kapetanović 1978; Guzina & Vuković 1978; Kosorić 1978; Vuković & Kosorić 1978; Berberović 1980; Marić 1981; 1988; Kosorić *et al.* 1983, 1989; Grgurević 1984; Bianco & Taraborelli 1985; Galić 1986; Ljubojević 1989; Economidis & Bănărescu 1991; Crivelli 1996; Mikavica 1998; Glamuzina *et al.* 2001, 2002, 2008a; Tutman *et al.* 2002, 2009a, 2009b, 2012a, 2018; Bianco *et al.* 2004; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Muhamedagić *et al.* 2019; Šanda *et al.* 2008a, 2008b; Zupančič 2008; Dulčić *et al.* 2009; Sofradžija 2009; Marić 2010; Perea *et al.* 2010; Matić-Skoko *et al.* 2011; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Milanović *et al.* 2015; Benovics *et al.* 2019; Dekić *et al.* 2024.

Genus *Pelecus* Agassiz, 1835

50. ***Pelecus cultratus*** (Linnaeus, 1758)

Vernacular names

Sabljarka. Ziege.

Previous names used for the species

Cyprinus cultratus Linnaeus, 1758.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Medić 1902; Ćurčić 1910; Vuković 1963a, 1977a; Veljović 1982, 1985; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.*

2006; Škrijelj *et al.* 2005a, 2005b; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Simonović *et al.* 2015; Lukić *et al.* 2016, Dekić *et al.* 2024.

Genus *Phoxinellus* Heckel, 1843

51. ***Phoxinellus alepidotus*** Heckel, 1843

Vernacular names

Pijurica. Adriatic minnow.

Previous names used for the species

Paraphoxinus alepidotus (Heckel, 1843); *Phoxinellus alepidotus* Heckel, 1843.

Origin and geographic range in BiH

Endemic (CCE). Adriatic Basin.

Remarks

Endemic to the Cetina River catchment in BiH and Croatia.

Literature

Heckel 1843; Heckel & Kner 1858; Gunther 1859; Steindachner 1882c; Katurić 1883; Kolombatović 1886; Seeley 1886; Kišpatić 1893; Trgovčević 1905; Ćurčić 1916; Karaman 1923, 1928; Protić 1924; Taler 1953a, 1953b; Vuković 1963a, 1964, 1977a, 1977b, 1982b; Sabioncello 1967; Sket 1967; Biberdžić 1968; Aganović 1969; Berberović *et al.* 1969a, 1970d, Sofradžija *et al.* 1969; Vuković & Miladinović 1969; Vuković & žnidaršić-Krzyk 1969; Aganović & Kapetanović 1970; Vuković *et al.* 1970b, 1971a, 1971b; Guzina & Vuković 1972; Miladinović *et al.* 1971; Kaluđerčić *et al.* 1971; Trewavas 1971; Vuković & Ivanović 1971; Karaman 1972; Sofradžija & Berberović 1972; Bozja & Švob 1974; Vuković & Vuković 1974; Kaćanski *et al.* 1978; Pocrnjić *et al.* 1979; Berberović 1980; Marić 1980, 1983, 1990; Leiner 1984; Howes 1985; Vuković & Sofradžija 1987; Povž *et al.* 1990; Škrijelj & Sofradžija 1990; Šorić 1992; Crivelli 1996; Kottelat 1997; Zupančič & Bogutskaya 2000, 2002; Škrijelj 2002; Bogutskaya & Zupančič 2003; Delić *et al.* 2005; Freyhof *et al.* 2006, 2020; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Sofradžija 2009; Palandačić *et al.* 2010; Perea *et al.* 2010; Dekić *et al.* 2011, 2016a, 2024; Drešković *et al.* 2011; Darwall *et al.* 2014; Milanović *et al.* 2015; Benovics *et al.* 2019; Muhamedagić *et al.* 2019; Žujo-Zekić 2021; Reier *et al.* 2022; Lukač *et al.* 2023; Palandačić *et al.* 2024.

52. ***Phoxinellus pseudalepidotus*** Bogutskaya & Zupančič, 2003

Vernacular names

Prikanac. Mostar minnow.

Origin and geographic range in BiH

Endemic (NCE, BiH). Adriatic Basin.

Remarks

Endemic to the Neretva River catchment; present data suggest that the species is restricted to the Mostarsko Blato wetland only (Bogutskaya & Zupančič 2003). However, it is considered as more widespread (Mihinjač *et al.* 2014).

Literature

Zupančič & Bogutskaya 2000, 2002; Bogutskaya & Zupančič 2003; Freyhof *et al.* 2006, 2020; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008a, 2008b, 2009; Zupančič 2008; Palandačić *et al.* 2010; Perea *et al.* 2010; Markotić *et al.* 2012, 2013a, 2013b, 2018, 2019; Darwall *et al.* 2014; Geiger *et al.* 2014; Mihinjač *et al.* 2014; Milanović *et al.* 2015; Benovics *et al.* 2019; Reier *et al.* 2022; Palandačić *et al.* 2024.

Genus *Phoxinus* Rafinesque, 1820

53. ***Phoxinus karsticus*** Bianco & De Bonis, 2015

Vernacular names

Krški pijor. Karstic minnow.

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Based on morphological characters, Bianco & De Bonis (2015) described *P. karsticus* from the endorheic system of the karstic field Popovo Polje within the Trebišnjica River catchment in BiH. It is probably endemic to the same area (Bianco & De Bonis 2015). Palandačić *et al.* (2015, 2017) supported the validity of the species using mitochondrial data, but this was only partially supported by nuclear data. Further studies are necessary to resolve its taxonomy. Distributed also in Montenegro (Palandačić *et al.* 2015, 2017).

Literature

Bianco & De Bonis 2015; Palandačić *et al.* 2015, 2017; Vucić *et al.* 2018; Reier *et al.* 2022; Lukač *et al.* 2023.

Phoxinus ketmaieri Bianco & De Bonis, 2015

Remarks

Based on morphological characters, Bianco & De Bonis (2015) described this species from Krk Island and the Zrmanja River in Croatia and assumed that its distribution likely also includes the Cetina River and other rivers of the Dalmatian ichthyogeographic district, such as the Krka and Neretva. However, according to Palandačić *et al.* (2017), *Phoxinus ketmaieri* is not valid based on molecular species delimitation analyses, and is likely a junior synonym of *P. lumaireul*. Therefore, it is not included in the list of fishes from BiH.

Literature

Bianco & De Bonis 2015; Palandačić *et al.* 2015, 2017; Vucić *et al.* 2018.

54. ***Phoxinus lumaireul*** (Schinz, 1840)

Vernacular names

Primorski pijor, primorska gaga. Italian minnow.

Previous names used for the species

Cyprinus phoxinus Linnaeus, 1758; *Leuciscus phoxinus* (Linnaeus, 1758); *Phoxinus laevis* Fitzinger, 1832; *Phoxinus phoxinus phoxinus* (Linnaeus, 1758).

Origin and geographic range in BiH

Native. Danube River and the Adriatic Basins.

Remarks

In the earlier literature, it was mentioned as *Phoxinus phoxinus* (Vuković 1963a, 1963c, 1966b, 1967a, 1977a). According to Kottelat (2007), the minnows from Italy, Slovenia, Croatia and BiH were recognised as *P. lumaireul* (Schinz, 1840), based on anatomical data. In BiH, *P. lumaireul* is distributed in both the Danube River and the Adriatic Basin. Results from molecular studies (Vucić *et al.* 2018) confirmed that *P. lumaireul* is a minnow species which prevails in Croatia and is also reported from the westernmost river systems of the Sava River catchment in BiH, with a remarkable genetic variability across the entire known distribution range. However, the taxonomic status and range of *P. lumaireul* in BiH remain uncertain (Palandačić *et al.* 2015, 2017; Neuburg *et al.* 2023). It is also necessary to resolve its taxonomy and the taxonomic status of the genus *Phoxinus* in the Adriatic Basin as well, due to the presence of several genetic lineages, which may represent yet unnamed species (Palandačić *et al.* 2015, 2017, 2020).

Literature

Brusina 1892; Glowacki 1896; Zaplata & Taler 1932; Protić 1933; Šenk 1962, 1969; Vuković 1963a, 1963c, 1966b, 1967a, 1977a; Berberović 1967; Čanković *et al.* 1968a; Vuković & Miladinović 1969; Vuković & žnidaršić-Krzyk 1969; Vuković & Seratlić-Savić 1970; Kosorić *et al.* 1971; Berberović & Sofradžija 1972, 1974a; Kosorić 1974, 1977a, 1981; Kaćanski *et al.* 1977; Kosorić *et al.* 1980, 1983, 1989; Guzina *et al.* 1981; Sofradžija *et al.* 1984; Kosorić & Mikavica 1986; Mikavica *et al.* 1991; Babić & Mikavica 1994; Mikavica & Savić 1999; Radević 2000; Škrijelj *et al.* 2006; Kottelat 2007; Kottelat & Freyhof 2007; Muhamedagić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Sofradžija 2009; Perea *et al.* 2010; Bećiraj & Šahinović 2012; Golub *et al.* 2012, 2016a, 2018b; Delić *et al.* 2014; Palandačić *et al.* 2015, 2017; Simonović *et al.* 2015; Bećiraj *et al.* 2016, Čičić-Močić 2016, 2018, 2019; Keško 2018; Kovačević *et al.* 2018; Memić 2018, 2020; Vucić *et al.* 2018; Benovics *et al.* 2019; Muhamedagić *et al.* 2019; Dekić *et al.* 2020a, 2020b; Skenderović *et al.* 2020a, 2020b; Neuburg *et al.* 2023; Carosi *et al.* 2024.

Genus *Rutilus* Rafinesque, 1820

55. ***Rutilus rutilus*** (Linnaeus, 1758)

Vernacular names

Bodorka. Roach.

Previous names used for the species

Leuciscus rutilus (Linnaeus, 1758); *Rutilus rutilus carpathorossicus* Vladykov, 1930.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

According to Hamzić (2024), translocated to the Adriatic Basin; in Hutovo blato wetland – Neretva catchment, and Bilećko lake – Trebišnjica catchment.

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Plančić 1923b; Aganović 1957; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Žitnan *et al.* 1969; Vuković & Aganović 1971; Vuković & Vuković 1974; Đurović & Vuković 1975; Guzina & Vuković 1978; Vuković & Kosorić 1978; Berberović 1980; Kosorić *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982, 1985; Delić 1984; Kujačić 1987; Ljubojević 1989; Mikavica *et al.* 1991; Leiner 1998; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002; Gajević 2005; Gajević & Korjenić 2005; Skenderović *et al.* 2006, 2011b, 2020a, 2020b; Škrijelj *et al.* 2005a, 2005b, 2006; Bogut *et al.* 2006; Adrović 2007, 2012, 2018; Kottelat & Freyhof 2007; Skenderović & Adrović 2008b; Vuković *et al.* 2008; Adrović *et al.* 2009a, 2009b; Sofradžija 2009; Bećiraj & Šahinović 2012; Golub *et al.* 2013; Čičić-Močić 2014, 2016, 2019; Delić *et al.* 2014; Simonović *et al.* 2015; Skenderović 2015; Ćulibrk *et al.* 2016; Bajrić *et al.* 2016; Bećiraj *et al.* 2016; Mrdak & Milošević 2017; Kovačević *et al.* 2018; Memić 2018; Zuliani *et al.* 2019; Dekić *et al.* 2020a; Kalamujić Stroil *et al.* 2021; Hamzić 2024.

56. ***Rutilus virgo*** (Heckel, 1852)

Vernacular names

Plotica, platnica. Danube roach.

Previous names used for the species

Leuciscus virgo Linnaeus, 1758; *Rutilus pigus* (Lacepède, 1804); *Rutilus pigus virgo* (Heckel, 1852).

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Remarks

First mentioned in Vuković (1963a) and later in Sofradžija (2009) as *Rutilus pigus virgo*, then in Vuković (1977a) and in Bogut *et al.* (2006) as *R. pigus*. However, *R. pigus* is a Padany/Venetian endemic that is differentiated genetically (Ketmaier *et al.* 2008) and morphologically (Kottelat & Freyhof 2007) from the similar *R. virgo*. Therefore, *R. pigus* is not included in the list of species from BiH. *R. virgo* is endemic to the Danube River Basin (Kottelat & Freyhof 2007).

Literature

Brusina 1892; Glowacki 1896; Medić 1902; RHZZM 1908; Ćurčić 1910; Plančić 1923b; Zaplata 1932; Zaplata & Taler 1932; Aganović & Milošević 1959; Smlatić 1961; Vuković 1963a, 1977a; Čanković 1967; Šenk & Aganović 1968; Aganović & Kapetanović 1973; Kosorić *et al.* 1975, 1980; Kosorić 1981; Obratil 1982; Mikavica 1987b; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000, 2002; Mrakovčić *et al.* 2002, 2006; Bogut *et al.* 2006; Škrijelj *et al.* 2006; Kottelat & Freyhof 2007; Pavlović *et al.* 2009; Sofradžija 2009; Drešković *et al.* 2011; Bećiraj & Šahinović 2012; Muhamedagić & Habibović 2013; Čičić-Močić 2014; Delić *et al.* 2014; Milanović *et al.* 2015; Simonović *et al.* 2015; Bećiraj *et al.* 2016; Golub *et al.* 2017b, 2017c, 2018b; Kovačević *et al.* 2018; Nedić *et al.* 2018; Lolić *et al.* 2019; Skenderović & Adrović 2019; Zuliani *et al.* 2019; Dekić *et al.* 2020a, 2024; Skenderović *et al.* 2020b, 2021.

Genus *Scardinius* Bonaparte, 1837

57. ***Scardinius dergle*** Heckel & Kner, 1858

Vernacular names

Drlja. Dalmatian rudd.

Previous names used for the species

Scardinius hesperdicus Bonaparte, 1845; *Scardinius erythrophthalmus hesperdicus* Heckel, 1851.

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Endemic to the Adriatic Basin in Croatia and the Cetina River catchment in BiH. In BiH, it inhabits karst streams in Livanjsko Polje field, and Buško Blato and Mandečko lakes near Livno.

Literature

Heckel & Kner 1858; Ćurčić 1916; Karaman 1923, 1928; Taler 1953a, Vuković 1963a, 1964, 1977a; Aganović 1969; Vuković *et al.* 1971a, 1971b; Kottelat 1997; Freyhof *et al.* 2005; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Sofradžija 2009; Tutman *et al.* 2012c; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Žujo-Zekić *et al.* 2018; Mušović *et al.* 2020; Sabolić *et al.* 2021; Žujo-Zekić 2021.

58. ***Scardinius erythrophthalmus*** (Linnaeus, 1758)

Vernacular names

Crvenperka. Rudd.

Previous names used for the species

Leuciscus erythrophthalmus (Linnaeus, 1758); *Scardinius erythrophthalmus erythrophthalmus* (Linnaeus, 1758).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

A widespread European species; in BiH it is present in the Danube River Basin, though it has also been translocated to the Adriatic Basin in the Trebišnjica River system (Bileća Lake).

Literature

Anonymous 1886; Glowacki 1896; Medić 1898; Ćurčić 1910; Plančić 1923b; Aganović 1957; Vuković 1963a, 1977a; Bralo 1967; Čanković 1967; Čanković *et al.* 1968a, 1968b; Kiškarolj & Čanković 1968, 1969; Vuković & Veledar 1974; Vuković 1977a; Guzina & Vuković 1978; Sofradžija et. al. 1978b; Seratlić & Vuković 1979; Berberović 1980; Habeković *et al.* 1981; Marić 1981; Obratil 1982; Veljović 1982, 1985; Mikavica *et al.* 1991; Pažur 1993; Mikavica & Savić 1999; Radević 2000; Škrijelj *et al.* 2005a, 2005b; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2010, 2011a,

2011b, 2020a, 2020b; Adrović 2007, 2012; Kottelat & Freyhof 2007; Skenderović & Adrović 2008b; Vuković *et al.* 2008; Sofradžija 2009; Golub *et al.* 2013, 2017c; Čičić-Močić 2014; Nedić *et al.* 2014a, 2014b, 2014c, 2014d; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Kovačević *et al.* 2018; Memić 2018; Dekić *et al.* 2020a; Adrović *et al.* 2021; Žujo-Zekić 2021.

59. ***Scardinius plotizza*** Heckel & Kner, 1858

Vernacular names

Peškelj. Neretva rudd.

Previous names used for the species

Scardinius erythrophthalmus scardafa (Bonaparte, 1837); *Scardinius scardafa* (Bonaparte, 1837); *Scardinius platizza* Heckel, 1845.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

First mentioned in BiH as *Scardinius erythrophthalmus scardafa* (Bonaparte, 1837) by Vuković (1977a) and Bogut *et al.* (2006). However, according to Kottelat & Freyhof (2007), *S. scardafa* is endemic to Italy. *Scardinius. plotizza* is endemic to the Neretva River catchment in BiH and Croatia (Kottelat & Freyhof 2007); in BiH, it is distributed in the rivers of the Adriatic Basin/Neretva River catchment (lakes on the Neretva River, Hutovo Blato wetland, Krupa River, Deransko Lake); Trebišnjica catchment (Svitava reservoir and the Trebišnjica channel downstream from Trebinje) (Tutman *et al.* 2012c).

Literature

Heckel & Kner 1858; Karaman 1928; Jedlička 1947; Aganović 1952a; Taler 1953a; Ivanišević 1962; Vuković & Ivanišević 1962; Vuković 1963a, 1977a; Kosorić & Vuković 1966a; Guzina *et al.* 1971; Ivanović 1972; Guzina & Vuković 1978; Kosorić 1978; Seratlić *et al.* 1978; Kosorić *et al.* 1983, 1989; Sadović 1986; Economidis & Bănărescu 1991; Crivelli 1996; Kottelat 1997; Glamuzina *et al.* 2001, 2002, 2008a; Tutman *et al.* 2002, 2009b, 2012a, 2012c; Bianco *et al.* 2004; Bianco & Kottelat 2005; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Zupančič 2008; Dulčić *et al.* 2009; Prusina *et al.* 2009; Sofradžija 2009; Perea *et al.* 2010; Marčić *et al.* 2012; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Ivanković *et al.* 2017; Benovics *et al.* 2019; Sabolić *et al.* 2021.

Genus ***Squalius*** Bonaparte, 1837

Several species, including many synonyms and misidentifications, have been reported from the Adriatic Basin of Croatia and BiH, whose taxonomic status including relationships of several populations and their distributional range, has yet to be resolved in detail (Buj *et al.* 2020a).

Squalius albus (Bonaparte, 1838)

Previous names used for the species

Leuciscus cephalus albus Bonaparte 1938.

Remarks

In Vuković (1963a, 1977a), Bogut *et al.* (2006) and Sofradžija (2009), it was mentioned as *Leuciscus cephalus albus* for the waters of the Neretva River catchment. According to Buj *et al.* (2020a) for these reports, the recommended nomenclature is *Squalius squalus*. On the other hand, *S. albus* is still of questionable taxonomic status (Lucentini *et al.* 2014); according to Kottelat & Freyhof (2007), it is endemic to Italy (Lake Trasimeno). Due to the unresolved taxonomic status, *S. albus* it is not included in the BiH checklist.

Literature

See *Squalius squalus.*

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

Vernacular names

Kljen. Chub.

Previous names used for the species

Leuciscus cephalus (Linnaeus, 1758); *Leuciscus cephalus cephalus* (Linnaeus, 1758).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

In Vuković (1963a, 1977a) and Sofradžija (2009), it was mentioned as *Leuciscus cephalus cephalus*, and in Bogut *et al.* (2006) as *Squalius cephalus cephalus*, all for the Danube River Basin in BiH. According to Hamzić (2024), translocated to the Adriatic Basin.

Literature

Heckel & Kner 1858; Anonymous 1886; Brusina 1892; Glowacki 1896; Langhoffer 1904; Plančić 1923b; Karaman 1928; Zaplata & Taler 1932; Kosorić & Kardoš 1955; Aganović & Milošević 1959; Vuković 1959; 1960, 1963a, 1977a, 1982b; Pavlović *et al.* 1960; Vuković *et al.* 1962; Aganović *et al.* 1966; Kosorić & Vuković 1966a; Berberović 1967, 1980; Čanković 1967; Kekić 1967; Sket 1967; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Vuković & Vuković 1968b, 1974; Šenk 1969; Guzina *et al.* 1971, 1981; Ivanović & Sekulović 1971; Vuković & Ivanović 1971; Berberović & Sofradžija 1972; Marić 1972; Aganović & Kapetanović 1973; Bozja & Švob 1974; Kosorić 1974, 1977a, 1978, 1981; Đurović & Vuković 1975; Kosorić *et al.* 1975, 1980, 1983, 1989; Sofradžija 1977; Kaćanski *et al.* 1977; Aganović & Kapetanović 1978; Guzina & Vuković 1978; Habeković *et al.* 1981; Veljović 1982; Šolaja & Pocrnjić 1983b; Kaplanović 1984; Pocrnjić *et al.* 1984; Ratković & Mikavica 1984; Sofradžija *et al.* 1984; Bianco & Knežević 1987; Mikavica 1987b, 1998; Pocrnjić & Šolaja 1988; Economidis & Bănărescu 1991; Mikavica *et al.* 1991, 1997; Pažur 1993; Babić & Mikavica 1994; Bogutskaya & Zupančič 1999; Mikavica & Savić 1997, 1999; Rončević 1997; Radević 2000, 2002; Mrakovčić *et al.* 2002; Korjenić *et al.* 2003; Škrijelj *et al.* 2005a, 2005b, 2006; Tinjak 2005; Bogut *et al.* 2006; Korjenić 2006a, 2006b; Adrović 2007, 2012, 2018; Kottelat & Freyhof 2007; Kurtović *et al.* 2007, 2009; Đurđević *et al.* 2008; Nišić 2008; Skenderović & Adrović 2008b; Škrijelj & Mašović 2008; Šanda *et al.* 2008a, 2008b; Vuković *et al.* 2008; Mitrašinović & Suljević 2009; Skenderović *et al.* 2006, 2010, 2011a, 2011b 2020a, 2020b; Ivanc *et al.* 2011; Bećiraj & Šahinović 2012; Golub *et al.* 2012, 2013, 2016a, 2017b, 2017c, 2018a, 2018b; Ivanc & Dekić 2012; Tutman *et al.* 2012a; Čičić-Močić 2014, 2016, 2018, 2019; Delić *et al.* 2014; Filipović Marijić *et al.* 2014a, 2014b;

Nedić *et al.* 2014a, 2014c, 2014d, 2018; NHMW 2014; Bajrić *et al.* 2015, 2017, 2020; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Bećiraj *et al.* 2016; Mihailović *et al.* 2016; Dekić *et al.* 2017b, 2020a, 2020b; 2024; Benovics *et al.* 2018; Hajdarević *et al.* 2018; Kovačević *et al.* 2018; Memić 2018, 2020; Vesnić *et al.* 2018; Lolić *et al.* 2019; Muhamedagić *et al.* 2019; Zuliani *et al.* 2019; Cvijić *et al.* 2020; Bakrač *et al.* 2020a; Tanović *et al.* 2022, 2023; Hamzić 2024.

Squalius illyricus Heckel & Kner, 1858

Vernacular names

Ilirski klen. Illyrian chub.

Remarks

Hamzić (2024) mentioned this species for BiH, but it is endemic to the Krka River and Cetina River catchments in Croatia only (Ćaleta *et al.* 2019) and is therefore not included in the list of fishes from BiH.

61. ***Squalius microlepis*** Heckel, 1843

Vernacular names

Makal. Makal dace.

Previous names used for the species

Leuciscus microlepis (Heckel, 1843); *Squalius microlepis* Heckel, 1843.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Endemic to the Neretva River catchment in BiH and Croatia. Two phenotypically distinct forms of this species inhabit the upper and middle-lower stretches of the Trebižat River. They are largely separated by the subterranean stretch of the river, and is possible that they might represent distinct species (Bogutskaya *et al.* 2019). Further research is required (Perea *et al.* 2010; Geiger *et al.* 2014; Schönhuth *et al.* 2018).

Literature

Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Sofradžija 2009; Perea *et al.* 2010; Drešković *et al.* 2011; Darwall *et al.* 2014; Geiger *et al.* 2014; Milanović *et al.* 2015; Ivanković *et al.* 2017; Benovics *et al.* 2019; Bogutskaya *et al.* 2019; Freyhof *et al.* 2020; Dekić *et al.* 2024.

62. ***Squalius squalus*** (Bonaparte, 1837)

Vernacular names

Primorski klen, bijeli klen. Cavedano chub.

Previous names used for the species

Leuciscus cephalus cabeda Risso, 1826; *Leuciscus squalus* Bonaparte, 1837; *Leuciscus cephalus albus* Bonaparte, 1838; *Leuciscus cavedanus* (Bonaparte, 1838); *Squalius albus* (Bonaparte, 1838); *Squalius cavedanus* (Bonaparte, 1838).

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

The taxonomic status and distribution range of *Squalius squalus* is still a matter of an ongoing debate (Buj *et al.* 2020a). According to their results, its distribution range is fragmented and encompasses the Istrian rivers and Visovac Lake on the Krka River in Croatia, and Trebišnjica River and the Ravno field in BiH; it was not found in the main course of the Krka or Neretva rivers. Previous literature mentioned *Leuciscus cephalus albus* Bonaparte, 1838 (Vuković 1977a), and *L. cavedanus* (Bonaparte, 1838) (Karaman 1928) in BiH, according to Buj *et al.* (2020a) for these reports, the recommended taxonomy is *S. squalus*.

Literature

Aganović 1952a; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Vuković 1977a; Kosorić *et al.* 1983; Buntić 1985; Economidis & Bănărescu 1991; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Šorić 2007; Šanda *et al.* 2008a, 2008b; Muhamedagić *et al.* 2008; Pavlović *et al.* 2009; Geiger *et al.* 2014; Benovics *et al.* 2019; Buj *et al.* 2020a; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

63. ***Squalius svallize*** Heckel & Kner, 1858

Vernacular names

Strugač, sval. Neretva chub.

Previous names used for the species

Leuciscus svallize (Heckel & Kner, 1858); *Leuciscus svallize svallize* (Heckel & Kner, 1858).

Origin and geographic range in BiH

Endemic (NCE BiH, CRO). Adriatic Basin.

Remarks

Endemic to the Neretva River catchment in BiH and Croatia.

Literature

Heckel & Kner 1858; Karaman 1928; Aganović 1952a, 1952c; Taler 1953a; Vuković 1963a, 1977a; Kosorić & Vuković 1966a; Čanković 1967; Kapetanović & Vuković 1968; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Guzina *et al.* 1971; Berberović & Sofradžija 1972; Marić 1972; Švob & Kilalić 1972; Kosorić 1974, 1977a, 1978, Vuković & Vuković 1974; Kaćanski *et al.* 1977; Sofradžija 1977; Kosorić *et al.* 1983, 1989; Ratković & Mikavica 1984; Buntić 1985; Bianco & Knežević 1987; Vuković & Sofradžija 1987; Bogutskaya 1994; Crivelli 1996; Mikavica 1998; Bogutskaya & Zupančič 1999; Korjenić *et al.* 2003; Škrijelj *et al.* 2003; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Glamuzina *et al.* 2008a; Jelić *et al.* 2008; Muhamedagić *et al.* 2008; Šanda *et al.* 2008b; Škrijelj & Mašović 2008; Zupančič 2008; Dulčić *et al.* 2009; Pavlović *et al.*

2009; Sofradžija 2009; Ivanković *et al.* 2010, 2011; Perea *et al.* 2010; Drešković *et al.* 2011; Tutman *et al.* 2012a; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Milanović *et al.* 2015; Bećiraj *et al.* 2016; Mrdak & Milošević 2017; Vesnić *et al.* 2018; Buj *et al.* 2020a; Skenderović *et al.* 2020b; Lukač *et al.* 2023; Dekić *et al.* 2024.

64. ***Squalius tenellus*** Heckel, 1843

Vernacular names

Sitnoljuskavi klen. Livno masnica.

Previous names used for the species

Leuciscus turskyi tenellus (Heckel, 1843); *Leuciscus turskyi* (Heckel, 1843); *Squalius turskyi* Heckel, 1843.

Origin and geographic range in BiH

Endemic (CCE). Adriatic Basin.

Remarks

Endemic to the Cetina River catchment in BiH, introduced in Croatia from Buško Blato in BiH (Buj *et al.* 2020a). In BiH, the species is rare in the tributaries and canals connected to Buško Blato, whereas a more abundant population is present in Lake Blidinje (Spasojević, unpublished data). Literature data mentioned *Leuciscus turskyi tenellus* (Heckel, 1843) (Aganović *et al.* 1974, 1976) and *Leuciscus turskyi* (Heckel, 1843) (Gilić 1983) in BiH, but according to Buj *et al.* (2020a) recommended taxonomy is *S. tenellus*.

Literature

Heckel & Kner 1858; Ćurčić 1916; Karaman 1923, 1928; Protić 1924; Taler 1953a; Vuković 1963a, 1964, 1977a; Pipić 1966; Berberović 1967; Čanković *et al.* 1968a; Aganović 1969; Pranjić 1969; Vuković & Žnidaršpć-Krzyk 1969; Kaluđerčić *et al.* 1971; Vuković & Ivanović 1971; Berberović & Sofradžija 1972; Marić 1972; Aganović *et al.* 1974, 1976; Vuković & Veledar 1974; Sofradžija 1977; Kaćanski *et al.* 1978; Seratlić & Vuković 1979; Berberović 1980; Gilić 1983; Volić 1984; Guzina *et al.* 1986; Vuković & Sofradžija 1987; Mikavica 1988b; Economidis & Bănărescu 1991; Kottelat 1997; Bănărescu & Herzig-Strachil 1998; Mikavica 1998; Freyhof *et al.* 2005; Freyhof *et al.* 2006, 2020; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Muhamedagić *et al.* 2008; Pavić 2008; Šanda *et al.* 2008b; Zupančič 2008; Perea *et al.* 2010; Darwall *et al.* 2014; Geiger *et al.* 2014; Mustafić & Mrakovčić 2017; Benovics *et al.* 2019; Bogutskaya *et al.* 2019; Buj *et al.* 2020a; Mušović *et al.* 2020; Skenderović *et al.* 2020b; Žujo-Zekić 2021; Carosi *et al.* 2024; Dekić *et al.* 2024.

Genus *Telestes* Bonaparte, 1837

65. ***Telestes dabar*** (Bogutskaya, Zupančič, Bogut & Naseka, 2012).

Vernacular names

Dabarska gaovica. Dabar minnow.

Previous names used for the species

Paraphoxinus metohiensis Steindachner, 1901; *Phoxinellus metohiensis* (Steindachner, 1901); *Telestes metohiensis* (Steindachner, 1901).

Origin and geographic range in BiH

Endemic (NCE, BiH). Adriatic Basin.

Remarks

Described based on anatomical comparisons of isolated geographic populations of specimens previously identified as *Telestes metohiensis* (Bogutskaya *et al.* 2012). However, according to molecular data, some specimens identified as *T. dabar* are actually *T. metohiensis* (Buj *et al.* 2017). Furthermore, Reier *et al.* (2022) recognized both species as distinct based on molecular data. Occurs only in the underground waters of Dabarsko Polje (Eastern Herzegovina) (Bogutskaya *et al.* 2012).

Literature

Bogutskaya *et al.* 2012; Dekić *et al.* 2012a; Geiger *et al.* 2014; Lolić *et al.* 2015; Buj *et al.* 2017; Benovics *et al.* 2019; Francuski *et al.* 2019; Freyhof *et al.* 2020, Reier *et al.* 2022; Lukač *et al.* 2023.

66. ***Telestes metohiensis*** (Steindachner, 1901)

Vernacular names

Gatačka gaovica. Gacko minnow.

Previous names used for the species

Paraphoxinus metohiensis Steindachner, 1901; *Phoxinellus metohiensis* (Steindachner, 1901).

Origin and geographic range in BiH

Endemic (NCE, BiH). Adriatic Basin.

Remarks

In earlier literature, it was mentioned as *Paraphoxinus metohiensis* (Vuković 1977a), *Phoxinellus metohiensis* (Sofradžija 2009), and as *Telestes metohiensis* in Bogutskaya *et al.* (2012); endemic to the Neretva River catchment in BiH.

Literature

Steindachner 1901; Trgovčević 1905; Ćurčić 1915a, 1915b; Taler 1953a, 1953b; Vuković 1963a, 1977a, 1982b; Bašić 1964; Sabioncello 1967; Berberović *et al.* 1969b, 1970d; Vuković & Miladinović 1969; Aganović & Kapetanović 1970, 1971; Guzina & Vuković 1972; Miladinović *et al.* 1971; Vuković & Ivanović 1971; Karaman 1972; Sofradžija & Berberović 1972; Bozja & Švob 1974; Vuković & Vuković 1974; Pavlović & Berberović 1978; Pocrnjić *et al.* 1979; Leiner 1984; Vuković & Sofradžija 1987; Povž *et al.* 1990; Šorić 1992; Crivelli 1996; Kottelat 1997; Zupančič & Bogutskaya 2000, 2002; Bogutskaya & Zupančič 2003; Ketmaier *et al.* 2004; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Jelić *et al.* 2008; Šanda *et al.* 2008b; Zupančič 2008; Pavlović *et al.* 2009; Sofradžija 2009; Palandačić *et al.* 2010; Perea *et al.* 2010; Dekić *et al.* 2011, 2012a, 2012b, 2013a, 2013b, 2024; Drešković *et al.* 2011; Bogutskaya *et al.* 2012; Darwall *et al.* 2014; Geiger *et al.* 2014; Lolić *et al.* 2015; Milanović *et al.* 2015; Mandić *et al.* 2016; Buj *et al.* 2017; Benovics *et al.* 2019; Francuski *et al.* 2019; Freyhof *et al.* 2020; Reier *et al.* 2022; Lukač *et al.* 2023.

Telestes polylepis Steindachner, 1866

Vernacular names

Croatian riffle dace.

Remarks

Hamzić (2024) recorded this species in BiH, but it is endemic only to the karstic fields in the Lika region in Croatia (Ćaleta *et al.* 2019) and is therefore not included in the list of fishes of BiH.

67. ***Telestes souffia*** (Risso, 1827)

Vernacular names

Jelšovka. Vairone, Souffia.

Previous names used for the species

Leuciscus souffia Risso, 1826; *Leuciscus agassizii* Valenciennes, 1844; *Leuciscus souffia agassizii* Valenciennes, 1844.

Origin and geographic range in BiH

Native. Danube River Basin.

Remarks

Vuković (1963a) mentioned the species as *Telestes agassizzi*, Vuković (1977a) for BiH, and Sofradžija (2009) as *Leuciscus souffia agassizii*, but all are now considered junior synonyms of *T. souffia* (Risso, 1827).

Literature

Anonymous 1886; Glowacki 1896; Vuković 1963a, 1963b, 1977a, 1979, 1982b, 1986, 1987, 1990; Vuković & Ivanović 1971; Vuković & Vuković 1974; Sofradžija 1977; Guzina & Vuković 1978; Mikavica *et al.* 1991; Korjenić 1998; Mikavica 1998; Mikavica & Savić 1999; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Gilles *et al.* 2009; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Simonović *et al.* 2015; Dekić *et al.* 2024.

Telestes turskyi (Heckel, 1843)

Vernacular names

Turski klen. Turski dace.

Previous names used for the species

Leuciscus turskyi tenellus (Heckel, 1843); *Leuciscus turskyi* (Heckel, 1843); *Squalius turskyi* Heckel, 1843.

Remarks

Endemic to the Krka River catchment in Croatia (Buj *et al.* 2022). Sofradžija (2009) stated that the species inhabits BiH freshwaters, but this is likely based on misidentification of specimens. Therefore, it is not included in this checklist.

Literature

Vuković & Ivanović 1971; Mikavica 1988b; Mrakovčić *et al.* 2006; Sofradžija 2009.

Telestes ukliva (Heckel, 1843)

Vernacular names

Ukliva.

Remarks

Hamzić (2024) recorded this species in BiH, but it is endemic only to the Cetina River catchment in Croatia (Ćaleta *et al.* 2019). Therefore, the species is not included in our checklist either.

Genus *Vimba* Fitzinger, 1873

68. ***Vimba vimba*** (Linnaeus, 1758)

Vernacular names

Šljivar, nosara. Vimba.

Previous names used for the species

Abramis melanops (Heckel, 1837); *Abramis vimba* (Linnaeus, 1758); *Vimba vimba carinata* (Pallas, 1811).

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Glowacki 1896; RHZZM 1908; Ćurčić 1910; Plančić 1923b; Zaplata & Taler 1932; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Berberović 1980; Kosorić *et al.* 1980; Kaćanski *et al.* 1981; Veljović 1982, 1985; Mikavica 1987b; Mikavica *et al.* 1991; Leiner 1998; Mikavica & Savić 1999; Radević 2000, 2002; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Čičić-Močić 2014, 2016, 2018; Nedić *et al.* 2014a, 2014c, 2014d, 2018; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović & Adrović 2019; Dekić *et al.* 2020a, 2024; Skenderović *et al.* 2020b, 2021.

Order Siluriformes Hay, 1929
Family Siluridae Cuvier, 1816
Genus *Silurus* Linnaeus, 1758

69. ***Silurus glanis*** Linnaeus, 1758

Vernacular names

Som. European catfish.

Remarks

Translocated to the Adriatic Basin (Glamuzina *et al.* 2017).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Literature

Anonymous 1886, 1931, 1947b; Brusina 1892; Glowacki 1896; Ribić 1901; Ćurčić 1910; Plančić 1923b; Ćurčić 1933; Bek 1935; Jedlička 1935; Taler 1945b; Smlatić 1961; Vuković 1963a, 1977a; Kiškarolj 1965; Čanković *et al.* 1968a, 1968b, 1968c; Munjko 1972; Kosorić *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Sofradžija 1982b, 2009; Veljović 1982, 1985; Delić 1984; Mikavica 1987b; Mikavica *et al.* 1991; Pažur 1993; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002; Mateš 2004; Bogut *et al.* 2006; Adrović 2007; 2012; Kottelat & Freyhof 2007; Suić *et al.* 2008; Šanda *et al.* 2008b; Vuković *et al.* 2008; Sofradžija 2009; Tutman *et al.* 2012a; Golub *et al.* 2013, 2017c, 2018b; Čičić-Močić 2014; Delić *et al.* 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2016b, 2018; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Glamuzina *et al.* 2017; Kovačević *et al.* 2018; Memić 2018; Mušović *et al.* 2018, 2020; Žujo-Zekić *et al.* 2018; Dekić *et al.* 2020a, 2024; Skenderović *et al.* 2020b, 2021; Žujo-Zekić 2021; Hamzić 2024.

Family Ictaluridae

Genus *Ameiurus* Rafinesque, 1820

70. ***Ameiurus melas*** (Rafinesque, 1820)

Vernacular names

Crni somić. Black bullhead.

Previous names used for the species

Ictalurus melas (Rafinesque, 1820).

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

Non-native species introduced from North America whose distribution in BiH is not yet known because of possible misidentifications of specimens of *Ameirurus nebulosus*. Recently, it was also mentioned as *A. melas* for the artificial lake Modrac (Halilović & Adrović 2015).

Literature

Bogut *et al.* 2006; Šanda *et al.* 2008b, 2009; Sofradžija 2009; Tutman *et al.* 2012a; Halilović & Adrović 2015; Halilović & Adrović 2015; Simonović *et al.* 2015; Skenderović *et al.* 2016, 2020b; Glamuzina *et al.* 2017; Memić 2018; Nedić *et al.* 2018; Piria *et al.* 2018; Dekić *et al.* 2024.

71. ***Ameiurus nebulosus*** (Lesueur, 1819)

Vernacular names

Američki somić. Brown bullhead.

Previous names used for the species

Ictalurus nebulosus (Lesueur, 1819).

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species introduced from North America. Reported from both the Adriatic and Danube River Basin in BiH, but its distribution is yet to be confirmed because of possible misidentifications of specimens of *Ameiurus melas*.

Literature

Vuković 1963a, 1977a; Kiškarolj 1965; Čanković *et al.* 1968a, 1968c; Žitnan *et al.* 1969; Obradović 1974; Kosorić 1978; Grbelja *et al.* 1980; Nadaždin *et al.* 1980; Obratil 1982; Veljović 1982; Delić 1984; Leiner 1998; Radević 2000; Bogut *et al.* 2006; Adrović 2007, 2012; Adrović & Skenderović 2007; Šanda *et al.* 2008b, 2009; Glamuzina *et al.* 2008a, 2017; Vuković *et al.* 2008; Sofradžija 2009; Šukalo *et al.* 2012; Tutman *et al.* 2012a; Golub *et al.* 2013; Mikavica *et al.* 2013; Čičić-Močić 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2016b, 2018, 2021; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Kovačević *et al.* 2018; Piria *et al.* 2018; Skenderović & Adrović 2019; Dekić *et al.* 2020a, 2024; Mušović *et al.* 2020; Skenderović *et al.* 2020b; Žujo-Zekić 2021.

Genus *Ictalurus* Rafinesque, 1820

Ictalurus punctatus Rafinesque, 1818

Vernacular names

Kanalski som. Channel catfish.

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

Non-native species introduced to Europe from North America. Literature records in BiH (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009) are still dubious (Hamzić 2024), and is not clear whether the species has established a population in the region. Therefore, it is not included in this checklist.

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009; Hamzić 2024.

Order Salmoniformes Bleeker, 1859
Family Esocidae Cuvier, 1817
Genus *Esox* Linnaeus, 1758

72. ***Esox lucius*** Linnaeus, 1758

Vernacular names

Štuka. Northern Pike.

Previous names used for the species

Esox lucioides Agassiz & Girard, 1850; *Lucius lucius* (Linnaeus, 1758).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the Adriatic Basin in Hutovo Blato wetland (Glamuzina *et al.* 2017).

Literature

Heckel & Kner 1858; Anonymous 1886; Brusina 1892; Glowacki 1896; Anonymous 1909; Ćurčić 1910; Plančić 1923b; Ćurčić 1933; Bek 1935; Jedlička 1935; Taler 1945b; Smlatić 1961; Vuković 1963a, 1977a; Kiškarolj 1965; Čanković 1967; Čanković *et al.* 1968a, 1968b, 1968c; Munjko 1972; Kosorić *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982, 1985; Delić 1984; Mikavica *et al.* 1991; Pažur 1993; Leiner 1998; Mikavica & Savić 1999; Radević 2000; Simonović 2001; Mrakovčić *et al.* 2002; Skenderović *et al.* 2006; Adrović 2007, 2012; Kottelat & Freyhof 2007; Suić *et al.* 2008; Vuković *et al.* 2008; Sofradžija 2009; Skenderović *et al.* 2011a, 2020a, 2020b; Bećiraj & Šahinović 2012; Tutman *et al.* 2012a; Golub *et al.* 2013, 2017c, 2018a, 2018b; Čičić-Močić 2014, 2016; Delić *et al.* 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2016b, 2018; Riđanović *et al.* 2015; Simonović *et al.* 2015; Bećiraj *et al.* 2016; Glamuzina *et al.* 2017; Kovačević *et al.* 2018; Memić 2018; Skenderović & Adrović 2019; Zuliani *et al.* 2019; Dekić *et al.* 2020a, 2024; Adrović *et al.* 2021.

Family Umbridae Bonaparte, 1845
Genus *Umbra* Kramer, 1777

73. ***Umbra krameri*** Walbaum, 1792

Vernacular names

Crnka. European mudminnow.

Previous names used for the species

Umbra krameri Fitzinger, 1832; *Umbra canina* Károli, 1882.

Origin and geographic range in BiH

Native. Danube River Basin.

Remarks

In BiH, there are few confirmed records in the Gromiželj swamp near Bijeljina (Sekulić *et al.* 2013) and the lower Matura River system (Marić *et al.* 2019).

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Sofradžija 2009; Drešković *et al.* 2011; Sekulić *et al.* 2013; Marić *et al.* 2015, 2017, 2019; Lukić *et al.* 2016; Ćurčić 2017; Čolić 2018; Dekić *et al.* 2024.

Family Salmonidae Cuvier, 1816
Genus *Coregonus* Linnaeus, 1758

73. ***Coregonus peled*** (Gmelin, 1789)

Vernacular names

Sjeverna ozimica. Peled.

Previous names used for the species

Coregonus oxyrinchus (Linnaeus, 1758).

Origin and geographic range in BiH

Non-native. Adriatic Basin.

Remarks

Non-native species introduced in several water bodies in the past, but the recent distribution is not well known. Hamzić *et al.* (2011) collected several specimens in Boračko Lake near Konjic during August 2011.

Literature

Simonović 2001; Hamzić *et al.* 2011; Piria *et al.* 2018.

Genus *Hucho* Günther, 1866

75. ***Hucho hucho*** (Linnaeus, 1758)

Vernacular names

Mladica. Huchen.

Previous names used for the species

Salmo hucho Linnaeus, 1758.

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Remarks

Huchen is endemic to the Danube River Basin, where it inhabits streams and rivers with fast water flow. It is one of the largest salmonid fish of the world and one of the most endangered species inhabiting the Danube River Basin of Central Europe (IUCN 2025). Some populations are supported by artificial reproduction and restocking programmes.

Literature

Anonymous 1886, 1903; Kesterčanek 1886; Brusina 1892; Hawlitschek 1895; Glowacki 1896; Mojsisovics 1897; Medić 1901; Horvat 1901; Hirc 1902; Ćurčić 1910; Plančić 1923b; Zaplata & Taler 1932; Protić 1933; Taler 1945a, 1951b; Hafner-Lahorski 1947, 1948; Vuković Teslić 1950; Kosorić & Kardoš 1955; Bogdanović 1957; Rukavina & Delić 1957; Smlatić 1961; Vuković 1963a, 1977a, 1982a; Sabioncello 1967; Čanković 1967; Čanković *et al.* 1968a; Aganović & kapetanović 1973; Kosorić *et al.* 1975; Sofradžija 1979; Kosorić 1981; Sofradžija & Hadžiselimović 1981b; Pažur *et al.* 1982; Imamović 1986; Mikavica 1987a, 1987b; 1988a, Skalin 1990; Mikavica *et al.* 1991; Pažur 1993; Babić & Mikavica 1994; Mikavica & Savić 1999; Radević 1999, 2000; Simonović *et al.* 2000, 2011, 2015; Georgiev 2003; Mateš 2004, 2008; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Škrijelj *et al.* 2006; Kottelat & Freyhof 2007; Pavlović *et al.* 2009; Sofradžija 2009; Ajanović *et al.* 2010; Popović 2010; Drešković *et al.* 2011; Weiss *et al.* 2011; Muhamedagić & Habibović 2013; Witkowski *et al.* 2013; Geiger *et al.* 2014; Freyhof *et al.* 2015, 2020; Bećiraj *et al.* 2016; Čičić-Močić 2016, 2018; Lukić *et al.* 2016; Weiss & Schenekar 2016; Glamuzina *et al.* 2017; Kovačević *et al.* 2018; Piria *et al.* 2018; Lolić *et al.* 2019; Skenderović *et al.* 2020b; Savić 2022; Dekić *et al.* 2020a, 2024.

Genus *Oncorhynchus* Suckley, 1861

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

Vernacular names

Kalifornijska pastrva. Rainbow trout.

Previous names used for the species

Parasalmo gairdneri (Richardson, 1836); *Salmo irideus* Gibbons, 1855; *Salmo gairdneri* Richardson, 1836.

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species introduced from North America in 1902 to the hatchery at Vrelo Bosne (Taler 1954). It can likely be found in all major watercourses in BiH where there are salmonid ponds. Usually introduced for the restocking of rivers and reservoirs in the sport fishery sector (Glamuzina *et al.* 2017). There is no published information on whether this species reproduces naturally in BiH.

Literature

Zaplata & Taler 1932; Mršić 1935; Vuković Teslić 1950; Taler 1953c, 1954; Bogdanović 1954; Aganović 1957; Aganović & Kapetanović 1963; Vuković 1963a, 1977a; Čanković 1967; Čanković *et al.* 1968a, 1970, 1971; Kiškarolj & Čanković 1969; Kaluđerčić *et al.* 1971; Kosorić *et al.* 1971; Guzina *et al.* 1977; Vuković & Kosorić 1978; Vicković 1979; Sofradžija 1982a; Imamović 1986, 1987; Kosorić *et al.* 1989; Mikavica & Grujić 1995a, 1995b; Radević 2000; Korjenić *et al.* 2003; Škrijelj *et al.* 2003; Bogut *et al.* 2006; Adrović & Skenderović 2007; Kottelat & Freyhof 2007; Muhamedagić *et al.* 2008; Šanda *et al.* 2008b, 2009; Sofradžija 2009; Dreca 2009; Hasković *et al.* 2011; Ivanc *et al.* 2011; Bećiraj & Šahinović 2012; Serdarević 2012; Simonović *et al.* 2015; Stanković *et al.* 2015, 2016; Pavličević *et al.* 2016; Bećiraj *et al.* 2016; Čičić-Močić 2016, 2018; Mrdak & Milošević 2017; Glamuzina *et al.* 2017; Adrović 2018; Keško 2018; Kovačević *et al.* 2018; Memić 2018; Piria *et al.* 2018; Savić *et al.* 2018; Mušović *et al.* 2020; Skenderović *et al.* 2020b; Žujo-Zekić 2021; Neuburg *et al.* 2023; Carosi *et al.* 2024; Dekić *et al.* 2024.

Genus *Salmo* Linnaeus, 1758

Salmo dentex (Heckel, 1852)

Vernacular names

Zubatak. Dentex trout.

Previous names used for the species

Salar dentex Heckel, 1851; *Salmo trutta dentex* Heckel, 1851.

Origin and geographic range in BiH

Adriatic Basin.

Remarks

Based on the results of Snoj *et al.* (2010), it is possible that this species represents a form in the life cycle of *Salmo marmoratus* in the Neretva River catchment and of *S. trutta* in the Skadar Lake catchment. Results of Snoj *et al.* (2010) clearly indicate that *S. dentex* does not represent a monophyletic lineage and should not be considered a distinct species. Therefore, it is not included in the list.

Literature

Heckel 1852; Ćurčić 1938; Taler 1953a; Vuković 1963a, 1977a; Kosorić & Vuković 1966a; Kosorić *et al.* 1983, 1989; Vuković & Ivanović 1971; Kaćanski *et al.* 1977; Mikavica 1998; Hamzić 2002; Bogut *et al.* 2006; Glamuzina & Bartulović 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Razpet *et al.* 2007; Has-Schön *et al.* 2008; Tutman *et al.* 2008a, 2012a; Zupančič 2008; Dulčić *et al.* 2009; Glamuzina *et al.* 2009; Sofradžija 2009; Snoj *et al.* 2010; Skenderović *et al.* 2020b.

77. ***Salmo farioides*** Karaman 1938

Vernacular names

Primorska pastrva. Balkan brook trout.

Previous names used for the species

Salmo trutta farioides.

Origin and geographic range in BiH

Endemic to Adriatic and Ionian Basins.

Remarks

Endemic to the Adriatic Basin in BiH, Croatia, Serbia, Montenegro, Albania and Republic of Northern Macedonia and Ionian Basin in Albania and Greece (Kottelat & Freyhof 2007). The taxonomic status of *Salmo farioides* has always been questionable due to inadequate original descriptions (Kottelat 1997; Razpet *et al.* 2007).

Literature

Kottelat 1997; Hamzić 2002; Korjenić 2005b; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Razpet *et al.* 2007; Šanda *et al.* 2008a, 2008b, 2009; Zupančič 2008; Sofradžija 2009; Suljević 2012; Tutman *et al.* 2012a; Geiger *et al.* 2014; Žujo-Zekić *et al.* 2018, Žujo-Zekić 2021; Carosi *et al.* 2024.

78. ***Salmo labrax*** Pallas, 1814

Vernacular names

Crnomorska pastrva. Black Sea trout.

Previous names used for the species

Salmo trutta labrax Pallas, 1814.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Some authors considered that *Salmo labrax* is just the Danube lineage of the *S. trutta* complex (Pustovrh *et al.* 2014a, 2014b), while others consider it as a distinct species (Kottelat 1997; Kottelat & Freyhof 2007). According to Hamzić (2024), translocated to the Adriatic Basin.

Literature

Kottelat & Freyhof 2007; Ajanović *et al.* 2010; Škraba *et al.* 2017; Škraba Jurlina *et al.* 2020; Marić *et al.* 2022; Hamzić 2024.

79. ***Salmo letnica*** (Karaman 1924)

Vernacular names

Ohridska pastrva. Ohrid trout.

Origin and geographic range in BiH

Non-native. Adriatic Basin.

Remarks

Endemic to Ohrid Lake, with still unclear taxonomic status (Sušnik *et al.* 2007a). Non-native species that was introduced in 1987 to the hatchery in Blagaj and in the same year stocked in Boračko Lake and Plivska Lakes where it spawns successfully (Hamzić *et al.* 2012a; Hamzić 2024).

Literature

Hamzić *et al.* 2012a; Hamzić 2024.

80. ***Salmo marmoratus*** Cuvier, 1829

Vernacular names

Glavatica. Marble trout.

Previous names used for the species

Salmo trutta marmoratus Cuvier, 1829; *Trutta fario marmorata* Siebold, 1863; *Trutta adriatica* Kolombatović, 1890.

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Endemic to the Adriatic Basin (Vuković 1977a; Bogut *et al.* 2006), mainly known from the Soča River in Slovenia. Native species with still unclear taxonomic status, as some genetic and phenotypic differences between populations from the Soča and Neretva Rivers were recently discovered (Razpet *et al.* 2007). Kottelat & Freyhof (2007) proposed this species as a junior synonym of *Salmo montenigrinus*. Due to the introduction of highly competitive non-native species and highly unregulated stocking, this species, if valid, is extremely endangered in BiH (Hamzić 2024).

Literature

Heckel & Kner 1858; Steindachner 1882b; Heintz 1908; Karaman 1927, 1938; Ćurčić 1938; Taler 1945a, 1950; 1951b, 1953a, 1953b; Aganović 1952a; Vuković 1963a, 1977a, 1982a; Landiges & Vogt 1965; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968; Kosorić 1969, 1972a, 1974, 1977a, 1978; Dorofejeva & Seratlić 1970; Tortonese 1970; Guzina *et al.* 1971; Kaluđerčić *et al.* 1971; Kosorić & Vuković 1971; Dorofejeva & Seratlić-Savić 1972; Vuković & Vuković 1977; Kaćanski *et al.* 1977; Vuković *et al.* 1977; Aganović & Kapetanović 1978; Kosorić *et al.* 1983, 1989; Ratković & Mikavica 1984; Vuković & Sofradžija 1987; Povž *et al.* 1990; Mikavica 1998; Hamzić 2002; Durmić-Pašić *et al.* 2005, 2007a; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Razpet *et al.* 2007; Durmić-Pašić 2008; Muhamedagić *et al.* 2008, 2019; Zupančič 2008; Drešković *et al.* 2011; Pustovrh *et al.* 2011, 2014a, 2014b; Tutman *et al.* 2012a; Skenderović *et al.* 2020b; Dekić *et al.* 2024; Hamzić 2024.

81. ***Salmo montenigrinus*** (Karaman, 1933)

Vernacular names

Crnogorska pastrva. Montenegro trout.

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Endemic to the Adriatic Basin of Montenegro and BiH. In BiH, it is present in the southern part of the country (Kottelat & Freyhof 2007). In the 1980s and 1990s, this species was stocked in the Trebišnjica River catchment with fry from the "Mareza" and "Morača" fish farms (Hamzić 2024).

Literature

Kottelat & Freyhof 2007; Hamzić 2024.

82. ***Salmo obtusirostris*** (Heckel, 1851)

Vernacular names

Mekousna pastrva. Softmouth trout, Soft-muzzled trout.

Previous names used for the species

Salmothymus obtusirostris Heckel, 1851; *Thymallus microlepis* Steindachner, 1874; *Salmothymus obtusirostris oxyrhynchus* Steindachner, 1882.

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

First reported in BiH as *Salmo obtusirostris oxyrhynchus* (Vuković 1963a, 1977a). Endemic to the rivers of the southeastern Adriatic Basin (Kottelat & Freyhof 2007). It is recorded in the Krka, Jadro, Žrnovnica and Vrljika Rivers in Croatia, the Neretva River in BiH and Zeta and Morača Rivers in Montenegro (Glamuzina *et al.* 2018).

Literature

Zaplata & Taler 1932; Ćurčić 1938; Taler 1950, 1951b; Rukavina & Delić 1959; Janković 1961; Vuković 1963a, 1977a, 1982a; Kosorić & Vuković 1966a; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968; Rukavina & Ćorić 1968; Šenk & Kosorić 1968; Kiškarolj & Čanković 1969; Šenk 1969; Berberović *et al.* 1970e; Čanković *et al.* 1970, 1971; Guzina *et al.* 1971; Kaluđerčić *et al.* 1971; Kosorić *et al.* 1971; Vuković & Ivanović 1971; Korovina & Vuković 1972; Švob & Kilalić 1972; Kosorić 1974, 1977a, 1977b; Kaćanski *et al.* 1977; Vuković & Vuković 1977; Aganović & Kapetanović 1978; Vuković & Kosorić 1978; Kosorić *et al.* 1983, 1989; Vuković & Sofradžija 1987; Economidis & Bănărescu 1991; Babić & Mikavica 1994; Kottelat 1997; Mikavica 1998; Mikavica *et al.* 2001, 2002; Hamzić 2002; Snoj *et al.* 2002a, 2002b, 2010; Durmić-Pašić *et al.* 2005, 2007a, 2007b; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sušnik *et al.* 2007b; Razpet *et al.* 2007; Jelić *et al.* 2008; Muhamedagić *et al.* 2008, 2019; Šanda *et al.* 2008a, 2008b, 2009; Zupančič 2008; Pavlović *et al.* 2009; Drešković *et al.* 2011; Tutman *et al.* 2012a, 2023; Darwall *et al.* 2014; Delić *et al.* 2014; Esteve *et al.* 2014; Geiger *et al.* 2014; Pustovrh *et al.* 2014a, 2014b; Milanović *et al.* 2015; Glamuzina *et al.* 2017, 2018; Mrdak & Milošević 2017; Freyhof *et al.* 2020; Dekić *et al.* 2020b, 2024; Skenderović *et al.* 2020b; Neuburg *et al.* 2023.

Salmo taleri (Karaman, 1933)

Vernacular names

Zetska pastrva.

Remarks

According to Kottelat & Freyhof (2007) this species inhabits only waters of Montenegro. However, Schöffmann & Marić (2024) suggested this species is widespread in the Sava River catchment. Because the occurrence and distribution of this species are unclear, it is not included in the list of fishes from BiH, awaiting further information.

Literature

Vuković 1963a, 1977a; Hamzić 2024.

83. ***Salmo trutta*** Linnaeus, 1758

Vernacular names

Pastrmka. Brown trout.

Previous names used for the species

Salmo fario Linnaeus, 1758; *Salmo trutta m. fario* Linnaeus, 1758; *Salmo trutta m. lacustris* Linnaeus, 1758; *Trutta fario* (Linnaeus, 1758).

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Native brown trout from the Mediterranean Basin can be assigned to three lineages, Adriatic (AD), Mediterranean (ME), and *marmoratus* (MA), while those from the Danube Basin belong to the Danubian (DA) lineage (Bernatchez *et al.* 1992; Bernatchez 2001). Numerous different sublineages are also

recognized within the AD, ME, and DA lineages (Kottelat & Freyhof 2007; Segherloo *et al.* 2021), and in general, the taxonomic status of many of these species remains unclear. Based on previous reports, *Salmo trutta* is not native to BiH (Kottelat & Freyhof 2007), but it was often used for stocking the rivers of the Danube and the Adriatic Basins in Croatia and BiH (Buj *et al.* 2020b). The local native genetic pool has recently been compromised with the import of fertilized eggs of different origins (i.e., Atlantic lineage), as reared juveniles are widely used for restocking activities. *Salmo trutta* in the Neretva River catchment does not form a genetically unified assemblage. The assemblages are not correlated with phenotype but rather with sampling location. Thus, the most distinctive brown trout associations were observed in relation to either remote (supposedly unstocked) or more urban (supposedly stocked) locations (Razpet *et al.* 2007; Kalamujić 2013). However, according to Neuburg *et al.* (2023), brown trout in the upper Neretva form a genetically homogeneous unit that is clearly distinct from other geographically separated populations such as the brown trout lineages from the Danube and Aegean Basins and the Atlantic lineage (introduced into the Neretva system).

Literature

Brusina 1892; Glowacki 1896; Hirc 1900; Langhoffer 1904; Anonymous 1909; Wisniewski 1932; Zaplata & Taler 1932; Protić 1933; Ćurčić 1938; Taler 1950, 1951b, 1951d; Vuković Teslić 1950; Aganović 1952a, 1952b, 1957, 1967; Kosorić & Kardoš 1955; Šinžar 1955; Šenk 1954, 1956b, 1969; Bogdanović 1957; Aganović & Milošević 1959; Rukavina & Delić 1959; Pavlović *et al.* 1960, 1962; Vuković 1963a, 1977a, 1982a; Smlatić 1961; Cicović 1964; Kosorić & Vuković 1966a; Čanković 1967; Cerović & Ivanović 1968; Čanković *et al.* 1968a; Kiškarolj & Čanković 1968, 1969; Rukavina & Ćorić 1968; Šenk & Aganović 1968; Rojnik 1969; Kaćanski & Kosorić 1970; Guzina *et al.* 1971; Kaluđerčić *et al.* 1970, 1971; Kosorić *et al.* 1971, 1980, 1983, 1989; Švob & Kilalić 1972; Aganović & Kapetanović 1973, 1978; Kosorić 1974, 1977a, 1978, 1981; Kaćanski *et al.* 1977, 1978; Vuković & Kosorić 1978; Sofradžija 1982a, 2009; Ratković & Mikavica 1984; Imamović 1986, 1987; Kosorić & Mikavica 1986; Mikavica 1988a; Economidis & Bănărescu 1991; Mikavica *et al.* 1991; Babić & Mikavica 1994; Mikavica & Savić 1999; Radević 2000; Hamzić 2002; Trožić-Borovac 2002; Korjenić 2003, 2004b, 2005b, 2007; Korjenić *et al.* 2003, 2009; Škrijelj *et al.* 2003, 2006; Alić *et al.* 2004; Bogunić 2005; Durmić-Pašić *et al.* 2005, 2007a; Kadribegović 2005; Trožić-Borovac *et al.* 2005; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Pojskić *et al.* 2007; Razpet *et al.* 2007; Muhamedagić *et al.* 2008, 2019; Sofradžija 2009; Mišić 2011; Bećiraj & Šahinović 2012; Golub *et al.* 2012; Ivanc & Dekić 2012; Suljević 2012; Tutman *et al.* 2012a; Čorbo 2013; Kalamujić 2013; Muhamedagić & Habibović 2013; Kerkez *et al.* 2014; NHMW 2014; Pustovrh *et al.* 2014a, 2014b; Spasojević 2014; Pojskić & Kalamujić 2015; Simonović *et al.* 2015, 2017; Bećiraj *et al.* 2016; Čičić-Močić 2016, 2018, 2019; Dekić *et al.* 2016b, 2017b, 2020a, 2020b, 2024; Pavličević *et al.* 2014, 2016; Škraba *et al.* 2017; Veladžić *et al.* 2017; Adrović 2018; Keško 2018; Kovačević *et al.* 2018; Memić 2018; Nikolić *et al.* 2018; Piria *et al.* 2018; Lolić *et al.* 2019; Mušović *et al.* 2020; Skenderović *et al.* 2020a, 2020b; Škraba Jurlina *et al.* 2020; Neuburg *et al.* 2023; Carosi *et al.* 2024.

Genus *Salvelinus* Richardson, 1836

84. ***Salvelinus alpinus*** (Linnaeus, 1758)

Vernacular names

Jezerska zlatovčica. Arctic charr.

Previous names used for the species

Salmo alpinus Linnaeus, 1758.

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species introduced in BiH for aquaculture in both Adriatic and Danube basins, and later also used for restocking rivers and reservoirs (Hamzić 2024).

Literature

Zaplata & Taler 1932; Vuković Teslić 1950; Aganović 1957, 1967; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Vuković & Kosorić 1978; Imamović 1986; Sofradžija 2009; Glamuzina *et al.* 2017; Piria *et al.* 2018; Skenderović *et al.* 2020b; Dekić *et al.* 2024; Hamzić 2024.

85. ***Salvelinus fontinalis*** Mitchill, 1814

Vernacular names

Potočna zlatovčica. Brook trout.

Previous names used for the species

Salmo fontinalis Mitchill, 1814.

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Introduced in BiH for aquaculture purposes in both the Adriatic and Danube basins, and later also used for restocking rivers and reservoirs (Hamzić 2024). Recent distribution and the abundance of the species is not known.

Literature

Zaplata & Taler 1932; Taler 1950; Vuković 1963a, 1977a; Čanković 1967; Čanković *et al.* 1968a; Vuković & Kosorić 1978; Kosorić 1981; Radević 2000; Muhamedagić *et al.* 2008, Šanda *et al.* 2008b, 2009; Sofradžija 2009; Stanić 2013; Glamuzina *et al.* 2017; Piria *et al.* 2018; Kalamujić Stroil *et al.* 2020; Skenderović *et al.* 2020b; Neuburg *et al.* 2023; Dekić *et al.* 2024; Hamzić 2024.

Salvelinus salvelinus (Linnaeus, 1758)

Remarks

Vuković (1963a) reported the occurrence of the species in the Plivsko Lake, Danube River Basin, where it was introduced. According to Hamzić (2024), this report is dubious and the species is therefore not included in this list.

Literature

Vuković (1963a).

Genus *Thymallus* Linck, 1790

86. ***Thymallus thymallus*** (Linnaeus, 1758)

Vernacular names

Lipljen. European grayling.

Previous names used for the species

Salmo thymallus Linnaeus, 1758; *Thymallus vulgaris* Nilsson, 1832.

Origin and geographic range in BiH

Native to the the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to different rivers of the Adriatic Basin, in BiH, like the upper Neretva River and Šuica River (Duvanjsko Polje karst field) (Vuković & Sofradžija 1987; Hamzić 2024).

Literature

Anonymous 1886; Glowacki 1896; Langhoffer 1904; Jedlička 1931, 1932; Zaplata & Taler 1932; Taler 1944, 1945a; Aganović 1952b, 1952c; Stepanek 1953; Šenk 1953, 1956a, 1969; Kosorić & Kardoš 1955; Aganović 1957, 1965a, 1965b; Bogdanović 1957; Janković 1960; Pavlović *et al.* 1960, 1962; Smlatić 1961; Vuković 1963a, 1977a, 1982a; Horvat 1964; Mijatović 1966; Sabioncello 1967; Čanković *et al.* 1968a; Rukavina & Ćorić 1968; Šenk & Aganović 1968; Dedić 1971; Vuković & Ivanović 1971; Aganović & kapetanović 1973; Kaćanski *et al.* 1977; Vuković & Kosorić 1978; Kosorić 1981; Kosorić *et al.* 1983, 1989; Imamović 1986; Kosorić & Mikavica 1986; Mikavica 1988a; Mikavica *et al.* 1988, 1991; Babić & Mikavica 1994; Mikavica & Savić 1999; Radević 2000; Mitrašinović 2002; Korjenić 2004a, 2005a, 2005b; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Škrijelj *et al.* 2006; Kalamujić *et al.* 2007; Kottelat & Freyhof 2007; Bakrač-Bećiraj 2008; Bećiraj *et al.* 2008, 2016; Kalamujić 2008; Muhamedagić *et al.* 2008, 2019; Dekić *et al.* 2009b, 2024; Korjenić *et al.* 2009; Sofradžija 2009; Ajanović *et al.* 2010; Ivanc *et al.* 2011; Marić *et al.* 2011, 2012; Mišić 2011; Bećiraj & Šahinović 2012; Golub *et al.* 2012; Muhamedagić & Habibović 2013; Trožić-Borovac *et al.* 2013; Simonović *et al.* 2015; Čičić-Močić 2018; Kovačević *et al.* 2018; Nedić *et al.* 2018; Lolić *et al.* 2019; Bakrač *et al.* 2020b; Skenderović *et al.* 2020b; Neuburg *et al.* 2023; Hamzić 2024.

Order Gadiformes Goodrich, 1909
Family Lotidae Bonaparte, 1832
Genus *Lota* Oken, 1817

87. ***Lota lota*** (Linnaeus, 1758)

Vernacular names

Manić, menek. Burbot.

Previous names used for the species

Lota fluviatilis Perty, 1832; *Lota lota lota* (Linnaeus, 1758); *Lota vulgaris* Fitzinger, 1832.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Glowacki 1896; Brusina 1892; Medić 1901; Ćurčić 1910, 1933; Plančić 1923b; Vuković 1963a, 1977a; Čanković *et al.* 1968a, 1968c; Veljović 1982, 1985; Sofradžija *et al.* 1984; Bojčić 1987; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002, 2006; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Ivanc & Dekić 2012; Delić *et al.* 2014; Simonović *et al.* 2015; Glamuzina *et al.* 2017; Golub *et al.* 2018a, 2018b; Kovačević *et al.* 2018; Skenderović *et al.* 2020b; Dekić *et al.* 2024; Hamzić 2024.

Order Syngnathiformes
Family Syngnathidae Bonaparte, 1831
Genus *Syngnathus* Linnaeus, 1758

ME3 ***Syngnathus abaster*** Risso, 1827

Vernacular names

Šilo kratkokljuno. Black-striped pipefish.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Although the black-striped pipefish was previously included in the list of fishes of BiH (Vuković 1963a, 1977a; Bogut *et al.* 2006), Tutman *et al.* (2012b) provided the first reliable record of its presence with the exact location, including morphometric and meristic information of a specimen.

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Tutman *et al.* 2012b.

Order Gobiiformes Bleeker, 1859

A review by Tutman *et al.* (2020b) updated the information on the taxonomic status and distribution of freshwater gobies in BiH (families Oxudercidae and Gobiidae), and four species are excluded from the national checklist given the lack of data supporting their occurrence: *Knipowitschia panizzae*, *Pomatoschistus microps*, *Proterorhinus marmoratus* and *Zosterisessor ophiocephalus.* Therefore, the freshwater gobiid fauna of BiH includes seven species in six genera. The Adriatic Basin (Neretva River catchment) is inhabited by three endemic species: *Knipowitschia radovici*, *Orsinigobius croaticus* and *Ninnigobius canestrinii*, while the Danube River Basin is inhabited by one native species, *Proterorhinus semilunaris*, and four invasive species: *Babka gymnotrachelus*, *Neogobius fluviatilis*, *Neogobius melanostomus* and *Ponticola kessleri*. Distribution of the endemics *K. radovici* and *O. croaticus* is restricted to small areas in the lower Neretva River catchment on both sides of the Croatia–BiH border.

Family Odontobutidae Hoese & Gill, 1993
Genus *Perccottus* Dybowski, 1877

88. ***Perccottus glenii*** Dybowski, 1877

Vernacular names

Amurski spavač. Amur sleeper.

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

Reported from the Sava River near Slavonski Brod and Bosanski Brod (Ćaleta *et al.* 2010).

Literature

Ćaleta *et al.* 2010.

Family Oxudercidae Günther, 1861
Genus *Knipowitschia* Iljin, 1927

Knipowitschia panizzae (Verga, 1841)

Vernacular names

Glavočić vodenjak. Adriatic dwarf goby.

Previous names used for the species

Gobius pannizae Verga, 1841; *Padogobius panizzai* (Verga, 1841).

Origin and geographic range in BiH

Adriatic Basin.

Remarks

First recorded as *Gobius panizzae* by Vuković (1963a), but without information on its distribution in BiH. Later, Vuković (1977a) reported it as *Padogobius panizzai* in the lower Neretva River catchment, while Sofradžija (2009) listed it as *Knipowitschia panizzae* for the same area; it was not mentioned by Bogut *et al.* (2006). Since its taxonomic status in the Adriatic Sea is doubtful (Kovačić & Pallaoro 2003), and is not recorded in BiH (Šanda & Kovačić 2009), until confirmation *K. panizzae* should not be included in this checklist.

Literature

Vuković 1977a; Mikavica 1998; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Šanda & Kovačić 2009; Drešković *et al.* 2011.

89. ***Knipowitschia radovici*** Kovačić, 2005

Vernacular names

Norinski glavočić. Norin goby.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Stenoendemic species that inhabits only the lower Neretva River catchment in Croatia (tributary Norin River; Kovačić 2005) and BiH (Hutovo Blato wetland; Šanda & Kovačić 2009; Tutman *et al.* 2013). However, molecular results grouped this species with *Knipowitschia panizzae* and *K. mrakovcici* (Geiger

et al. 2014, Thacker *et al.* 2019); therefore, according to Tougard *et al.* (2021), the taxonomic status of this species requires additional clarification.

Literature

Glamuzina *et al.* 2001, 2002, 2008a; Tutman *et al.* 2002, 2009b, 2012a, 2020b; Bogut *et al.* 2006; Dulčić *et al.* 2008; Šanda *et al.* 2008a, 2008b, 2009; Šanda & Kovačić 2009; Darwall *et al.* 2014; Geiger *et al.* 2014; Thacker *et al.* 2019; Freyhof *et al.* 2020; Tougard *et al.* 2021.

Genus *Ninnigobius* Whitley, 1951

90. ***Ninnigobius canestrinii*** (Ninni, 1883)

Vernacular names

Glavočić crnotrus. Black-spot goby.

Previous names used for the species

Gobius canestrinii Ninni, 1883; *Pomatochistus canestrinii* (Ninni, 1883).

Origin and geographic range in BiH

Endemic (ABE). Adriatic Basin.

Remarks

Endemic to the Adriatic Basin. It was first reported as *Gobius canestrinii* by Vuković (1963a), but without any distribution data. Later, Vuković (1977a), Bogut *et al.* (2006), Sofradžija (2009) and Drešković *et al.* (2011) listed it as *Pomatoschistus canestrinii* in the lower Neretva River. However, no official records were published (Kosorić 1978; Kosorić *et al.* 1983; Šanda & Kovačić 2009) until Tutman *et al.* (2013) presented the first reliable report of its occurrence in the Hutovo Blato wetland.

Literature

Vuković 1963a, 1977a; Mikavica 1998; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Tutman *et al.* 2012a, 2013, 2020b; Geiger *et al.* 2014.

Genus *Orsinigobius* Gandolfi, Marconato & Torricelli, 1986

91. ***Orsinigobius croaticus*** (Mrakovčić, Kerovec, Mišetić & Schneider, 1994)

Vernacular names

Vrgoračka gobica. Croatian goby.

Previous names used for the species

Knipowitschia punctatissima croatica Mrakovčić, Kerovec, Mišetić & Schneider, 1994.

Origin and geographic range in BiH

Endemic (NCE, BiH, CRO). Adriatic Basin.

Remarks

Endemic to the Neretva River catchment, originally described as a subspecies, *Knipowitschia punctatissima croatica*, from a restricted area in Croatia (Mrakovčić *et al.* 1996). It was later recognized

as a species, *K. croatica* (Kottelat 1997). Following molecular studies by Geiger *et al.* (2014) and Thacker *et al.* (2019), it was recently transferred to the genus *Orsinigobius*, as *O. croaticus*. It occurs only in the karst watercourses of the Neretva River catchment in BiH and Croatia. Its current distribution in BiH covers the lower Neretva River up to the town of Čapljina, its tributarie Bregava and, Trebižat Rivers, and the Hutovo Blato wetland (Šanda & Kovačić 2009; Drešković *et al.* 2011; Glamuzina *et al.* 2013; Tutman *et al.* 2013, 2020b).

Literature

Glamuzina *et al.* 2001, 2002, 2008a; Tutman *et al.* 2002, 2009b, 2012a, 2020b; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Dulčić *et al.* 2008; Jelić *et al.* 2008; Šanda *et al.* 2008a, 2008b, 2009; Šanda & Kovačić 2009; Zupančič 2008; Drešković *et al.* 2011; Darwall *et al.* 2014; Geiger *et al.* 2014; Oikonomou *et al.* 2014; Milanović *et al.* 2015; Horvatić *et al.* 2017; Zanella *et al.* 2017; Freyhof *et al.* 2020.

Genus *Pomatoschistus* Gill, 1863

Pomatoschisctus microps (Krøyer, 1838)

Previous names used for the species

Gobius microps Krøyer, 1838; *Pomatoschisctus microps* (Kröyer, 1838).

Remarks

First reported as *Gobius microps* (Vuković 1963a), while Vuković (1977a) and Bogut *et al.* (2006) referred to it as *Pomatoschisctus microps* for the lower Neretva River catchment. It was not listed by Sofradžija (2009). This species is not present in the Adriatic Sea (Dulčić & Kovačić 2020), therefore all reports from the Neretva River catchment result from misidentification of specimens. Accordingly, it is not included in this checklist.

Literature

Vuković 1963a, 1977a; Bogut *et al.* (2006).

Family Gobiidae Cuvier, 1816
Genus *Babka* Iljin, 1927

92. ***Babka gymnotrachelus*** (Kessler, 1857)

Vernacular names

Glavočić trkač. Racer goby.

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

It was first reported in BiH as *Neogobius gymnotrachelus*, between the cities of Orašje and Tolisa in the middle part of the Sava River (Nedić *et al.* 2018).

Literature

Nedić *et al.* 2018; Skenderović *et al.* 2020b.

Genus *Neogobius* Iljin, 1927

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

Vernacular names

Riječni glavoč. Pontian monkey goby.

Previous names used for the species

Gobius fluviatilis Pallas, 1811.

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

Vuković (1977a) was the first to record the presence of *Neogobius fluviatilis* (as *Gobius fluviatilis*) in the lowlands of the Danube River Basin in northern BiH, with remarks that this species was rare, but without providing any precise distribution data. Similar information was given by Bogut *et al.* (2006) and Sofradžija (2009). Nedić *et al.* (2014a, 2014c) and Delić *et al.* (2014) recorded it in the Sava and Una rivers, respectively.

Literature

Vuković 1977a; Mrakovčić *et al.* 2002; Škrijelj *et al.* 2005a; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Ćaleta *et al.* 2010; Piria 2011b; Delić *et al.* 2014; Nedić *et al.* 2014a, 2014c, 2014d; Simonović *et al.* 2015; Golub *et al.* 2017c, 2018a, 2018b; Tutman *et al.* 2020b.

94. ***Neogobius melanostomus*** (Pallas, 1814)

Vernacular names

Round goby. Glavočić okrugljak.

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

Reported from the Sava River (Piria *et al.* 2011a, 2016a; Jakovlić *et al.* 2015), and Una River near Kozarska Dubica (Čolić *et al.* 2018).

Literature

Piria *et al.* 2011a, 2016a; Jakovlić *et al.* 2015; Simonović *et al.* 2015; Čolić *et al.* 2018; Tutman *et al.* 2020b.

Genus *Padogobius* Berg, 1932

Padogobius bonelli (Bonaparte, 1846)

Remarks

Listed in Hamzić (2024) with the remark that its presence has yet to be confirmed. Therefore, it is not included in this checklist.

Literature

Hamzić (2024).

Genus *Ponticola* Iljin, 1927

95. ***Ponticola kessleri*** (Günther, 1861)

Vernacular names

Bičkaš. Pontian bighead goby.

Previous names used for the species

Gobius kessleri (Günther, 1861); *Neogobius kessleri* (Günther, 1861).

Origin and geographic range in BiH

Non-native. Danube River Basin.

Remarks

This species was first mentioned in BiH as *Gobius kessleri* by Vuković (1977a), in the lowlands of the Danube River Basin, without precise distribution data, and it was considered rare. This information was repeated also by Bogut *et al.* (2006), as *Neogobius kessleri*, while Sofradžija (2009) considered its occurrence in the Sava River and its lower tributaries. Recently, Jakovlić *et al.* (2015) and Piria *et al.* (2016a) also reported its presence in the Sava River in Croatia.

Literature

Vuković 1977a; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Ćaleta *et al.* 2010; Tutman *et al.* 2020b; Skenderović *et al.* 2020b.

Genus *Proterorhinus* Smitt, 1900

Proterorhinus marmoratus (Pallas, 1814)

Previous names used for the species

Gobius marmoratus Pallas, 1814.

Remarks

It was first mentioned in BiH by Vuković (1977a) for the lowland waters of the Danube River Basin. However, its precise location was not provided, though it was considered rare. This information was later repeated by Bogut *et al.* (2006), while Sofradžija (2009) listed it for the waters of Sava River. However, molecular studies of the genus in the Danube River Basin (Neilson & Stepien 2009a, 2009b) confirmed that *Proterorhinus marmoratus* is present only in marine and brackish waters at the mouth of

the Danube Basin, while inland, freshwater representatives were confirmed as *P. semilunaris*. Therefore, *P. marmoratus* is not included in this checklist.

Literature

See *Proterorhinus semilunaris.*

96. ***Proterorhinus semilunaris*** (Heckel, 1837)

Vernacular names

Mramorasti glavoč. Western tubenose goby.

Previous names used for the species

Gobius marmoratus Pallas, 1814; *Proterorhinus marmoratus* (Pallas, 1814).

Origin and geographic range in BiH

Native. Danube River Basin.

Remarks

Literature records mention *Proterorhinus marmoratus*, eventhough this was the result of misidentification of specimens (Hamzić, 2024). In recent years, *P. semilunaris* was recorded in the Sava River at the confluence with the Ukrina River (Ćaleta & Marčić, unpublished data).

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Sofradžija 2009; Tutman *et al.* 2020b; Dekić *et al.* 2024.

Genus *Zoosterisessor* Whitley, 1935

Zoosterisessor ophiocephalus (Pallas, 1811)

Vernacular names

Glavoč travaš. Grass goby.

Previous names used for the species

Gobius ophiocephalus Pallas, 1811.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

This species was originally recorded in BiH as *Gobius ophiocephalus* by Vuković (1963a), but no distribution data was provided. Sofradžija (2009) did not include the species in his study, but Vuković (1977a) and Bogut *et al.* (2006) reported it in the lower Neretva, again without providing distributional data. It seems it does not occur in BiH, but is present in the lower reaches of the Neretva River in Croatia, in brackish waters and lagoons (Dulčić *et al.* 2007). Although this species is regularly found in transitional waters (Kottelat & Freyhof 2007), there is no reliable information of its occurrence in BiH, and therefore it is not included in this checklist.

Literature

Vuković 1977a; Bogut *et al.* 2006; Tutman *et al.* 2020b.

Order Carangiformes Jordan, 1923
Family Pleuronectidae Rafinesque, 1815
Genus *Platichthys* Girard, 1854

ME4 ***Platichthys flesus*** (Linnaeus, 1758)

Vernacular names

Iverak, kalkan. Flounder.

Previous names used for the species

Pleuronectes flesus Linnaeus, 1758; *Pleuronectes flesus luscus* Pallas, 1814.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Distributed in the lower reaches of the Neretva River and the Hutovo blato wetland, where it enters from the coastal areas of the Adriatic Sea.

Literature

Vuković 1963a, 1977a; Kosorić 1978; Kosorić *et al.* 1983, 1989; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Glamuzina *et al.* 2008a; Sofradžija 2009; Tutman *et al.* 2012a.

Order Atheriniformes Rosen, 1966
Family Atherinidae Risso, 1827
Genus *Atherina* Linnaeus, 1758

ME5 ***Atherina boyeri*** Risso, 1810

Vernacular names

Oliga, gavun. Sand smelt.

Previous names used for the species

Hepsetia boyeri Jordan & Hubbs, 1919.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Occurs in the lower reaches of the Neretva River and the Hutovo blato wetland, where it enters from coastal areas of the Adriatic Sea.

Literature

Vuković 1963a, 1977a; Mikavica 1998; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Tutman *et al.* 2012a.

Atherina hepsetus Linnaeus, 1758

Vernacular names

Gavun. Mediterranean sand smelt.

Previous names used for the species

Atherina athaerina Nardo, 1827; *Atherina mochon* Cuvier, 1829; *Hepsetia mochon* Schultz, 1948.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Listed in Vuković (1963a) as *Atherina mocho* and in Vuković (1977a) as *A. mochon*. In Bogut *et al.* (2006) and Hamzić (2024), it is mentioned as *A. hepsetus*. It was not mentioned by Sofradžija (2009). Glamuzina & Dobroslavić (2020) did not report the species either from the lower Neretva River stretches in Croatia. Environmental conditions of the lower Neretva River are indeed not suitable for the species; therefore, its occurrence in the BiH is unlikely and the species is not included in this checklist.

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006; Hamzić 2024.

Order Cyprinodontiformes Berg, 1940
Family Cyprinodontidae Gill, 1865
Genus *Aphanius* Nardo, 1827

Aphanius fasciatus (Valenciennes, 1821)

Vernacular names

Obrvan. Mediterranean toothcarp.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Recorded by Sofradžija (2009) and Hamzić (2024) in the lower Neretva River, without distributional data provided. However, since environmental conditions of the lower Neretva River are not suitable for the species, its occurrence in the BiH is unlikely and the species is not included in this checklist.

Literature

Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Hamzić 2024.

Family Poeciliidae Bonaparte, 1831
Genus *Gambusia* Poey, 1854

Gambusia affinis Girard, 1859

Previous names used for the species

Gambusia affinis (Baird & Girard, 1853).

Remarks

The record provided by Sofradžija (2009) is most likely based on misidentification of specimens. Landeka *et al.* (2015) confirmed the presence of only *Gambusia holbrooki* across the entire Mediterranean biogeographical region in Croatia and BiH. Therefore, it is not included in this checklist.

Literature

See in *Gambusia holbrooki.*

97. ***Gambusia holbrooki*** Girard, 1859

Vernacular names

Gambuzija. Eastern mosquitofish.

Previous names used for the species

Gambusia affinis Girard, 1859; *Gambusia affinis holbrooki* (Girard, 1859).

Origin and geographic range in BiH

Non-native. Adriatic Basin.

Remarks

Older literature mentioned *Gambusia affinis* Girard, 1859 (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009) and *G. affinis holbrooki* (Girard, 1859) (Landeka *et al.* 2015) in BiH, but those records are likely misidentification of specimens, since according to Landeka *et al.* (2015), only *G. holbrooki* occurs in the Mediterranean biogeographic region in Croatia and BiH.

Literature

Vuković 1963a, 1977a; Kosorić 1978; Kosorić *et al.* 1983, 1989; Bogut *et al.* 2006; Glamuzina *et al.* 2008a, 2017; Šanda *et al.* 2008a, 2008b; Sofradžija 2009; Tutman *et al.* 2012a; Landeka *et al.* 2015; Piria *et al.* 2018.

Order Mugiliformes Günther, 1880
Family Mugilidae Jarocki, 1822
Genus *Chelon* Artedi, 1793

ME6 ***Chelon auratus*** (Risso, 1810)

Vernacular names

Cipol zlatac. Golden mullet.

Previous names used for the species

Mugil auratus Risso, 1810; *Liza aurata* (Risso, 1810).

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Reported in the literature (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009) as occurring in the lower Neretva River, where it enters from coastal areas of the Adriatic Sea. However, data on its distribution are based on very general information and no actual specimens with detailed description have ever been reported (Kosorić 1978; Kosorić *et al.* 1983; Mikavica 1998). This has led to doubts about its occurrence in BiH. Reliable data about its occurrence in the Neretva River in Croatia were presented by Glamuzina & Dobroslavić (2020). Therefore, more information confirming its occurrence is necessary, with previous reports considered unreliable.

Literature

Aganović 1952a; Vuković 1963a, 1977a; Kosorić 1978; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009.

ME7 ***Chelon labrosus*** (Risso, 1827)

Vernacular names

Cipol putnik. Thicklip mullet.

Previous names used for the species

Mugil labrosus Risso, 1827; *Mugil chelo* Cuvier, 1829; *Liza chelo* Popov, 1929; *Liza labrosus* Buen, 1935.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Reported in the literature as occurring in the lower Neretva River, where it enters from coastal areas of the Adriatic Sea (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009). However, data on its occurrence are based on very general information and no actual specimens with detailed descriptions have ever been reported (Kosorić 1978; Kosorić *et al.* 1983; Mikavica 1998). More reliable data about its occurrence for the Neretva River in Croatia were presented by Glamuzina & Dobroslavić (2020). Therefore, more information confirming its occurrence is necessary, with previous reports being unreliable.

Literature

Vuković 1963a, 1977a; Kosorić 1978; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009.

ME8 ***Chelon ramada*** (Risso, 1827)

Vernacular names

Cipol balavac. Thinlip mullet.

Previous names used for the species

Mugil ramada Risso, 1826; *Liza ramada* Risso, 1827; *Mugil capito* Cuvier, 1829.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Distributed in the lower reaches of the Neretva River and the Hutovo blato wetland, where it enters from coastal areas of the Adriatic Sea.

Literature

Vuković 1963a, 1977a; Kosorić 1978; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Tutman *et al.* 2012a.

ME9 ***Chelon saliens*** (Risso, 1810)

Vernacular names

Cipol dugaš. Sharpnose mullet.

Previous names used for the species

Mugil saliens Risso, 1810 ; *Liza saliens* (Risso, 1810).

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Reported in the literature as occurring in the lower Neretva River, where it enters from coastal areas of the Adriatic Sea (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009). However, data on its distribution are based on very general information and no actual specimens with detailed description have ever been reported (Kosorić 1978; Kosorić *et al.* 1983; Mikavica 1998). This has led to doubts about its occurrence in BiH. Reliable data about its occurrence in the Neretva River in Croatia were presented by Glamuzina & Dobroslavić (2020). Therefore, more information confirming its occurrence is necessary, with previous reports unreliable.

Literature

Vuković 1963a, 1977a; Kosorić 1978; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Tutman *et al.* 2012a.

Genus *Mugil* Linnaeus, 1758

ME10 ***Mugil cephalus*** Linnaeus, 1758

Vernacular names

Cipol bataš. Striped mullet.

Previous names used for the species

Mugil vulpinus Nardo, 1847.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Distributed in the lower reaches of the Neretva River and the Hutovo Blato wetland, where it enters from coastal areas of the Adriatic Sea.

Literature

Aganović 1952a; Vuković 1963a, 1977a; Kosorić 1978; Kosorić *et al.* 1983, 1989; Bogut *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Tutman *et al.* 2012a; Skenderović *et al.* 2020b.

Genus *Oedalechilus* Fowler, 1903

Oedalechilus labeo (Cuvier, 1829)

Vernacular names

Cipol plutaš. Boxlip mullet.

Previous names used for the species

Mugil labeo Cuvier, 1829.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

According to Vuković (1963a, 1977a), it is distributed in the lower reaches of the Neretva River, where it enters from the coastal areas of the Adriatic Sea. However, no actual specimens with detailed descriptions have ever been reported (Kosorić 1978; Kosorić *et al.* 1983; Mikavica 1998). The report of the occurrence of the species in BiH by Vuković (1963a, 1977a) is therefore unreliable. Furthermore, environmental conditions of the lower Neretva River are not suitable for the species; therefore, its occurrence in the BiH is unlikely and the species is not included in this checklist.

Literature

Vuković 1963a, 1977a; Bogut *et al.* 2006.

Order Blenniiformes Bleeker, 1860
Family Blenniidae Rafinesque, 1810
Genus *Salaria* Forsskål, 1775

98. ***Salariopsis fluviatilis*** (Asso, 1801)

Vernacular names

Riječna babica. Freshwater blenny.

Previous names used for the species

Blennius fluviatilis Asso, 1801; *Blennius vulgaris* Pollini, 1816; *Lipophrys fluviatilis* (Asso, 1801).

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Although previously included in lists of freshwater fishes of BiH (Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009), its occurrence in the lower Neretva River near the border with Croatia was confirmed for the first time by Tutman & Glamuzina (2021).

Literature

Vuković 1963a, 1977a; Mikavica 1998; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Tutman & Glamuzina 2021.

Order Perciformes Bleeker, 1863
Family Percidae Rafinesque, 1815
Genus *Gymnocephalus* Bloch, 1793

99. ***Gymnocephalus baloni*** Holčik & Hensel, 1974

Vernacular names

Balonov balavac. Danube ruffe.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Kottelat & Freyhof 2007; Pavlović *et al.* 2009; Drešković *et al.* 2011; Lukić *et al.* 2016; Simonović *et al.* 2015; Dekić *et al.* 2024.

100. ***Gymnocephalus cernua*** (Linnaeus, 1758)

Vernacular names

Balavac. Ruffe.

Previous names used for the species

Acerina cernua (Linnaeus, 1758).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Distributed in the Danube River Basin of BiH (Vuković 1977a), reported as translocated in the Hutovo Blato wetland in the lower portion of the Neretva River (Dulčić *et al.* 2005).

Literature

Anonymous 1886; Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Čanković *et al.* 1968a; Kosorić *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982, 1985; Mikavica 1987b; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002; Dulčić *et al.* 2005; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2011a, 2020a, 2020b; Adrović 2007, 2012; Kottelat & Freyhof 2007; Vuković *et al.* 2008; Sofradžija 2009; Tutman *et al.* 2012a, 2019; Čičić-Močić 2014; Milanović *et al.*

2015; Simonović *et al.* 2015; Skenderović 2015; Glamuzina *et al.* 2017; Mrdak & Milošević 2017; Adrović 2018; Memić 2018; Lolić *et al.* 2019; Dekić *et al.* 2020a.

101. ***Gymnocephalus schraetser*** (Linnaeus, 1758)

Vernacular names

Prugasti balavac. Stripped ruffe.

Previous names used for the species

Acerina schraetser (Linnaeus, 1758); *Perca schraetser* Linnaeus, 1758.

Origin and geographic range in BiH

Endemic (DBE). Danube River Basin.

Remarks

Endemic to the Danube River Basin.

Literature

Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Mikavica 1987b; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Pavlović *et al.* 2009; Sofradžija 2009; Popović 2010; Drešković *et al.* 2011; Simonović *et al.* 2015; Lukić *et al.* 2016; Dekić *et al.* 2024.

Genus *Perca* Linnaeus, 1758

102. ***Perca fluviatilis*** Linnaeus, 1758

Vernacular names

Grgeč. Perch.

Previous names used for the species

Perca fluviatilus fluviatilis Linnaeus, 1758; *Perca vulgaris* Fitzinger, 1832.

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the Hutovo Blato wetland and reservoirs in the lower Neretva River (Glamuzina *et al.* 2017).

Literature

Anonymous 1886; Brusina 1892; Glowacki 1896; Ćurčić 1910; Jedlička 1935; Vuković 1963a, 1977a; Kiškarolj 1965; Čanković *et al.* 1968a, 1968b, 1968c; Žitnan *et al.* 1969; Kosorić *et al.* 1980; Habeković *et al.* 1981; Obratil 1982; Veljović 1982, 1985; Delić 1984; Mikavica *et al.* 1991; Leiner 1998; Mikavica & Savić 1999; Radević 2000; Mrakovčić *et al.* 2002; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2011a, 2020a, 2020b; Škrijelj *et al.* 2006; Adrović 2007, 2012, 2018; Kottelat & Freyhof 2007; Vuković *et al.* 2008; Sofradžija 2009; Ivanc *et al.* 2011; Tutman *et al.* 2012a; Golub *et al.* 2013, 2016a, 2017c, 2018a, 2018b; Čičić-Močić 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2018; Riđanović *et al.* 2015;

Simonović *et al.* 2015; Skenderović 2015; Glamuzina *et al.* 2017; Kovačević *et al.* 2018; Memić 2018; Lolić *et al.* 2019; Cvijić *et al.* 2020; Dekić *et al.* 2020a, 2024.

Genus *Sander* Oken, 1817

103. ***Sander lucioperca*** (Linnaeus, 1758)

Vernacular names

Smuđ. Pikeperch.

Previous names used for the species

Lucioperca lucioperca (Linnaeus, 1758); *Stizostedion lucioperca* (Linnaeus, 1758).

Origin and geographic range in BiH

Native to the Danube River Basin, translocated to the Adriatic Basin.

Remarks

Translocated to the reservoirs in the lower Neretva River (Pavličević *et al.* 2016).

Literature

Anonymous 1886, 1947b; Jurinac 1887; Brusina 1892; Glowacki 1896; Medić 1901; Langhoffer 1904; Ćurčić 1910; Plančić 1923b; Taler 1932; Bek 1935; Vuković 1963a, 1977a; Čanković 1964; Kiškarolj 1965; Čanković *et al.* 1968a, 1968c; Žitnan *et al.* 1969; Munjko 1972; Kosorić *et al.* 1980; Habeković *et al.* 1981; Veljović 1982, 1985; Delić 1984; Mikavica *et al.* 1991; Pažur 1993; Leiner 1998; Mikavica & Savić 1999; Radević 2000; Škrijelj & Mašović 2001; Korjenić *et al.* 2003; Škrijelj *et al.* 2003, 2011; Bogut *et al.* 2006; Skenderović *et al.* 2006, 2011a, 2020a, 2020b, 2021; Adrović 2007, 2012; Adrović & Skenderović 2007; Kottelat & Freyhof 2007; Trožić-Borovac & Škrijelj 2007; Muhamedagić *et al.* 2008; Suić *et al.* 2008; Šanda *et al.* 2008b; Vuković *et al.* 2008; Sofradžija 2009; Jamaković 2011; Tutman *et al.* 2012a, 2019; Čičić-Močić 2014; Nedić *et al.* 2014a, 2014c, 2014d, 2018; Riđanović *et al.* 2015; Simonović *et al.* 2015; Skenderović 2015; Mitrašinović-Brulić *et al.* 2016; Pavličević *et al.* 2016; Šljuka 2011, 2016; Glamuzina *et al.* 2017; Kovačević *et al.* 2018; Memić 2018; Mušović *et al.* 2018, 2020, 2025; Žujo-Zekić *et al.* 2018; Dekić *et al.* 2020a, 2024; Žujo-Zekić 2021.

104. ***Sander volgensis*** (Gmelin, 1789)

Vernacular names

Smuđ kamenjak. Volga pikeperch.

Previous names used for the species

Perca volgensis Gmelin, 1788; *Stizostedion volgensis* (Gmelin, 1788).

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Glowacki 1896; Medić 1896, 1901; Ćurčić 1910; Anonymous 1947b; Vuković 1963a, 1977a; Radević 2000; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Dekić *et al.* 2024.

Genus *Zingel* Cloquet, 1817

105. ***Zingel streber*** (Siebold, 1863)

Vernacular names

Mali vretenac. Streber.

Previous names used for the species

Aspro streber Siebold, 1863; *Aspro streber streber* Siebold, 1863; *Aspro vulgaris* Cuvier, 1828.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Anonymous 1886; Glowacki 1896; Medić 1901; Ćurčić 1910; Zaplata & Taler 1932; Vuković 1963a, 1977a; Veljović 1982; Mikavica 1987b; Mikavica *et al.* 1991; Mikavica & Savić 1999; Radević 2000; Korjenić 2004b; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Pavlović *et al.* 2009; Sofradžija 2009; Popović 2010; Drešković *et al.* 2011; Milanović *et al.* 2015; Simonović *et al.* 2015; Kovačević *et al.* 2018; Lukić *et al.* 2016; Dekić *et al.* 2024.

106. ***Zingel zingel*** (Linnaeus, 1766)

Vernacular names

Veliki vretenac. Zingel.

Previous names used for the species

Perca zingel Linnaeus, 1766; *Aspro zingel* Linnaeus, 1766.

Origin and geographic range in BiH

Native. Danube River Basin.

Literature

Glowacki 1896; Ćurčić 1910; Vuković 1963a, 1977a; Kosorić *et al.* 1980; Veljović 1982; Mikavica *et al.* 1991; Mikavica & Savić 1999; Bogut *et al.* 2006; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Sofradžija 2009; Drešković *et al.* 2011; Milanović *et al.* 2015; Simonović *et al.* 2015; Kovačević *et al.* 2018; Nedić *et al.* 2018; Skenderović *et al.* 2020b; Dekić *et al.* 2024.

Family Gasterosteidae Bonaparte, 1831
Genus *Gasterosteus* Linnaeus, 1758

107. ***Gasterosteus aculeatus*** Linnaeus, 1758

Vernacular names

Bodonja. Threespine stickleback.

Previous names used for the species

Gasterosteus aculeatus gymnurus Cuvier, 1829.

Origin and geographic range in BiH

Native. Adriatic Basin.

Literature

Karaman 1928; Taler 1953a; Vuković 1963a, 1977a; Vuković & Prolić 1966; Vuković & Kosorić 1967; Ćemalović 1975; Kosorić 1978; Kosorić *et al.* 1983, 1989; Hećo 2000; Cano *et al.* 2006, 2008; Mäkinen *et al.* 2006, 2008a, 2008b; Mrakovčić *et al.* 2006; Kottelat & Freyhof 2007; Glamuzina *et al.* 2008a; Mäkinen & Merilä 2008; Šanda *et al.* 2008a, 2008b; DeFaveri *et al.* 2012; Hamzić *et al.* 2012b; Tutman *et al.* 2012a; Zanella *et al.* 2015; Coll-Costa *et al.* 2024; Hamzić 2024.

Genus *Pungitius* Coste, 1848

Pungitius platygaster (Kessler, 1859)

Vernacular names

Gregorac. Ukrainian stickleback.

Remarks

Reported from the Danube up to Belgrade (Kottelat & Freyhof 2007). Mentioned in Sofradžija (2009) for the Danube River Basin, but without a more precise distribution area. There is no confirmation of its presence in recent literature, and additional research is needed.

Literature

Sofradžija 2009.

Family Cottidae Bonaparte, 1831
Genus *Cottus* Linnaeus, 1758

108. ***Cottus gobio*** Linnaeus, 1758

Vernacular names

Peš. Sculpin.

Previous names used for the species

Cottus gobio gobio Linnaeus, 1758; *Cottus ferrugineus* Bonaparte, 1846; *Cottus gobio ferugineus* Heckel & Kner, 1858.

Origin and geographic range in BiH

Native. Danube River and Adriatic Basin.

Remarks

Distributed in both the Danube and Adriatic basins. Although genetic analyses conducted by Šlechtová *et al.* (2004) support the existence of a single species in the region, several divergent genetic clades have subsequently been identified (Bravničar 2012; Bravničar *et al.* 2015, 2021; Neuburg *et al.* 2023). Specimens sampled in the upper Neretva River seem to be more related to populations from Danube tributaries in the northern Balkan Peninsula, despite the fact that the Neretva River drains towards the Adriatic Basin (Bravničar *et al.* 2015). Furthermore, Heckel & Kner (1858) described *Cottus ferrugineus* as a species endemic to the Adriatic Basin. Mentioned in Vuković (1977a) and Bogut *et al.* (2006)

as *C. cottus ferrugineus* for the lower Neretva River. However, according to Šlechtová *et al.* (2004), *C. ferrugineus* is not a valid species and therefore is not included in this checklist. Until this situation is resolved, only *C. gobio* is included in the checklist of fishes of BiH.

Literature

Brusina 1892; Glowacki 1896; Langhoffer 1904; Zaplata & Taler 1932; Aganović & Milošević 1959; Smlatić 1961; Vuković 1963a, 1977a; Kiškarolj 1965; Okuka 1966; Čanković 1967; Čanković *et al.* 1968a; Vuković & Ivanović 1971; Aganović & kapetanović 1973; Berberović & Sofradžija 1974b; Kosorić 1974, 1977a, 1981; Sofradžija & Berberović 1975; Kaćanski *et al.* 1977; Kosorić *et al.* 1980, 1983, 1989; Sofradžija *et al.* 1984; Kosorić & Mikavica 1986; Mikavica 1988a; Mikavica *et al.* 1991; Babić & Mikavica 1994; Mikavica & Savić 1999; Radević 2000; Korjenić 2004b, 2005a; Šlechtová *et al.* 2004; Bogut *et al.* 2006; Škrijelj *et al.* 2006; Kottelat & Freyhof 2007; Muhamedagić *et al.* 2008, 2019; Korjenić *et al.* 2009; Sofradžija 2009; Drešković *et al.* 2011; Bećiraj & Šahinović 2012; Golub *et al.* 2012, 2017c; NHMW 2014; Simonović *et al.* 2015; Bećiraj *et al.* 2016; Čičić-Močić 2016, 2018, 2019; Lukić *et al.* 2016; Adrović 2018; Keško 2018; Kovačević *et al.* 2018; Memić 2018; Lolić *et al.* 2019; Dekić *et al.* 2020a, 2020b; Skenderović *et al.* 2020a, 2020b; Neuburg *et al.* 2023.

Cottus poecilopus Heckel, 1836

Vernacular names

Šareni peš. Siberian bullhead.

Remarks

Mentioned in Vuković (1977a) and Bogut *et al.* (2006) but witout any data on its distribution. According to Kottelat & Freyhof (2007), this species is distributed in northern Europe; therefore, previous reports are inaccurate and the species is not included in this list.

Order Centrarchiformes Bleeker, 1859
Family Centrarchidae Bleeker, 1859
Genus *Lepomis* (Rafinesque, 1819)

109. ***Lepomis gibbosus*** (Linnaeus, 1758)

Vernacular names

Sunčanica. Pumpkinseed.

Previous names used for the species

Eupomotis gibbosus (Linnaeus, 1758).

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species from North America. According to EU regulation it is considered an invasive alien species of EU concern.

Literature

Žitnan *et al.* 1969; Vuković 1977a; Kosorić 1978; Obratil 1982; Veljović 1982, 1985; Leiner 1998; Radević 2000; Mrakovčić *et al.* 2002; Trožić-Borovac *et al.* 2003; Škrijelj *et al.* 2005a, 2005b; Bogut *et al.* 2006; Adrović 2007, 2012, 2018; Adrović & Skenderović 2007; Glamuzina *et al.* 2008a, 2017; Has-Schön *et al.* 2008; Muhamedagić *et al.* 2008; Šanda *et al.* 2008a, 2008b; Vuković *et al.* 2008; Sofradžija 2009; Tutman *et al.* 2012a, 2019; Golub *et al.* 2013, 2018a, 2018b; Simonović *et al.* 2015; Skenderović 2015; Ćulibrk *et al.* 2016; Pavličević *et al.* 2016; Mrdak & Milošević 2017; Kovačević *et al.* 2018; Memić 2018; Piria *et al.* 2018; Vesnić *et al.* 2018; Žujo-Zekić *et al.* 2018; Dekić *et al.* 2020a, 2024; Mušović *et al.* 2020; Skenderović *et al.* 2020b.

Genus *Micropterus* Lacepède, 1802

110. ***Micropterus salmoides*** (Lacepède, 1802)

Vernacular names

Pastrmski grgeč. Largemouth bass.

Origin and geographic range in BiH

Non-native. Danube River and Adriatic Basin.

Remarks

Non-native species from North America. The first confirmed record of the species was based on a single specimen captured in the Sava River near the small town of Kaoci (northern BiH) in December 2014 (Tutman *et al.* 2017c). The origin of this introduction is unknown, but it was most likely due to dispersal from neighbouring freshwater habitats from other parts of the Sava River catchment in Croatia and the Danube River in Serbia.

Literature

Radević 2001; Bogut *et al.* 2006; Tutman *et al.* 2017c; Piria *et al.* 2018; Lelo & Hamzić 2020; Hamzić 2024.

Order Acanthuriformes Jordan, 1923
Family Moronidae Jordan & Evermann, 1896
Genus *Dicentrarchus* (Gill, 1860)

ME11 ***Dicentrarchus labrax*** (Linnaeus, 1758)

Vernacular names

Lubin. Sea bass.

Previous names used for the species

Morone labrax (Linnaeus, 1758).

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Occurs in the lower reaches of the Neretva River and the Hutovo Blato wetland, where it enters from the coastal areas of the Adriatic Sea.

Literature

Aganović 1952a; Vuković 1963a, 1977a; Bogut *et al.* 2006; Sofradžija 2009; Tutman *et al.* 2012a.

Family Sparidae Rafinesque, 1810
Genus *Sparus* Linnaeus, 1758

ME12 ***Sparus aurata*** Linnaeus, 1758

Vernacular names

Komarča. Gilthead bream.

Previous names used for the species

Chrysophrys aurata Valenciennes, 1830.

Origin and geographic range in BiH

Native. Adriatic Basin.

Remarks

Present in the lower reaches of the Neretva River and the Hutovo Blato wetland, where it enters from coastal areas of the Adriatic Sea.

Literature

Vuković 1963a, 1977a; Mikavica 1998; Bogut *et al.* 2006; Sofradžija 2009; Tutman *et al.* 2012a.

Discussion

General overview of the taxonomic status of freshwater fishes of BiH

The ichthyofauna of BiH can be clearly divided into a northern Danubian and a southern Adriatic Sea parts (Supp. file 1; Table 1). Geographically, these parts are divided by the central massif of the Dinaric Arc mountains range. The northern part shares many species with Central Europe, while the southern part shares several species with the Mediterranean Basin (Kottelat & Freyhof 2007). The Adriatic Sea Basin features a high rate of endemism and highly specialised species in the relatively short karst watercourses flowing southwards into the Adriatic Sea. *Anguilla anguilla*, *Phoxinus lumaireul* and *Cottus gobio* are the only native species present in both the Danube and Adriatic Sea drainages. Consequently, the freshwater fishes of BiH, including lampreys, are of particular importance as part of the national, regional and European natural heritage, especially due to their diversity and high degree of endemism. This ichthyofaunal diversity is mainly the result of the complex geological and climatic history of the Balkan Peninsula, which has allowed multiple colonisations events from outside the area and long periods of hydrographic isolation of populations, leading to speciation (Hewitt 1999; Šlechtová *et al.* 2004). In addition, BiH stands at the crossroads of the main biogeographical regions of southeast Europe and the Mediterranean Danube River Basin and Adriatic Basin.

According to historical and recent scientific literature, taking into account all taxonomic changes, 123 species of fish have been recorded and confirmed in the freshwaters of BiH. However, when we consider only strictly freshwater species, excluding euryhaline ones, the number is reduced to 110 species. In relation to previous checklists, significant changes are proposed here in terms of composition and number of reported species. The first monograph by Vuković (1963a) reported 103 species, Vuković (1977a) reported 106 species, Bogut *et al.* (2006) reported 116 species, Sofradžija (2009) reported 118 species, whereas the most recent report on the freshwater species of the BiH

(Hamzić 2024) reported 137 species. Such differences can be the consequence of several factors, e.g., introduction of non-native species, taxonomic re-evaluations of existing taxa based on new information, and description of new species. Indeed, with the development of modern biomolecular research, many taxonomic aspects of the BiH freshwater fishes, including lampreys, have changed since the monographs of Sofradžija (2009) and Hamzić (2024), both still in use by ichthyologists.

Among the species reported as occurring in BiH according to our results, 87 are native, of which 38 are endemic, while 23 are non-native. Furthermore, there are 12 euryhaline species and one purely marine species. Amongst the endemic species, 15 were restricted only to the Neretva River catchment in BiH and Croatia, 10 were restricted to the Danube River Basin area, 10 to the broader Adriatic Basin, and three to the Cetina River catchment. A total of 18 species are new records for BiH, and two species were found to have expanded ranges. Thirty-four families and 75 genera are presented in total. The richest in species families are the Leuciscidae with 37 species, and the Salmonidae with 13 species, whereas there are 17 families with only one species represented in BiH (Supp. file 1).

The total number of species known from the Adriatic Basin (83) is slightly higher than that from the Danube River Basin (77) (Fig. 3). This is mostly due to the number of translocated Danube natives (22) and the introduction of non-native species (17) (Glamuzina *et al.* 2017; Vukić *et al.* 2019). Considering only the numbers of native species, the Danube River Basin has more species (57 vs 34 in the Adriatic Basin). However, from the biogeographic point of view, the fish diversity is indeed more unique in the Adriatic Basin where about 80% of the native species are endemic. The Neretva River has the highest species diversity and the Cetina River the lowest, and both are located in the Adriatic Basin (Supp. file 1; Table 1). Although the distinctiveness of fish populations in BiH rivers flowing into the Adriatic Sea has long been recognized (Vuković 1963a, 1977a; Vuković & Ivanović 1971; Vuković & Sofradžija 1987), it is rarely considered in current fisheries policy studies in BiH (Drešković *et al.* 2011). Nevertheless, this high proportion of endemism requires additional confirmation because the taxonomy of several species remains uncertain, such as in the genus of *Salmo* (e.g., Georgiev 2011; Razpet *et al.* 2007).

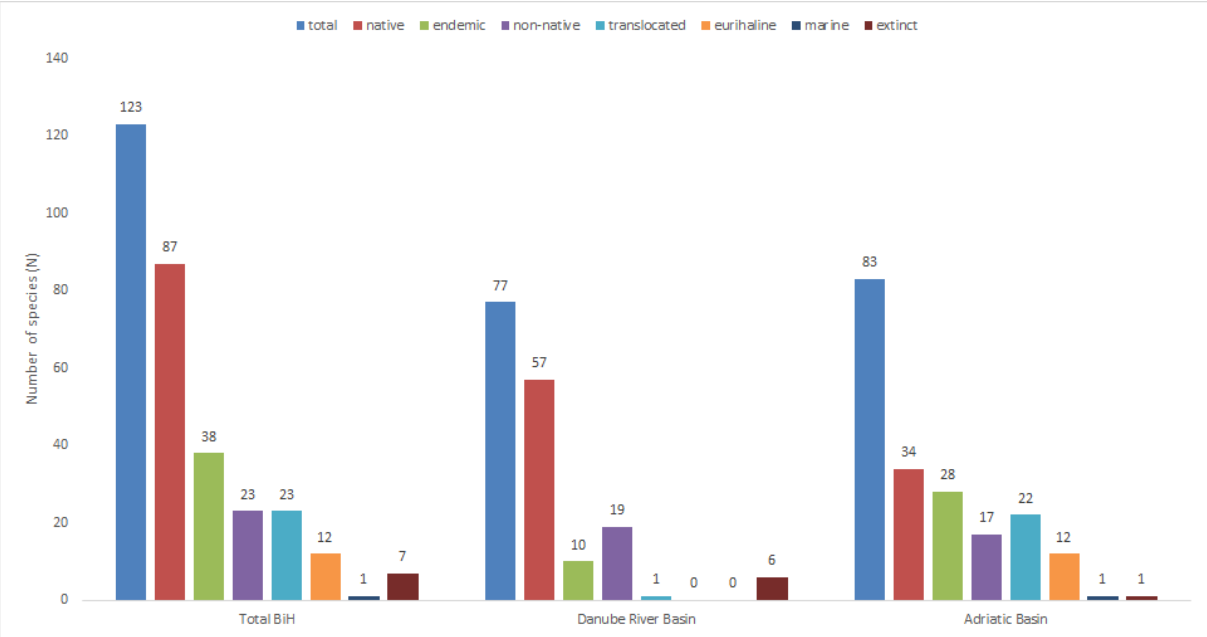

Fig. 3. Number of species presented in both the Danube River Basin and the Adriatic Basin, in Bosnia and Herzegovina.

Native and translocated species

Generally, the ichthyofauna of BiH shows significant differences in biodiversity by catchment basins. Species assemblage inhabiting the Danube River Basin in BiH are similar to the one of the Danube River Basin in Central Europe (Kottelat & Freyhof 2007). Among the 57 native species inhabiting the Danube River Basin, some are particularly interesting, like *Cobitis elongata*, and *Hucho hucho*, mostly recorded in the broader area of the Sava River catchment. The native ichthyofauna of the Adriatic Basin, in turn, is mostly endemic to small parts of the freshwater catchments.

Translocated species recorded in the Adriatic Basin are native species transferred from the Danube River Basin (e.g., *Sander lucioperca*, *Silurus glanis*) (Glamuzina *et al.* 2017). Their occurrence is a result of human intervention, usually the result of legally regulated or unconscionable stocking of target species or accidental introduction during stocking. Some of these species have not established self-sustainable populations, like *Gymnocephalus cernuus*, and *Oncorhynchus mykiss* (Dulčić *et al.* 2005; Glamuzina *et al.* 2017). However, where introduced, translocated species often turned out to be invasive and detrimental to native fish communities (Glamuzina *et al.* 2017).

Endemic species

The freshwater fishes, including lampreys, of BiH is characterised by a considerable species richness and diversity, with the presence of several endemic species with a restricted distribution area, making them more vulnerable to extinction. In total, 38 endemic species have been recorded in the freshwaters of BiH to date (Supp. file 1). At present, four species appear to be endemic only to BiH: *Cobitis herzegoviniensis*, *Phoxinellus pseudalepidotus*, *Telestes dabar* and *T. metohiensis*, all found in the Neretva River catchment (Adriatic Basin). The number of regionally endemic species in BiH is comparable with those in neighbouring countries (Slovenia 12, Montenegro 24, Albania, 43, Croatia 44) (Crivelli 1996). Such an abundance of endemic species in BiH can be primarily attributed to its geographic location and isolation from other European river systems, as well as the complex geologic history and climatic characteristics of the region (Perea *et al.* 2010). The Neretva River catchment, as part of the Adriatic Basin, has a prominent place in the BiH ichthyofauna (Vuković & Sofradžija 1987). This system is comprised of two main catchments, drained by the Neretva and Trebišnjica rivers. The Neretva River catchment has one of the highest endemicity of freshwater fishes in this part of the Balkan Peninsula (Economidis & Bănărescu 1991), housing nearly all the country's endemic species. The discovery of a new mitochondrial CR haplotype of *Cottus gobio* and confirmation of native *Salmo trutta*, *Barbatula barbatula*, and *Phoxinus* sp., by Neuburg *et al.* (2023) highlight the importance of the upper Neretva as a refuge and source of genetic diversity, emphasizing the importance of this stretch of the river as a biodiversity hotspot. Unfortunately, the entire endemic fish assemblage there faces significant conservation threats due to major anthropogenic alterations such as damming processes, habitat degradation, pollution, and the introduction of non-native species (Tutman *et al.* 2012a; Glamuzina *et al.* 2017). Nearly 90% of the endemic species have been categorized as threatened according to the IUCN (2025) (Table 2). According to IUCN (2025), at least ten species are Critically Endangered (CR): *Acipenser naccarii*, *Lampetra soljani*, *Salmo marmoratus*, *S. farioides*, *S. obtusirostris*, *Orsinigobius croaticus*, *Chondrostomus knerii*, *T. metohiensis*, *T. dabar* and *Delminichtys ghetaldii* (Freyhof & Brooks 2011; Bogutskaya *et al.* 2012). *Telestes metohiensis*, *T. dabar* and *D. ghetaldii* migrate underground during the low waters in the summer. Even though these three minnows are adapted to stagnant waters (e.g., Lake Bileća, Hamzić, personal observation), in other parts of their distributional areas there have been major declines in population density, like in the Popovo Polje field. For all these 10 Critically Endangered species little is known about their life history, migration pathways, biological traits and spawning activities. Therefore, more comprehensive ichthyological surveys of these species are necessary, providing a baseline for effective protection measures such as establishing ichthyological reserves, and ensuring adequate habitat for the recovery of their populations. Unfortunately, to date, BiH has not yet compiled a list of threatened species, nor is there a Red

Book of freshwater fishes at the national level, and no strategies have been implemented for conservation or protection of the lampreys and other fish fauna (Tutman *et al.* 2017a, 2017b, 2020a, 2020b).

Recently described species and new records within hydrographic catchments

Recently described lampreys and fish species for BiH freshwaters are *Phoxinellus pseudalepidotus* (Bogutskaya & Zupančič 2003), *Knipowitschia radovici* (Kovačić 2005), *Alburnus neretvae* (Buj *et al.* 2010), *Telestes dabar* (Bogutskaya *et al.* 2012), *Cobitis herzegoviniensis* (Buj *et al.* 2014), *Phoxinus karsticus* (Bianco & De Bonis 2015) and *Lampetra soljani* (Tutman *et al.* 2017a). These recent discoveries indicate how diverse and remarkable the freshwater ichthyofauna is in BiH, and suggest that there is still more to be discovered in the lakes, rivers and wetlands of the country. Those species were described by 17 scientists from eight European countries, without the participation of scientists or scientific institutions from BiH. Although BiH has not yet ratified the Nagoya Protocol, procedures regarding the permissions for field work, sampling, and transboundary export of BiH natural resources (as whole individuals, tissues, or extracted DNA) are prescribed by law. Even though international collaborations are beneficial as they decrease the knowledge gap concerning biodiversity in BiH, it is important that all research groups strictly follow national legal requirements and do not take advantage of the country's porous borders. Foreign scientists should adhere to the principles of responsible research and respect BiH's right to fair access and benefit sharing resulting from its resources.

For some species, like gobiids, it seems that the lack of adequate sampling techniques has resulted in this group being previously overlooked in the freshwaters of BiH (Šanda & Kovačić 2009; Tutman *et al.* 2009a, 2012b, 2013, 2021). Here, we provided new knowledge about the distributional range of some species of the family, again reinforcing that more studies on the group are necessary in BiH.

Non-native species

The introduction of non-native freshwater fish species induced by humans potentially represents one of the most serious threats to biodiversity and ecosystem integrity in different parts of Europe (Ribeiro & Leunda 2012; Costa *et al.* 2021) and the world (Clavero & García-Berthou 2005; Helfman 2007). Non-native species have been implicated in the decline and extinction of native freshwater fauna worldwide and are considered a major threat to biodiversity (Taylor *et al.* 1984; Lever 1996). These species usually have a high potential for dispersion and occupy niches of native species due to their competitive advantages and the absence of predators (Kolar & Lodge 2001). They are often blamed for adverse ecological impacts on native fishes such as competition for food and space, predation, import and spread of pathogens and parasites, habitat alteration, and even their extinction (Bernery *et al.* 2022).

Currently, 23 non-native fish species are recorded in BiH freshwaters (Supp. file 1). The fact that the number of introduced species in the Neretva River catchment (17 non-native and 18 translocated) is the same as the number of native freshwater species (35) ever recorded in the Adriatic Basin and higher than the number of endemic species (28) is particularly alarming (Vukić *et al.* 2019). As with most aspects of BiH freshwater fish biogeography, the ecology and conservation impacts of non-native species are largely unknown. Most non-natives were introduced to benefit the commercial value of waters in freshwater fisheries (e.g., *Hypophthalmichthys molitrix*, *H. nobilis*, *Micropterus salmoides*) or for aquaculture purposes (e.g., *Onchorhynchus mykiss*, *Salvelinus alpinus*, *S. fontinalis*). A recent example of such an introduction is *Coregonus peled* (Hamzić *et al.* 2011). In addition to intentionally stocked species, several other species were likely introduced accidentally due to poor regulation and control. This includes *Lepomis gibbosus*, *Carassius gibelio* and *Pseudorasbora parva*, which have spread widely and potentially pose the greatest threat to native species, especially in the Adriatic Basin (Glamuzina *et al.* 2017). Non-native species have experienced different fates in the region, but some have established self-sustaining populations, such as *L. gibbosus*, *P. parva* and *Leucaspius delineatus* (Glamuzina *et al.* 2017). Introductions continue to this day,

and *Carassius langsdorfi* (Kalous *et al.* 2012), for instance, is now present in the Adriatic Basin, whereas *M. salmoides* (Tutman *et al.* 2017c) is recorded in both the Adriatic and Danube Basins.

Taxonomic considerations

Many unresolved challenges concerning the phylogenetic placement and taxonomic validity of several fish species still remain, highlighting how still insufficiently is our knowledge on the BiH freshwater fish fauna. This is specifically true for the species of the Adriatic Basin, which is rich in endemics (Palandačić *et al.* 2015, 2017; Reier *et al.* 2022; Lukač *et al.* 2023, 2024). Advancing the phylogeny and taxonomy of the genera *Alburnus*, *Delminchthys*, *Phoxinus*, *Rutilus*, *Telestes*, *Squalius* and *Salmo*, which are widespread in the karst area of eastern Herzegovina (Ketmaier *et al.* 2004; Buj *et al.* 2017, 2020a, 2020b, 2022; Charmpila *et al.* 2025), has been a long-standing task. The taxonomic status of the genera *Gobio* and *Romanogobio* (Takács *et al.* 2014; Zangl *et al.* 2020), as well as the *Barbatula* (Calegari *et al.* 2025) from the Danube Basin also requires a thorough revision.

The taxonomic status of the populations of *Alburnus* in BiH has also not yet been resolved (Buj *et al.* 2010; Vucić *et al.* 2017). The population from the Neretva River catchment is now recognized as a distinct species *A. neretvae*; therefore, it seems that *A. arborella* is likely absent from BiH (Buj *et al.* 2010). Additional systematic research is also necessary for the populations in the Sava catchment, Danube Basin (Vucić *et al.* 2017). Furthermore, the taxonomy of *Rutilus* and species of the Leuciscinae of northern Italy, the Western Balkans, and southern Greece has not been comprehensively studied (Ketmaier *et al.* 2008). A significant intraspecific difference within southern European roaches was noticed (Bianco & Ketmaier 2014; Geiger *et al.* 2014), and the taxonomy of the genera *Rutilus* and *Leucos* is debated with no agreement on the validity and distribution of their species (Petrosino *et al.* 2022). There is a lack of consensus regarding the validity of several species inhabiting the freshwaters of the Western Balkans and BiH (Geiger *et al.* 2014). Subpopulations occurring in this region are either treated as separate, locally endemic species such as in *Telestes*, *Rutilus*, i.e., *R. basak* from the Neretva River system (Geiger *et al.* 2014; Buj *et al.* 2017, 2020a, 2022; Petrosino *et al.* 2022), or considered as being merely subpopulations of more widespread species, such as *Leucos basak* (Bianco & Ketmaier 2014; Pietrock *et al.* 2022). Further research is indeed needed because at present molecular analyses do not fully support their separation into distinct species (Perea *et al.* 2010; Geiger *et al.* 2014; Schönhuth *et al.* 2018).

A similar situation has been observed with the species previously belonging to the genera *Phoxinellus* and *Paraphoxinus*, which were later divided into the genera *Delminichthys* and *Telestes* (Palandačić *et al.* 2015, 2017, 2024; Reier *et al.* 2022; Lukač *et al.* 2023, 2024). However, according to molecular data some specimens identified as *T. dabar* actually represent *T. metohiensis* (Buj *et al.* 2017), while Reier *et al.* (2022) recognized both species as distinct based on molecular data. Therefore, this taxonomic question needs to be more fully clarified and the validity of the *T. dabar* population in the Dabarsko Polje should be properly tested.

Another taxonomic puzzle includes the populations of *Phoxinus phoxinus* sensu lato. According to Kottelat & Freyhof (2007), two species of European minnow occur in the western Balkan Peninsula, with *P. phoxinus* in the Danubian and *P. lumaireul* in the Adriatic part of the peninsula. However, more recent evidence indicates high levels of molecular and anatomical diversity in both species (Palandačić *et al.* 2015). This finding indicates that a multispecies complex of *Phoxinus* is present (Palandačić *et al.* 2015, 2017, 2020; Vucić *et al.* 2018). Neuburg *et al.* (2023) confirmed that the minnows from the upper Neretva River belong to clade 2 of Palandačić *et al.* (2015), comprising populations from the lower Sava catchment (Danube Basin) and rivers flowing directly into the Adriatic Sea (Adriatic Basin) (Palandačić *et al.* 2015, 2017, 2020). The occurrence in the same Basin of two other species of this genus, *P. ketmaieri* and *P. karsticus*, was proposed based only on anatomy. However, Palandačić *et al.* (2017) concluded that *P. ketmaieri* is not valid based on molecular species delimitation techniques, and *P. ketmaieri* was synonymised with *P. lumaireul*. They also concluded that *P. karsticus* forms a clearly distinct group in both mtDNA analysis and RAG1 networks. The same

authors further indicate that, due to taxonomic complexities of the genus *Phoxinus*, species descriptions and synonymisation in the genus should ideally include morphological and molecular data. In sum, more research is needed to confirm the presence of *P. carsticus* in BiH.

A similar complex taxonomic situation is present in the case of the species previously identified as *Salmo dentex* (Snoj *et al.* 2010). The validity of *S. farioides* has always been questionable due to inadequate original descriptions, rare records and the absence of type specimens (Kottelat 1997). Analysis indicates that the trouts of the Neretva River are genetically heterogeneous, with the single exception of members of *S. obtusirostris*, which have its own distinct set of mtDNA and nuclear DNA markers (Razpet *et al.* 2007).

Furthermore, *Knipowitschia radovici* is a relatively recently described stenoendemic species that inhabits only the lower Neretva River catchment in Croatia (tributary Norin River; Kovačić 2005) and BiH (Hutovo Blato wetland; Šanda & Kovačić 2009; Tutman *et al.* 2013). However, in a recent study that applied molecular tools, Tougard *et al.* (2021) provided new evidence that among the endemic Adriatic species of *Knipowitschia*, *K. panizzae*, *K. radovici* and *K. mrakovcici* were genetically highly similar, although they are regarded as distinct species based on morphology. Based on the high genetic similarity and species delimitation tests, they proposed that *K. radovici* and *K. mrakovcici* are junior synonyms of *K. panizzae*.

Threats, legislation and protection

Regarding nature protection in BiH, the competence lies in both the Federation of Bosnia and Herzegovina and Republic of Srpska, in addition to the Brčko District as three political entities of BiH. Implementing international laws is a competence of the Ministry of Foreign Trade and Economic Relations of BiH at the state level. The Red Lists of Fauna are adopted at the entity level. The Red List of the fauna of the Federation of BiH (Official of the Federation of Bosnia and Herzegovina 7/14) contains 115 freshwater and marine fishes. Considering exclusively freshwater fish species, seven were classified as Critically Endangered (CR), 16 as Endangered (EN), seven as Vulnerable (VU), and seven are Data Deficient (DD) (Škrijelj *et al.* 2013; Dekić *et al.* 2024). The Red List of Protected Species of Flora and Fauna of the Republic of Srpska lists two species of lampreys and 46 species of actinopterigians without clear threat categories (Dekić *et al.* 2024). Unfortunately, the national assessment of the threat risk of several species of fish in BiH has not yet been thoroughly carried out, and no conservation strategies or protection measures have been implemented. More detailed information can be found in Dekić *et al.* (2024). However, a global assessment following IUCN criteria has been conducted for the majority of BiH fishes (Table 2). *Anguilla anguilla* is classified as Critically Endangered (CR), while 15, mostly endemic species, in BiH are considered Endangered (EN) according to the IUCN, with a significant anthropological impacts threatening their conservation. All of them are regionally endemic with a restricted range, distributed in a single river, river catchment or in several localities in a very small area (Buj *et al.* 2014, 2015a, 2015b), implying the necessity of immediate effective protection. Furthermore, according to the *Regulation on strictly protected and protected wild species* (Official Gazette of the Republic of Srpska 65/20), there are 31 species of fishes that are in the category of Strictly Protected, and 20 species that are in the category of Protected in the Republic of Srpska. In comparison, nine fish species are Strictly Protected, and 13 species of fish are Protected in the Federation of Bosnia and Herzegovina following the *Rules on protection measures for protected and strictly protected species and subspecies* (Official Gazette of the Federation of Bosnia and Herzegovina 21/20). The conservation of protected and strictly protected wild species, except for species protected by fishing regulations, is implemented by prohibiting the use, destruction, and undertaking of all activities that may endanger these species and their habitats, as well as by undertaking measures and activities to manage populations (Dekić *et al.* 2024).

Water pollution and habitat loss through modification of river substrates are among the major threats to freshwater fishes, including lampreys, in BiH (Hamzić, 2002; Tutman *et al.* 2017b, 2020a, 2020b, Palandačić *et al.* 2024). The introduction of non-native species, especially predatory ones, can be added to these threats

(Kosorić & Kardoš 1955; Glamuzina *et al.* 2017; Dekić *et al.* 2024; Hamzić 2024; Palandačić *et al.* 2024). The construction of hydroelectric dams along the Neretva, Drina and Vrbas rivers since the 1950s has altered the natural flow and sedimentation regimes and potentially blocked migration routes, fragmented subpopulations, and markedly reduced the extent of habitat suitable for all life stages (Glamuzina *et al.* 2017). Diffuse and point source agricultural, domestic and industrial pollution have resulted in eutrophication or discharge of toxic substances at some locations (Has-Schön *et al.* 2008). The industrial extraction of riverine gravel and sand for urban development has taken place since the 1970s, causing additional impacts on river bed and habitat degradation in areas such as the Mostarsko blato that affected the life cycle of several species (Glamuzina *et al.* 2017). Additional threat to the lower Neretva River is the intense saltwater intrusion as a result of hydrological regime changes of freshwater inflows, which can cause increased intake of brackish and marine organisms (Tutman *et al.* 2021). The Hutovo Blato wetland is potentially the most endangered habitat for a number of endemic species of fish. Although no specific conservation actions are in place, part of the range of some species lies within the boundaries of protected areas like Hutovo Blato wetland in the lower Neretva River catchment (Tutman *et al.* 2002, 2006, 2008a, 2009b, 2012a, 2012c, 2018, 2019) and the Blidinje Nature Park (Carosi *et al.* 2024), which have been included in the EU Natura 2000 network. Despite numerous ichthyological surveys conducted in the region of the Danube River and the Adriatic Basin, there are substantial gaps in the knowledge of the current taxonomic status and geographical distribution of freshwater fishes, including lampreys, in BiH. Except for Dekić *et al.* (2024) and Hamzić (2024), no information has been presented to address the vulnerability of threatened endemic species in BiH.

Despite the new information presented here, the knowledge of the taxonomy and distribution of several freshwater fishes in BiH remains insufficient. In particular, data on the biology and ecology of most endemic species and their distribution in BiH is very scarce and based on general notes and historical data. Given these gaps, this study can in no way be considered a definitive checklist of the freshwater fishes, including lampreys, of BiH, though hopes are that the data presented herein will serve as the foundation for further analysis and conservation actions. This highlights the importance of establishing conservation measures, considering the high faunistic and scientific value of the species inhabiting the BiH freshwaters (Tutman *et al.* 2017b, 2020a, 2020b).

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Supplementary file

Supp. file 1. List of all lampreys and other fish species recorded in freshwaters in Bosnia and Herzegovina according to literature to date. https://doi.org/10.5852/ejt.2026.1042.3201.14209