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## **Allochthonous Ichthyofauna of Certain Water Bodies in North-Eastern Bosnia**

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**Abstract:** Researches on fish diversity in North-Eastern Bosnia have been intensified in the last few years, and they have included several flowing rivers and two reservoirs. Ichthyological investigations were performed on the Gostelja, Spreča, Tinja and Brka rivers and the hydro reservoirs of Modrac and Sniježnica. During the research relatively wide fish species diversity was noted, and the presence of allochthonous species of the *Salmonidae*, *Cyprinidae*, *Ameiuridae* and *Centrarchidae* families was registered. There were the Prussian carp and the pseudorasbora of the *Cyprinidae* family; the rainbow trout of the *Salmonidae* family; the brown bullhead of the *Ameiuridae* family; the perch – *Percidadae* family; the pumpkinseed – *Centrarchidae* family. All of these registered allochthonous species have large habitats in Bosnia & Herzegovina, and in the broader region.

**Key words:** ichthyofauna, allochthonous fish, Bosnia.

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### **Introduction**

Allochthonous species are the ones distributed off the area of their natural habitat of their evolution. The presence of other species can be accidental or deliberate, but it is often the cause of extinction of autochthonous species.

During the 60's and 70's of the last century, the introduction of new species was very common in the world. Sometimes these new species would become extinct due to local predator aggression, unsuccessful adaptation or lack of free ecological environment. In other cases, when the new fish adapted to new life conditions, they were observed to affect the number of allochthonous species, in such a manner that they changed the existing fish species. Sometimes the new was a predator, over

domicile species, over roes and sometimes they affected the structure of the whole ecosystem. A special issue is the possibility of bringing other organisms with new fish, for example ecto and endo parasites or infected fish.

The researches on the allochthonous fish of Bosnia & Herzegovina showed that the region was extremely rich and of importance being reflected in the existence of numerous endemic forms. This fact should be yet another reason to do something about the issue of allochthonous species in our country so as to avoid the loss of such rich endemic genofund.

Researches of allochthonous fish in Bosnia & Herzegovina have not gained deserved attention, which is manifested in a relatively small number of published papers on this issue. This is the reason why it is important to mention a paper by Masovic (2000) dealing with allochthonous fish species in the Neretva River reservoir and the one by Skrijelj and Masovic (2001) defining and describing the perch population in the same area.

A greater number of allochthonous fish researches of various rivers in the north-eastern Bosnia region have been conducted in the last few years (Adrovic, 2002., Skenderovic, 2003). During this researches many allochthonous fish were registered. With the facts mentioned in mind, a list is made here of registered allochthonous fish species and basic figures of their origin, biology and ecology.

### **Materials and Methods**

The investigations of the rivers in the north - eastern Bosnia region were conducted over the period 1999-2006. The rivers were as follows: Brka (Adrovic & Ibrisimovic, 2001.), the upper course of the Spreca from the Modrac reservoir (Skenderovic, 2003), the lower course, downstream of the Modrac (Sofradzija et al., 2003), and the artificial reservoirs of Sniježnica (Skrijelj et al., 2005), Tinja (2005), (unpublished figures) and a research of the Modrac is underway. Apart from the actual research figures, available references on the rivers mentioned were taken into consideration (Zelinka, 1971., Habekovic et al., 1981).

The river material was collected by an aggregate, used in electro-fishing, «ELT 61 II» - 300/500 V, and the Modrac material was collected using gillnets of 30 x 1.5 meters and with the OKAC range of 30 x 30 mm, barracudas 32 x 2 meters and with the mesh size of 25 x 25 mm and 32 x 6.5 mm and with the mesh size range of 35 x 35 mm. The fish were fixed in 4% mixture of formalin, and later determined according to a fish determination key (Vuković and Ivanović, 1971., Kryštufek and Janžeković, 1999., Simonović, 2001). Lab processing of the ichthyological sample involved determination of the diversity and quantity of ichthyopopulation whereby the quantity of allochthonous species and their plural and singular numbers in each ecosystem researched were determined. From available ichthyologic literature figures were collected on basic biosystematics features of registered allochthonous species, their biology, ecology and the distribution in the waters of surrounding countries.

## Results and Discussion

The research showed that the ichthyofauna of North -Eastern Bosnia included species belonging to three fish families: *Salmonidae*, *Cyprinidae*, *Ameiuridae*, *Percidae* and *Centrarchidae*. (Table 1).

Among the 16 fish species living in the upper course of the Spreča river (Skenderović, 2003), the pikeperch was the allochthonous species registered. The whole number of caught fish was 769, with only two perch individuals recorded (0, 26%). At the same time, importantly, no allochthonous fish species were registered in the lower course of the Spreča, downstream of the Modrac reservoir. The sample consisted of 118 fish individuals (Sofradžija et. all., 2003). 21 fish species were found to live in the Gostelja River (Adrović, 2002) three of which were allochthonous species: the rainbow trout, the pumpkinseed and the Prussian carp. In the sample of 2438 individuals there were only two rainbow trout (0.09%), four Prussian carp (0,18%) and 13 pumpkinseed individuals (0.54%).

The Brka river was inhabited by 10 fish species (Ibrišimović and Adrović, 2006), and a single allochthonous species – the pseudorasbora. The ichthyo-sample consisted of 911 individuals of various fish species, and a single pseudorasbora individual which was 0.11%.

The Sniježnica hydro reservoir was inhabited by 11 fish species (Škrijelj et al., 2005), two of which were allochthonous ones: the Prussian carp and the pumpkinseed. In the whole sample of 598 individuals 22 Prussian carp (4.40%) and 16 pumpkinseed (3. 20%) were registered.

Table 1. Allochthonous species registered in the waters of North-Eastern Bosnia

Family	Fish species
Salmonidae	<i>Oncorhynchus mykiss</i> (Walbaum, 1792)
Cyprinidae	<i>Carassius auratus</i> (Linnaeus, 1758)
	<i>Pseudorasbora parva</i> (Schlegel, 1842)
Ameiuridae	<i>Ameiurus nebulosus</i> (Le Sueur, 1819)
Percidae	<i>Sander lucioperca</i> (Linnaeus, 1758)
Centrarchidae	<i>Lepomis gibbosus</i> (Linnaeus, 1758)

There are only fragmented figures about the ichthyofauna of the Modrac reservoir (Zelinka, 1971), and this paper gives data on three allochthonous species present: Prussian carp, pumpkinseed and pikeperch. It gives information on introducing new individuals of Prussian carp and pikeperch, without providing information on the time of this process or the origin of the individuals. The same author notes that Prussian carp and pumpkinseed are present in this reservoir but not in great numbers.

Habeković et.al. (1971) present data on the Modrac ichthyofauna content. According to them, there are 17 registered species one of which, the pikeperch, is an allochthonous one. Of the 1910 registered species, there are 73 individuals of perch (3.83%).

Habeković et al. (1981) provide information on perch population in the Modrac. They classify the water of this reservoir as a typical perch habitat.

***Elements of biology, ecology and origin of allochthonous species***

Family: *Salmonidae*

Brown trout – *Oncorhynchus mykiss* (Walbaum, 1792)

Biosystematics diagnosis: (D II-IV 10-11; A II-III 8-10; *l.l.* 125-160) 135  
150 (100 - 150)

The back part of the upper jaw extends to the back edge of the eye. Gill rakes are of moderate length and their number varies from 16-22 on the first bow. There are 15-16 scales between greasy fin and side line. The body is multi-coloured; the back is dark grey, sides are brighter and stomach is most often silver. There are big black spots on grease and tail fin. Along body sides there are red-orange stripes, which are very visible on males in the mating period. The fish grows up to one meter long and up to seven kilograms of weight. This fish is carnivore and feeds on organisms from the bottom, shrimps, insects (youngsters) and fish (older fish).

Under autochthonous conditions the mating period is from the beginning surface, in which fish makes a small hole with its tail and lays 1000-5000 roes.

Californian trout is one of the most famous and mostly grown of salmonidae fish. For growing purposes this fish was introduced to Europe in 1882, when first roes were imported directly from California. Several years later, in 1890, it was brought to Studenac near Maribor, then to Kraljičin Zdenac near Zagreb, in 1952, where it was grown. There are two types: stationary, which was firstly introduced and migratory.

In 1894 on the Spring of Bosnia River, a big spawning place was built and introduced with Californian trout. After that, in 1938, it was transferred to Krupa on Vrbas, near Banja Luka (Aganović, 1979), and later on to other parts of Bosnia and Herzegovina. According to available information (Hamzić, 2003) there are 30 different fish growing places of various types in Bosnia and Herzegovina.

The Californian trout originates from cold rivers of North America, where it is spread from Mexico to Alaska. Californian trout in Bosnian and Herzegovina rivers originates from the McCloud River, Kern River and Klamath River and other tributaries of the Sacramento River.

Californian trout is very tolerant to variation of life conditions. This is why it managed to adapt to the life conditions of rivers and lakes in our country. It is known for a fact that this species inhabits the Neretva, Vrbas, Drina, Una, Sana, Trebišnjica, Gostelja (Adrović, 2002), Spreča (Skenderović, 2003). It also lives in the waters of the Livanjsko and Duvanjsko field, Hutovo mud, Buško Lake and Klinje Lake.

It is widely spread in the waters of Serbia and Montenegro (Simonović 2001), Croatia (Opačak et al., 2006), Slovenia (Povž, 1998).

Family: *Cyprinidae*

Prussian carp – *Carassius gibelio* (Linnaeus, 1758)

Biosystematics diagnosis: (D III-IV (14) 15- 19; A II-III 5-6; *l.l.* 28-33)

The primal homeland of this fish species are waters of the Far East (China) from where the distribution area spread to wider area of waters of Siberia (1948) and to Eastern and Western European waters and the Skadarsko Lake (Vuković, 1973) which it entered from the waters of Albania. Later research proved that Prussian carp spread to open waters of Srem, Banat, Slavonia, Podravina and it was also registered in Sava River. (Skrijelj, 1990/91).

In Bardača fishery, the presence of Prussian carp was registered for the first time in Bosnia and Herzegovina; in 1972. This species was also mentioned in Mikavica research of the Bardača (Mikavica, 1989). Its presence was also registered in the Neretva (Vuković, 1982) which was confirmed by the research of the Jablanica reservoir (Škrijelj, 1989/90), (Mrakovčić, 1996, 2006).

It is also medley spread in the waters of Serbia (Simonović 2001, Marković and Jurakić, 2006), Montenegro (Drecun 1985), Slovenia (Povž, 1998, 2005).

*Pseudorasbora* - *Pseudorasbora parva* (Temminc et Schlegel, 1846)

Biosystematics diagnosis: D III (8); A II – III (6); P I 11 – 12; V (6) 7;

*l.l.*(32)33 – 39 (40) 5-6/3-4;D.phar.5-5 (6-5);2n = 50;Vert. (31) 32 – 34 (-36)

The *Pseudorasbora* is a small fish, autochthonous for waters of Japan, China, Korea and Amur River basin (Vuković,1977), (Kryštufek and Jaženkovič, 1999). The body is quite sadly flat, extended, covered with big, dark scales. From the front part of the head, over the eyes and the whole length of the body, along the sides, there is a dark stripe, harder to see on darker males. The back is black, the sides are silver and the stomach is white. The head is conical. The mouth is upper, small, wide and without mustache. The lower jaw is slight stuck out comparing to the upper one. There are small teeth on jaws. Pharynx teeth are in one line. Peritoneum is silver. In the mating period on males head there are thorn swellings. On dorsal and anal fins there are dark freckles. They live in flush in still and slow waters.

The *pseudorasbora* reaches 9 - 11 centimeters of length. It feeds on plankton, insects, organisms from the bottom and other fish eggs. They spawn during spring and summer, and they lay up to 3000 eggs on tick vegetation. Fish becomes sexually mature with one year of age. It has no economical significances and it came into our waters accidentally. The presence of *pseudorasbora* in our waters has been registered in the Black Sea waters: fisheries of Bardača (Mikavica, 1989), Brka river (Adrović and Ibrišimovic, 2005).

The *pseudorasbora* is widely spread in the waters of neighboring countries. In Serbia (Simonović, 2001) in the waters of Vojvodina the Danube, (Lakić, 2000), the Sava, the Tisa, the Morava, as well as in the waters of south –western Serbia. In Montenegro it is registered in the Šasko lake (Knežević, 1977). In Croatia, it is present in the Sava and in its tributaries and in the Lonjsko field (Zanella, 2000). In Slovenia it is present in the waters of the Danube basin (Kryštufek and Janžekovič, 1999).

Family: *Ameiuridae*Brown bullhead - *Ameiurus nebulosus* (Le Sueur, 1819)

Biosystematics diagnosis: D I 7; A I 17- 28; P I 8-9; V 8; C 19.

The body of the American brown bullhead is bare without scales. The head is wide; mouth is terminal and there are eight moustaches around them. There is hard thorn in back and chest fins. Behind a back fin there is a little fin aligned with the lower part of the anal fin. The back edge of the tail fin is flat or cut. Side line is complete. The body is dark brown on top, and white and yellow in the lower part. It lives in muddy bottoms of slow and still waters, where it feeds on insects, roes and young fish. It spawns in soaring with body length of 8-10 centimeters and water temperature of 18-20 degrees of Celsius. The female lays roes (4 - 5000, depending on female size) on buttons in small holes under plant roots. Roe diameter is 3 millimeters, and growth in ovo lasts 4-6 days. Both parents look after roes and offspring. This North American species originates from Mississippi. It is very resistant and can survive difficult life conditions, such us back of water or low level of oxygen in water. This species was introduced into our area in the beginning of the 20th century (Vuković, 1977). It was spread into the waters of the Balck Sea basin and accidentally brought into the Hutovo mud, where it successfully adapted.

This species has not been found in the rivers studied, but it is present in the Modrac reservoir, where it is highly abundant (Adrović, 2006. unpublished). Local fishermen have provided data on young fish flocks which can be seen in spring months in various parts of accumulation. There are no written information on the way this species entered the Modrac reservoir. This species is widely spread in neighboring countries.

In Serbia, it is present in the waters of Vojvodina and the Morava basin (Simonović, 2001). In Croatia, it is also widely spread (Mrakovčić 2006) and there are some indications that the canal brown bullhead is also spread in Croatian waters. This species also lives in the waters of Slovenia, the Danube and the Adriatic basin (Kryštufek and Janžeković, 1999). The same authors note that this species is spread in the Sava, Mura, Drava, Kupa, Krka and Soča rivers. Povž et al. (1998), however, have not found the brown bullhead in the Kupa.

Family: *Pericidae*Pikeperch - *Sander lucioperca* (Linnaeus, 1758)

Biosystematics diagnosis: D1 XIII; D2 I-III 19-24; A II-III 10-14;

l.l. 80-95; 2n = 48

The perch body is flat on the sides and covered with small scales. Back and back fins have visible dark stripes. Mouths are big and terminal and upper jaw reaches a vertical of the front eyes edge. There are strong and sharp teeth in jaws. It lives in dear waters with lower oxygen concentration than 7 mg/l and water temperature between 10 and 18 degrees of Celsius. The spawning period is in spring; the males take care of roes and offspring. The perch is widely spread in the waters of Asia from the Caspian Lake to the Baltic Sea and in the lakes of Finland, to 64 degrees North longitude. Due to relatively fast growth and tasteful

meat, the perch is often used in introduction. This species is spread in rivers and reservoirs of northeastern Bosnia (Skenderovic, 2003), and in the Neretva reservoirs (Škrijelj and Mašović, 2001).

Family: *Centrarchidae*

Pumpkinseed - *Lepomis gibbosus* (Linnaeus, 1785)

Biosystematics diagnosis: D X (IX-XI) 10-12; A III (9- ) 10-11; V15-7; l.l. 35-45; 2n=48.

It is a fresh water species inhabiting the waters of North America from Big lakes to Florida. Its body is distinctively coloured, and this is the reason why it is very renowned as an aquarium fish. From aquarium cultivation, it spread into fisheries where it makes huge damage because it feeds on roe and other fish. In ex-Yugoslavia, it entered the Danube from some fisheries, and later in 1997 it was brought into waters of Lika. Body is high; flattened on sides, having vivid colors. The biggest height can fit 1 to 2 times into a length of a body. It grows up to 10 - 15 (extremely to 20 centimeters). There are small teeth on scale gill cover.

On a prolonged scale gill cover there is a black stain which is brighter or completely absent on females. On the front part side line is making a slight arc. This species is present in all waters of North-Eastern Bosnia (Adrović, 2002, Skenderović, 2003). There are many figures that prove how this species is widely spread and adapted in all waters of Bosnia and Herzegovina.

### Conclusion

The available data on the allochthonous ichthyofauna of North-Eastern Bosnia denote that there are six registered allochthonous fish species in rivers and reservoirs. For most of them there is not enough valid information on the date and manner of introduction into the waters of the area studied, nor there is information about damages they make to allochthonous ichthyofauna.

Having in mind the fact that previous researches could not be applied to this target group, they should be more focused on this issue for several reasons, the main one being the preservation of the specificity and richness in the species diversity, in Bosnia and Herzegovina, on one side, and the provision of more regular information on the introduction of new allochthonous species into the Central European waters, on the other.

### References

- Aganović, M. (1979): Salmonidne vrste riba i njihov uzgoj. Svjetlost, Sarajevo.
- Adrović, A. (2002): Populacije riba rijeke Gostelje. Magistarski rad. Prirodno – matematički fakultet, Sarajevo.
- Ibrišimović, Safija & Adrović, A. (2005): Biodiverzitet i longitudinalna distribucija riba u rijeci Brki. Zbornik radova PMF – a, 2, 1 – 7. (In press).
- Cakić, P., Arambašić, M. B., Lendhardt Mirjana (2000): Saprobiological Analysis of the Danube Riwer near Belgrade (Višnjica – Vinča Section, rkm 1161 -

- 1146) Based on Ichthyological material, According to different Classifications in the Period 1992 – 1997. Limnological Reports, Vol. 33 (331 - 336). Osijek.
- D r e c u n, Đ. (1962): Rasprostranjenje i popis slatkovodnih riba Crne Gore. Hidrobiologia montenegrina, T. II, N<sub>0</sub> 1, Titograd.
- H a b e k o v i ć, D o b r i l a, P o p o v i ć, J., H o m e n, Z. (1982): Neke značajke populacije smuđa (*Stizostedion lucioperca* L.) u jezeru Modrac. Ekologija, Vol. 17, br. 1. (65 – 75).
- H a b e k o v i ć, D o b r i l a, H o m e n, Z., P o p o v i ć, J. (1981): Ihtiofauna akumulacijskog jezera «Modrac». Ribarstvo Jugoslavije, Zagreb. 1 (4 - 7).
- H a m z i ć, A. (2003): Akvakultura u Bosni i Hercegovini. Coron's, Sarajevo.
- K r y š t u f e k, B., & J a n ž e k o v i ć, F. (1999.): Ključ za določevanje vretenčarjev Slovenije. DZS, Ljubljana.
- M a r k o v i ć, G., J u r a k i ć, Ž e l j k a (2006): Ekonomski značaj alohtonih vrsta riba u akvakulturi Srbije. Eko-konferencija 2006, Novi Sad (277-282).
- M r a k o v č i ć, M., K e r o v e c, M., M i š e t i ć, S., S c h n e i d e r D a n i e l a, T o m a s k o v i ć, N., Š u r m a n o v i ć, D. (1996): Ichthyofauna of the Drava River (Croatia). Limnologische Berichte Donau, Baja / Ungarn. (345 - 348).
- M r a k o v č i ć, M., M i š e t i ć, S. (1995): Status of freshwater fish in Croatian adriatic River Systems. Biological conservation 72 (179 - 185).
- M r a k o v č i ć, M., M i š e t i ć, S., P o v ž, M e t a (1995): Status of freshwater fish in Croatian river systems. Biological conservation, 72 (179 - 185).
- M r a k o v č i ć, M., B r i g i ć, A n d r e j a, B u j I v a n a, Č a l e t a, M., M u s t a f i ć, P., Z a n e l l a, D. (2006): Crvena knjiga slatkovodnih riba Hrvatske. Ministarstvo kulture i Državni zavod za zaštitu prirode Hrvatske, Zagreb.
- M i k a v i c a, D. R a d e v i ć, M., G r u j i ć, R., S a v i ć, N. (1989): Ihtiofauna hidrografskog područja Bardača. Društvo ekologa Srbije.
- M a š o v i ć, M. (2000): Istraživanje alohtonih ribljih populacija u neretvanskim hidroakumulacijama. Magistarski rad, Prirodno – matematički fakultet Sarajevo.
- O p a č a k, A., F l o r i j a n č i ć, T., O z i m e c, S., V u k o v i ć Ž. (2006): Biodiverzitet ihtiofaune ribolovnog područja Drava – Dunav. U: IV Nacionalno znanstveno – stručno savjetovanje s međunarodnim učešćem. Osijek, (24 – 28).
- P o v ž, M e t a., Š u m e r, S u z a n a, B u d i h n a, N a t a l i j a (1998.): Ribe in raki Pokolpja. I2 Založba Ljubljana.
- P o v ž, M e t a., Š u m e r, S u z a n a, B u d i h n a, N a t a l i j a (2005): A brief review of non – native freshwater fishes in Slovenia. J. Appl. Ichthyol. 21 (1 - 3).
- S k e n d e r o v i ć, I. A d r o v i ć, A., Š k r i j e l j, R. (2003): Biodiverzitet ihtiofaune rijeke Spreče uzvodno od hidroakumulacije Modrac. U: IV Nacionalno znanstveno – stručno savjetovanje s međunarodnim učešćem. Osijek, (41 – 52).
- S i m o n o v i ć, P. (2001): Ribe Srbije. NNK International; Zavod za zaštitu prirode i Biološki fakultet, Beograd.
- S o f r a d ž i j a, A., H a d ž i s e l i m o v i ć, R., S p a h i ć, M., Š k r i j e l j, R., G u z i n a N a r c i s a, T r o ž i ć – B o r o v a c S a d b e r a, K o r j e n i ć, E., H a m z i ć, A. (2003): Ribarstveno – gospodarska osnova općine Gračanica SRD «Drijenča» - Gračanica. Prirodno – matematički fakultet i Centar za ihtiologiju i ribarstvo, Sarajevo.
- Š k r i j e l j, R. (1990/91): Srebrni karaš – babuška (*Carassius auratus gibelio* Bloch) nova vrsta u ihtiofauni akumulacionog jezera «Jablanica». Biološki list, 38 (148 - 150), Sarajevo.
- Š k r i j e l j, R., M a š o v i ć, M. (2001): Populacija smuđa (*Stizostedion lucioperca* L.) u neretvanskim hidroakumulacijama. Ribarstvo (Zagreb), 59 (2) (57 - 69).
- Š k r i j e l j, R., S o f r a d ž i j a, A., H a d ž i s e l i m o v i ć, R., S p a h i ć, M., K o r j e n i ć, E., G u z i n a, N a r c i s a., M u h a m e d a g i ć, S., M u z a f e r o v i ć, Š., A d r o

- v i ć, A., D r e š k o v i ć, N. (2003): Hidrološke i ihtiološke karakteristike jezera Sniježnica. Radovi Poljoprivrednog fakulteta Univerziteta u Sarajevu. 56/2005 (63 - 74).
- T a l e r, Z. (1952): Rasprostranjenje i popis slatkovodnih riba Jugoslavije. Glasnik Prir. muz. srpske zemlje.
- V u k o v i ć, T. (1977): Ribe Bosne i Hercegovine: ključ za određivanje. Svjetlost, Sarajevo.
- Z a n e l l a, D. S c h n e i d e r, D., M r a k o v č i ć, M., M u s t a f i ć, P., S u i ć, J.(2000): Ichthyofauna of the Lonjsko polje. Limnological Reports, Vol. 33 (323 - 328). Osijek.
- Z e l i n k a, M. (1971): Ribarska osnova za ribolovno područje USR «Jezero Modrac». Tuzla, 1971.

## **ALOHTONA IHTIOFAUNA NEKIH VODOTOKOVA NA PODRUČJU SEVEROISTOČNE BOSNE**

- originalni naučni rad -

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### **Rezime**

Istraživanja diverziteta riba u severoistočnoj Bosni su intenzivirana tokom poslednjih nekoliko godina, a obuhvatila su više rečnih tokova i dve hidroakumulacije. Od reka ihtiološki su istražene: Gostelja, Spreča, Tinja i Brka, a od hidroakumulacija Modrac i Sniježnica. Tokom istraživanja je konstatovan relativno visok specijski diverzitet riba, a registrovano je i prisustvo alohtonih vrsta koje pripadaju porodicama: *Salmonidae*, *Cyprinidae*, *Ameiuridae* i *Centrarchidae*. Od ciprinidnih riba prisutne su dve alohtone vrste, babuška i bezribica; iz porodice *Salmonidae* kalifornijska pastrmka; iz porodice *Ictaluridae* patuljasti somić; iz porodice *Percidadae* smuđ, a iz porodice *Centrarchidae* sunčanica. Sve registrovane alohtone vrste imaju široke areale rasprostranjenja kako u Bosni i Hercegovini, tako i šire.