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THREATENED FISHES OF THE WORLD: *Delminichthys krbavensis* (Zupančič & Bogutskaya, 2002) (Cyprinidae)

Tanja Mihinjač¹, Zoran Marčić¹, Ivana Buj¹, Davor Zanella¹, Perica Mustafić¹, Milorad Mrakovčić¹, Marko Čaleta*²

¹ University of Zagreb, Faculty of Science, Department of Zoology, Rooseveltov trg 6, 10000 Zagreb, Croatia

² University of Zagreb, Faculty of Teacher Education, Savska cesta 77, 10000 Zagreb, Croatia

*Corresponding Author, E-mail: marko.caleta@ufzg.hr

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ABSTRACT

Krbava minnow, *Delminichthys krbavensis* is a freshwater fish species endemic to the Adriatic watershed in Croatia. It lives only in karstic springs, streams and subterranean waters in Krbavsko polje. This species is protected by Croatian law and is listed in the IUCN Red List as Critically Endangered (CR). *D. krbavensis* has very limited distribution which makes it vulnerable to different kinds of threats such as water extraction, exploitation of karstic springs and streams, agricultural pollution, road construction and introduction of nonindigenous fish species. Suggested conservation actions for this species are detailed study of biology, ecology and distribution as well as bans on water-course regulation and road construction, reduction of pollution and restriction on introductions of nonindigenous fish species. Also, conservation of this species should be ensured through implementation of management and action plans.

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SYNONYM

Phoxinellus krbavensis Zupančič & Bogutskaya, 2002

COMMON NAMES

Krbavski pijor (Cro); Krbava minnow (Eng)

CONSERVATION STATUS

IUCN Red list: Critically Endangered (Crivelli, 2006)

Croatia: Critically Endangered (Mrakovčić et al., 2006)

IDENTIFICATION

DIII7; AIII7; VI7; PI14; 20 – 40 total lateral line scales. Smooth pharyngeal teeth in one row (5 – 4), numerous gill rakers (10 – 12). Mouth subterminal. All scales deeply embedded in skin, roundish, small and poorly ossified. Lateral line interrupted, separated into segments, number of later-

al-line scales commonly much smaller than the number of pores. Skin is markedly thickened and plicate in adults, especially during spawning season. Distinguished from other species of *Delminichthys* by irregular spotted color pattern and humped back with an elongated shallow caudal peduncle (length on average 2.3 times its depth). Maximum size is up to 100 mm TL, usually smaller (Trgovčević, 1905 [as *Paraphoxinus ghetaldii*]; Zupančič and Bogutskaya, 2002; Mrakovčić et al., 2006; Kottelat and Freyhof, 2007; Zupančič, 2008).

DISTRIBUTION

Delminichthys krbavensis (Fig 1) is endemic species in Croatia. It inhabits karstic springs, streams and subterranean waters in Krbavsko polje (Vukova pečina, Ribičko jezero, špilja Suvaja). Area of occupancy for this species is <10 km² (Zupančič and Bogutskaya, 2002; Mrakovčić et al., 2006; Crivelli, 2006; Kottelat and Freyhof, 2007; Mrakovčić et al., 2010).



Fig 1. *Delminichthys krbavensis* 95 mm TL (photo by Perica Mustafić, April 2010)

ABUNDANCE

Delminichthys krbavensis is a common species in Krbavsko polje.

HABITAT AND ECOLOGY

Krbava minnow inhabits streams with clear water and slow current. Most of the year, during bad weather conditions and droughts (usually during late summer and winter), this species lives in subterranean waters (Zupančič and Bogutskaya, 2002; Mrakovčić et al., 2006; Kottelat and Freyhof, 2007). It feeds on small water invertebrates (Mrakovčić et al., 2006).

REPRODUCTION

Spawns in May – July. Females lay 1000 – 1200 eggs, most probably in more than one portion. Sexually mature males have small nuptial tubercles on upper surface of the head and inner surface of the pectoral. Genital papilla well developed in females (Zupančič and Bogutskaya, 2002; Kottelat and Freyhof, 2007).

THREATS

Delminichthys krbavensis has very limited distribution which makes it vulnerable to different kinds of threats. It is most threatened by water extraction, exploitation of karstic springs and streams, agricultural pollution and road construction (Crivelli, 2006; Mrakovčić et al., 2006; Kottelat and Freyhof, 2007; Zupančič, 2008). Also, possible introduction of non-indigenous fish species such as *Salmo trutta* or *Oncorhynchus mykiss* could be a potential threat for krbava minnow (through predation and competition). It is a well-known fact that introduced trout species have negative effect on abundance of native fish fauna.

CONSERVATION ACTION

In Croatia, this species is protected by law.

CONSERVATION RECOMMENDATIONS

A detailed study of biology, ecology and distribution of this species is required. Present data suggest habitat protection (establishment of ichthyological reserve), bans on further

watercourse regulation and road construction, reduction of pollution and restriction of introductions of nonindigenous fish species. Management plan for habitat and action plan for this species should be developed.

Sažetak

UGROŽENE VRSTE RIBA U SVIJETU: *Delminichthys krbavensis* (Zupančič & Bogutskaya, 2002) (Cyprinidae)

Krbavski pijor, *Delminichthys krbavensis*, je slatkovodna riba, endem jadranskog slijeva i hrvatski endem. Živi samo u krškim izvorima, vodotocima i špiljama u Krbavskom polju. Zakonom je zaštićena u Hrvatskoj, a nalazi se i na Crvenom popisu IUCN – a (International Union for Conservation of Nature) kao kritično ugrožena vrsta (CR). Glavni uzroci ugroženosti ove vrste su ograničeno područje rasprostranjenosti, isušivanje i pretjerano iskorištavanje krških vodotoka, zagađenje, gradnja prometnica i unos stranih vrsta riba. Za zaštitu ove vrste predlažu se detaljna istraživanja biologije, ekologije i stanja populacija te zabrana regulacije vodotoka, smanjenje zagađenja, zabrana gradnje i zabrana unosa stranih vrsta. Također, potrebna je izrada menadžment plana i plana upravljanja ovom vrstom.

Ključne riječi: *Delminichthys krbavensis*, Cyprinidae, Jadranski slijev, očuvanje

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