TAXA JOURNAL OF TAXONOMY AND SYSTEMATICS

CAPPADOCIA ACADEMY PUBLISHING

Research Article

Threatened fishes of the world: *Cobitis joergbohleni* (Teleostei: Cobitidae) with a suggestion of the IUCN Red List category

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Citation: Sungur, S., Çapar, O. B., Çiçek, E., & Eagderi, S. (2023). Threatened fishes of the world: *Cobitis joergbohleni* (Teleostei: Cobitidae) with a suggestion of the IUCN Red List category. *Taxa*, *2*, ad23202: 7p.

Received: 01.03.2023
Revised: 11.05.2023
Accepted: 29.06.2023
Published: 20.07.2023

Abstract

The Sultan Marsh is home to the endemic spined loach, *Cobitis joergbohleni*. Since its populations have been steadily declining over the past forty years as a result of numerous ecological changes in its habitats, there is a greater need for conservation. This review summarises the information that is currently known about the taxonomy, ecology, distribution, and threats to the natural habitats of *C. joergbohleni* and makes recommendations on how to effectively preserve the species' last isolated population. It was decided that the IUCN category should be Critically Endangered (CR), taking into account the requirements, as no IUCN category for the species had been suggested.

Keywords: Sultan Marsh, Sultan spined loach, Red List, endemic, conservation, Türkiye

e-ISSN: 2980-2237

Introduction

The genus *Cobitis* is freshwater fish species with a wide geographic distribution throughout Europe and Asia and one in northern Africa (van der Laan, 2022). Typically, they have a short, movable spine near each eye (Kottelat, 2012), hence known as the spined loach. A spined loach is a small, and elongated species having small scales with three to six pairs of whisker–like barbels. They use their barbels to comb the bottom for worms, insect larvae, and other food. They are hardy, usually nocturnal fish that inhabit both still and flowing waters.

Distribution, taxonomy, and biology of *Cobitis* in Turkey have been the subject of several works (Coad and Sarieyyüpoğlu, 1988; Erk'akan et al., 1998; 2008; 2017; Freyhof et al., 2018; Özdemir, 2018; Eagderi et al., 2022). Little information is available about *C. joergbohleni* described from Sultan Marshes (Freyhof et al., 2018). Hence, more data need on the taxonomy and distribution of *C. joergbohleni*, and the recommendations for the conservation of this isolated species.

Taxonomy and Systematics

The genus *Cobitis* consists of approximately 119 species. For a long time, most spined loaches in Anatolia were considered to belong to *Cobitis*

simplicispina Hankó, 1925; *Cobitis taenia* Linnaeus, 1758; or *Cobitis turcica* Hankó, 1925, separated into a number of sub–species (Geldiay and Balık, 1988; Kuru, 2004). Nowadays, many of these sub–species are considered as distinct species, and several new species have been described, but a compilation of data for their distribution ranges is lacking. In total, 26 nominal species of *Cobitis* are recognised from the fresh waters within the geographical range of Türkiye (Çiçek et al., 2020). These species are not equally distributed but show a higher density in the central and western parts of Turkey than in the eastern part. *Cobitis joergbohleni* was identified as a new species from Sultan Marsh in 2018 (Freyhof et al., 2018).

Order Cypriniformes

Family Cobitidae

Genus *Cobitis*

***Cobitis joergbohleni* Freyhof, Bayçelebi & Geiger, 2018**: 58, Figs. 45–47 [Spring Soysallı, about 1 km north of Soysallı, Kayseri province, Turkey, 38.390 35.365. Holotype: ZFMK ICH–97624] (Figures 1, 2).

Synonym: *Cobitis fusunae* Özdemir, 2019 (Özdemir, 2018). By the way previous report of *Cobitis turcica* in the marsh refers also *Cobitis joergbohleni* (Yerli et al., 1994).

Common name: Sultan spined loach.

Local name: Sultan taşısıranı (in Turkish). **Remarks.** Regionally, no name is used for *C. joergbohleni*. We suggested common names for this species because it is endemic to Sultan Marsh and only found there.

Figure 1. Illustration of *Cobitis joergbohleni* from Sultan Marshes.

Figure 2. Live specimen of *Cobitis joergbohleni* from Sultan Marshes.

Description: Body slender and elongated. Deepest part of body at or just in front of where dorsal fin starts, and shallower as towards tail fin base. Head slightly convex in profile with small eyes, and flattened at sides. Dorsal and anal fin margins convex, and no pelvic axillary lobe. Caudal fins slightly rounded. Dorsal fin with III– 7½, pectoral fin with 8, pelvic fin with 5, anal fin with III–5½ (2), and caudal fin with 7+7 rays. Except for midline of back, belly, and breast, whole body covered with tiny scales not seen with the naked eye. Lateral lines absent. Lips thin, and lower lip's mental lobes short and difficult to distinguish from lower lip. Three pairs of barbel in the mouth. Of these, rostral barbel extending to mandibular barbel's base. Mandibular barbel extending just above or vertically over the nostril. Anterior boundary, or eye centre, where the maxillary barbel extends vertically (Freyhof et al., 2018; Özdemir, 2018).

Size: Largest known specimen, 54.7 mm in SL.

Coloration: Background colour yellowish, and dark–brown pigmentation pattern not organised into pigmentation zones but rather appears as one mid–dorsal row of blotches, numerous small spots, small irregularly–shaped blotches, and brief vermiculation on flank. 5–8 predorsal blotches and 5–7 blotches behind base of dorsal fin making up mid–dorsal pigmentation. A single, barely perceptible, eye–sized black spot at base of upper caudal fin. Little spots and brief vermiculation found covering top of head, opercle, and snout. Hyaline fins with a few light–brown dots in pairs and white barbels. Both caudal and dorsal fins with six dark–brown, occasionally asymmetrical bars (Freyhof et al., 2018; Özdemir, 2018).

Sexual dimorphism: Males have a longer pectoral fin than females and two laminae circularis (vs. absent).

Distribution: The Sultan Marshes are an endorheic subbasin of the Kızılırmak Basin in Kayseri Province, Central Anatolia, Turkey. *Cobitis joergbohleni* is exclusively known from these streams (Figure 3). We conducted fieldwork in every region of the subbasin and its surrounding areas, but we were unable to locate any specimens outside of the Sultan Marshes. A large part of the Sultan Marsh has lost habitat characteristics suitable for this species. However, on 18 July 2023, sampling efforts made throughout the day in the marches were inconclusive, and no individuals were obtained. It was very disappointing that no individuals were found even in the springs where healthy populations were found in previous years. It would not be wrong to suggest that the species is close to extinction.

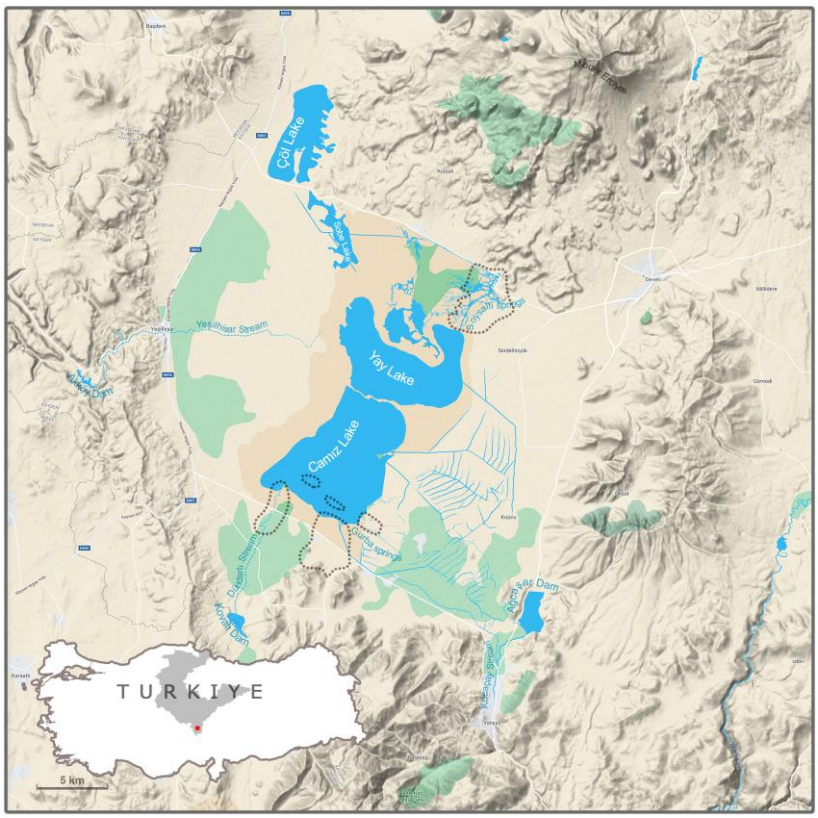

Figure 3. Geographic distribution map of *Cobitis joergbohleni* in Sultan Marsh.

Habitat and ecology: This species lives in the Sultan Marshes' little ponds and streams. The water is calm and nearly translucent, covered in dense periphytonic vegetation, and the substrate is made up of mud, gravel, and plant detritus. (Figure 4). The healthiest population was found in Gurba Springs. The fact is that during the fieldwork carried out in the summer of 2023, these areas were observed to have been destroyed, and no individuals were found.

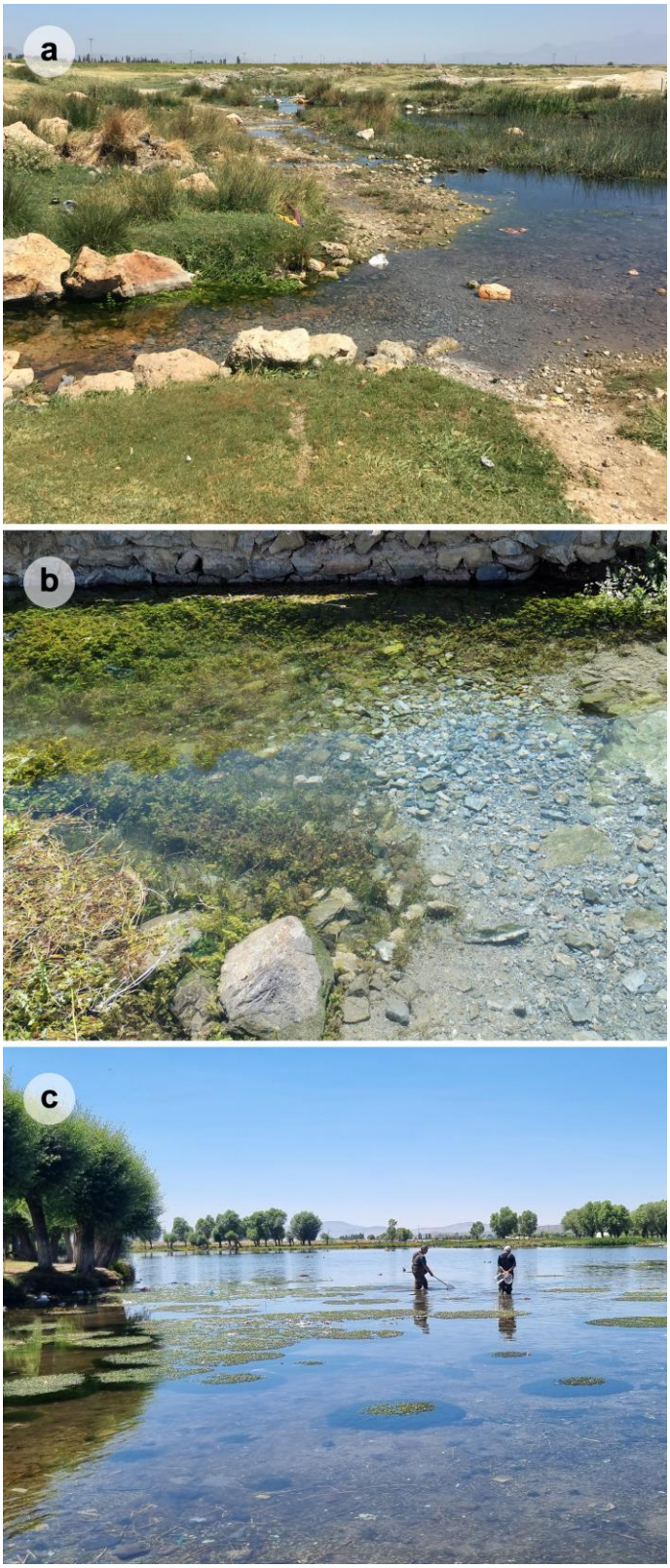

Figure 4. Natural habitat of *Cobitis joergbohleni* from Sultan Marsh (Soysallı Springs: a–c) 38°22'56.7''N–35°21'26.9''E; 38°23'23.3''N–35°21'55.8''E; 38°23'23.3''N–35°21'55.8''E; Gurba Springs and (d–f) 38°12'05.2''N–35°13'19.6'E; 38°11'53.31''N–35°13'54.1''E; 38°11'56.6''N–35°13'54.2''E).

Use and Trade: No

Food and feeding: No data is available anymore.

Reproduction: No data is available. Juvenile individuals appear between May and October during the field surveys.

Population: The species is found in small populations in small areas with clean water that are not connected to each other within the marsh area and especially in areas where springs are located.

Co–existing species: A total of four endemic fish species, viz. *Aphanius danfordii* (Cyprinodontidae), *Pseudophoxinus elizavetae* (Cyprinidae), *Cobitis joergbohleni* (Cobitidae), and *Oxynoemacheilus ciceki* (Nemacheilidae), and three translocated species of *Cyprinus carpio* (Cyprinidae), *Tinca tinca* (Tincidae), and *Esox lucius* (Esocidae) are found in the Sultan Marshes. In addition, five species of *Capoeta damascina, Garra turcica* (Cyprinidae), *Squalius seyhanensis* (Leuciscidae), *Oxynoemacheilus seyhanensis* (Nemacheilidae), and *Silurus glanis* (Siluridae) entered to the Marshes via a constructed tunnel in 2012 for water transfer from Seyhan Basin by Zamanti Tunnel. None of these species have yet reached the main body of the marsh, and their distributions are restricted in some channels (Çiçek and Sungur, 2020). Because Sultan Marsh is not a single body of water, different species can be found at different locations. However, the entry of new species from the Seyhan basin through the tunnel will continue, and new species will be possible to observe over time.

IUCN Status evaluation

The conservation status and threats have not yet been determined for this species. We evaluated the IUCN category of the species based on five criteria (A–E) used to evaluate if a taxon belongs in an IUCN threatened category (critically endangered, endangered, or vulnerable) (IUCN, 2014).

IUCN Red List Category and Criteria: Critically Endangered (CR) [A1ace/B1abc+2abc]

Population trend: Decreasing

Population severely fragmented: Yes

The continuing decline of mature individuals: Yes

Habitat and Ecology:

System: Freshwater (=Inland waters)

Habitat Type: Wetlands (inland)

Geographic Range: Turkey (endemic)

Range Description: The species is only known from the Sultan March endorheic basin, Kayseri, Turkey.

Threats:

Climate change & severe weather: Droughts

Natural system modifications:

Dams & water management/use

Abstraction of surface water (agricultural use)

Abstraction of groundwater (agricultural use)

Other ecosystem modifications

Invasive and other problematic species, genes & diseases:

Invasive non-native/alien species/diseases

Pollution

Agricultural & forestry effluents

Nutrient loads

Herbicides and pesticides

Threats in detail. The greatest hydrological changes, particularly during the past three decades, have been caused by dams (Kovalı, Akköy, and Ağcaşar) and pumping water from the aquifer for cultivation (Figure 5a). These have been resulted in habitat fragmentation that has harmed populations of *C. joergbohleni*. A few springs have dried up or had less water due to the consequences of global climate change, in addition to anthropogenic impacts; therefore, the marsh area has decreased (Figure 5c–e). Consequently, the species' optimal range has shrunk and in some places even vanished entirely. The *C. joergbohleni*'s range includes three different exotic fish species. One of these, *E. lucius*, affects the species through predation. In reality, not even *C. joergbohleni* or other native species were found in the *E. lucius*–inhabited areas (Çiçek and Sungur, 2020). Because *C. carpio* and *T. tinca* species feed by

churning the substrate of their habitats, they alter the bottom structure, destroy the habitat of the invertebrates that provide them with food, and increase water turbidity. The rising use of fertilizers in agricultural activities has increased the risk of eutrophication. Due to livestock and agricultural operations, and an increase in population near the marsh, pollution has increased. Drainage channels are another way that pesticides enter the marsh (Figure 5b). The marsh area has decreased due to groundwater exploitation, spring decline, and river blockage from dams.

Figure 5. Human-induced disturbance at the type locality of *Cobitis joergbohleni*.

Conservation Actions:
Land/water protection
Site/area protection
Conservation Actions in detail. Sultan Marsh is protected as a Ramsar site and national park. However, healthy populations of Sultan spined loach are found outside the park boundaries in the spring-stream system with suitable habitat characteristics. A report on the protection of spring-stream systems and

suitable habitats outside the park boundary has been submitted to the Kayseri Provincial Directorate of Nature Conservation and National Parks, and recommendations for habitat protection will be considered (Figures 4d-f).

Conservation recommendations in detail. The fact that no individuals were found even in the springs in the summer of 2023 where healthy populations were found in previous years shows how realistic and decisive our suggestion, which constitutes the main purpose of this publication/article, that the species should be added to the "critically endangered species" in IUCN red list and protected without delay, is for the future of *C. joergbohleni*. Developing a conservation strategy for the species, estimating the extinction rate, monitoring the habitat, conducting ecological studies, breeding captives, investigating the possibility of translocation (moving fish to a special reserve where they will have greater protection), engaging the local communities, NGOs, and media in a conservation program, working with the local communities and NGOs, and sharing the conservation knowledge with them, could conserve this endemic loach for their future generations.

Author Contributions: Resources, E.C., S.E., S.S.; writing—original draft preparation, E.C.; writing—review and editing, O.B.Ç., E.C., S.E., S.S.; visualization, O.B.Ç.; funding acquisition, E.Ç. All authors have read and agreed to the published version of the manuscript.

Acknowledgments: We are grateful to the Kayseri Provincial Directorate of Nature Conservation and National Parks to help with field trips.

Funding: This study was financially supported by Hana Arge ve Danışmanlık Ltd. Şti. Cappadocia Technopark (Project Name: Ecological Modelling Project Code: Hana-2020-01, STB Project Code: 064897).

Data Availability Statement: The data underlying this article will be shared upon reasonable request to the corresponding author.

Conflicts of Interest: The authors declare that they have no known competing for financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Bohlen, J., & Rab, P. (2001). Species and hybrid richness in spined loaches of the genus *Cobitis* (Teleostei: Cobitidae), with a checklist of European forms and suggestions for conservation. *Journal of Fish Biology, 59*(Supplement A), 75–89.

Çiçek, E., & Sungur S. (2020). Ichthyofauna of Sultan Marshes (Turkey) and possible effects of fish invasion from Seyhan Basin on diversity and conservation. *Commagene Journal of Biology, 4*(2), 115–120.

Çiçek, E., Fricke, R., Sungur, S., & Eagderi, E. (2018). Endemic freshwater fishes of Turkey. *FishTaxa, 3*(4), 1–39.

Çiçek, E., Sungur, S., & Fricke, R. (2020). Freshwater lampreys and fishes of Turkey; a revised and updated annotated checklist 2020. *Zootaxa, 4809*(2), 241–270.

Coad, B. W., & Sarieyyüpoğlu, M. (1988). *Cobitis elazigensis*, a new species of cobitid fish from Anatolia, Turkey. *Japanese Journal of Ichthyology, 34*(4), 426–430.

Eagderi, S., Seçer, B., & Freyhof, J. (2022). *Cobitis indus*, a new spined loach from the Dalaman River in the Eastern Aegean Sea basin (Teleostei: Cobitidae). *Zootaxa, 5162*(4), 410–420. https://doi.org/10.11646/zootaxa.5162.4.5

Erk'akan, F., Atalay–Ekmekçi, F. G. & Nalbant, T. T. (1998). Four new species and one new subspecies of the genus *Cobitis* (Pisces: Ostariophysi: Cobitidae) from Turkey. *Turkish Journal of Zoology, 22*, 9–15.

Erk'akan, F., Özdemir, F. & Özeren, S. C. (2017). Two new species of the genus *Cobitis* Linnaeus (Teleostei: Cobitidae) from Turkey. *FishTaxa*, 2 (2): 82–89.

Erk'akan, F., Özeren, S. C. & Nalbant, T. T. (2008a). *Cobitis evreni* sp. nova – a new spined loach species (Cobitidae) from the southern Turkey. *Journal of Fisheries International*, 3, 112–114.

Freyhof, J., Bayçelebi, E., Gieger, M. (2018). Review of the genus *Cobitis* in the Middle East, with the description of eight new species (Teleostei: Cobitidae). *Zootaxa, 4535*(1), 001–075.

Geldiay, R., & Balık, S. (1988). Freshwater Fishes of Turkey. I. Edition, Ege University Press, Bornova, Izmir, 519p.

IUCN. (2012). *Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0*. Gland, Switzerland and Cambridge, UK: IUCN.

Kottelat, M. (2012). Conspectus cobitidum: an inventory of the loaches of the world (Teleostei: Cypriniformes: Cobitoidei). *The Raffles Bulletin of Zoology, Suppl. 26*, 1–199.

Kottelat, M., & Freyhof, J. (2007). *Handbook of European freshwater fishes*. Publications Kottelat, 646 p.

Özdemir, F. (2018). *Cobitis fusunae*, A New Spined Loach Species (Teleostei: Cobitidae) from the Sultan Marsh, (Kayseri, Turkey). *Hacettepe Journal of Biology and Chemistry, 46*(4), 593–599.

Yerli, S., Gündüz, E., & Akbulut, A. (1994). *Evaluation of Tropic Status of Sultan Marshes. Environmental Profile of Kayseri, Sultan Marshes and Erciyes*. Publications of Environmental Protection Foundation of Kayseri, No:2, 129–133.