

The first record of the redbelly tilapia, *Tilapia zillii* (Gervais, 1848), in freshwaters of Iran

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Abstract: This paper is the first record of the exotic cichlid, the redbelly tilapia, *Tilapia zillii* (Gervais, 1848), from natural freshwater bodies of Iran, which has most likely been deliberately released to enhance fish production. The new records extend the geographical distribution range of this exotic fish.

Key words: Exotic fish, Tigris basin, Middle East, Iran

Introduction of fish species into Iran is well known, with the introduction of *Gambusia* (Poeciliidae) in the 1920s and *Cyprinus carpio* (Cyprinidae) in the late 1930s when they were introduced to control malaria and to enhance fish production, respectively (Coad, 1996; Esmaeili et al., 2007). Since then, 27 fish species have been introduced or translocated and some of them have been well established in different Iranian water bodies (Coad, 1996; Esmaeili et al., 2007; Esmaeili et al., 2010). Control of malaria, research, aquaculture, sport fishing, intentional release of ornamental fishes by local people, and accidental introductions have been the main reasons for these introductions (Coad, 1996; Esmaeili et al., 2007). Recent investigations show that the numbers of exotic species are increasing (Coad, 2012), and the redbelly tilapia is one of these recently introduced fish.

The redbelly Tilapia, *Tilapia zillii* (Gervais, 1848), is a cichlid fish (Cichlidae) of the subfamily Pseudocrenilabrinae, native to Africa; it now has been widely distributed in the Americas, Europe, Australia, and Asia (<http://www.fishbase.org/>). The redbelly tilapia is found in more than 56 countries as a native or introduced fish. Control of aquatic plants, control of mosquitoes and chironomid midges, use as forage or food fish, commercial aquarium trade, recreational fishery, and enhancement of aquaculture have been the main reasons for introduction of this cichlid fish outside its native range in many countries throughout the world (<http://www.fishbase.org/>).

In the Middle East it has been reported from Egypt, Jordan, and Lebanon as a native fish and from Saudi Arabia, Syria, and Iraq as an introduced fish (Job, 1967; Mutlak and Al-Faisal, 2009; Coad, 2012; <http://www.fishbase.org/>).

fishbase.org/) being established in the Syrian Euphrates (Coad, 2012). However, it has not been yet recorded from Iranian freshwaters (Esmaeili et al., 2010; Coad, 2012).

Here we report first introduction of *T. zillii* in southern Iran.

Tilapia zillii specimens were collected by electrofishing and gill net in October 2012 during fieldwork on the ichthyofauna of southern Iran from 2 localities including the Shadegan wetland (30°41'N, 48°32'E, 6 m a.s.l.), near Shadegan in Khuzestan Province of southern Iran (7 specimens), and a tributary of the Bahman Sheer River (30°01'N, 48°30'E, -1 m a.s.l.) near Chuebdeh, between Arvankenar and Abadan, Khuzestan Province (2 juvenile specimens).

Seven specimens were preserved in 10% formalin, 2 were preserved in 96% ethanol, and the specimens were deposited in the Zoological Museum-Collection of the Biology Department of Shiraz University (ZM-CBSU), Iran. Morphological characteristics (mm) of 7 collected specimens from the Shadegan wetland are given in the Table.

The Shadegan wetland is one the largest international wetlands of Iran, situated in the southwest of the country and connecting the Jarahi River to the Persian Gulf. Due to its unique biodiversity, it has been considered as one the wonderful natural landscapes of the world (Hashemi and Ansari, 2012).

Records of more than 27 native and exotic fishes, including *Acanthobrama marmid*, *Alburnoides* sp., *Aspius vorax*, *Carassius auratus*, *Chondrostoma regium*, *Cyprinion kais*, *C. macrostomum*, *Cyprinus carpio*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *H. nobilis*, *Luciobarbus*

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Table. Morphological characteristics (mm) of 7 collected specimens of *T. zillii* from Shadegan wetland, southern Iran.

Characteristics	Minimum	Maximum	Mean
Total length	116.0	139.3	126.1
Standard length	92.3	112.6	101.3
As percentage of standard length			
Head length	32.21	34.54	33.37
Head depth	24.20	30.02	27.68
Head length without scale	21.44	30.57	26.20
Preorbital distance	13.11	15.79	14.18
Postorbital distance	13.37	16.58	14.69
Interorbital distance	11.21	13.30	12.17
Eye diameter	7.39	9.021	8.19
Predorsal length	36.08	40.42	38.95
Postdorsal length	33.90	38.71	37.21
Height of dorsal fin	21.29	27.01	24.33
Length of dorsal fin	53.31	55.88	54.43
Depth of anal fin	32.77	37.99	35.82
Length anal fin	15.95	19.42	17.45
Preal length	71.67	74.96	73.66
Length of pectoral fin	27.95	32.00	30.77
Length of pelvic fin	26.21	34.41	30.17
Minimum body depth	13.07	14.29	13.80
Maximum body depth	35.91	40.24	38.04
Distance between pectoral and dorsal	39.13	45.01	41.86
Distance between pectoral and pelvic	13.82	17.69	15.50
Distance between pelvic and anal	32.65	38.09	34.92
Length of caudal fin	24.91	28.13	26.35
Length of caudal peduncle	15.09	18.80	16.58
Mouth width	10.28	13.20	11.53

barbulus, *L. pectoralis*, *L. xanthopterus*, *Mesopotamichthys sharpeyi*, *Tor grypus*, *Liza abu*, *L. subviridis*, *L. vaigiensis*, *Heteropneustes fossilis*, *Silurus triostegus*, *Mastacembelus mastacembeuls*, *Acanthopagrus latus*, *Tenualosa ilisha*, *Sardinella sindensis*, *Thryssa hamiltonii* (Hashemi and Ansari, 2012) and *Gambusia holbrooki*, show the high fish diversity of this wetland. We also collected *Carassius auratus*, *Luciobarbus barbulus*, *L. pectoralis*, *Mesopotamichthys sharpeyi*, *Tor grypus*, *Gambusia holbrooki*, and *Liza abu* from this wetland.

However, recent collections reveal the potential of having more exotic fishes due to accidental or deliberate introductions that may affect native fishes. According to local fishermen, *T. zillii* appeared in this wetland in April or May 2012, and now it is available in daily catches. According to them, it was deliberately introduced to the

Shadegan wetland to enhance fish production. This is the first record of this cichlid fish from the Shadegan wetland.

Effects of redbelly tilapia on native organisms have been well documented. Molnar et al. (2008) considered it as a potential competitor with native fish for food and spawning areas, and it is potentially detrimental to California rice crops. This voracious herbivore constitutes a serious threat to native aquatic plants and the organisms that depend on them. Walter Courtenay in Hogg (1976) called it "the most destructive fish to submerged vegetation known next to the grass carp, *Ctenopharyngodon idella*". Due to its feeding habits, the invasive redbelly tilapia eliminated all aquatic macrophytes from the Hyco Reservoir, North Carolina, USA, within a 2-year period, which caused declines in populations of several native fishes; however, because of its ability to switch to alternate food sources,

the tilapia populations continued expanding in the absence of macrophytes (Molnar et al., 2008).

Members of the family Cichlidae have successfully invaded different ecosystems worldwide (Martin et al., 2010). Based on available published data (see Martin et al., 2010), tilapia can tolerate wide fluctuations in temperature, dissolved oxygen, and salinity. This adaptivity to variable environmental conditions, along with their rapid growth rates, high fecundity, and omnivorous feeding habits, allow them to breed and to establish themselves in areas outside their native range (Martin et al., 2010). These factors may further contribute to the successful breeding and establishment of this exotic cichlid fish in the Shadegan wetland in the near future.

References

- Blanchet S, Loot G, Grenouillet G, Brosse S (2007). Competitive interactions between native and exotic salmonids: a combined field and laboratory demonstration. *Ecol Freshw Fish* 16: 133–143.
- Buria L, Albarino R, Villanueva VD, Modenutti B, Balseiro E (2007). Impact of exotic rainbow trout on the benthic macro invertebrate community from Andean-Patagonian headwater streams. *Fund Appl Limnol* 168: 145–154.
- Coad BW (1996). Exotic and transplanted fishes in Southwest Asia. *Publ Spec Inst Esp Oceanogr* 21: 81–106.
- Esmaili HR, Coad BW, Gholamifard A, Nazari N, Teimory A (2010). Annotated checklist of the freshwater fishes of Iran. *Zoosyst Rossica* 19: 361–386.
- Esmaili HR, Teimori A, Gholamhosseini A (2007). Freshwater ichthyodiversity and its conservation in Iran. In: 12th European Congress of Ichthyology, Cavtat, Croatia, 9–13 September 2007, booklet: 200–201.
- Hashemi SAR, Ansary H (2012). Biomass and production of fish species in the Shadegan wetland, Iran. *Res J Recent Sci* 1: 66–68.
- Hogg RG (1976). Established exotic cichlid fishes in Dade County, Florida. *Fla Sci* 39: 97–103.
- Job TJ (1967). Status of fish culture in the Near East region, In: Pillay TVR, editor. *Proceedings of the FAO World Symposium on Warm-Water Pond Fish Culture*. Fisheries Report. Rome: Food and Agriculture Organization, pp. 54–69.
- As invasive fishes such as gobies (Krakowiak and Pennuto, 2008), common carp (Miller and Crowl, 2006), salmonids (Blanchet et al., 2007; Buria et al., 2007), and Nile perch (Ogutu-Ohwayo and Hecky, 1991) are known to strongly impact native populations in many ecosystems, tremendous care should be taken to prevent introduction of exotic fishes to highly fish diverse wetlands such as the Shadegan wetland. Monitoring of this newly introduced fish by scientists, conservationists, and environmentalists is highly recommended.

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