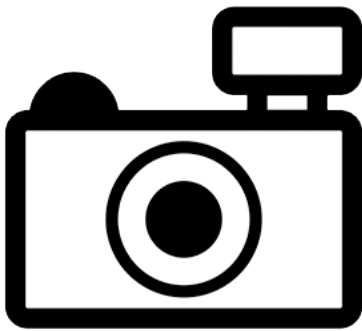


Farsi Tooth-carp (*Aphanius farsicus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, July 2017
Revised, August 2017
Web Version, 11/16/2017



No Photo Available

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2017):

“Western Indian Ocean: endemic to the Gulf Coast of Iran. [Coad 1998]. *Aphanius farsicus* has been recorded and collected only from the Maharlu Lake Basin, near Shiraz, Fars province [...]”

Status in the United States

This species has not been recorded as introduced or established in the United States.

Means of Introductions in the United States

This species has not been recorded as introduced or established in the United States.

From Seriously Fish (2017):

“You’re unlikely to find it on sale in aquatic stores although it may be available via specialist breeders or associations from time-to-time.”

Remarks

From Esmaeili et al. (2014):

“[...] may be extinct in the wild since 2013.”

From Seriously Fish (2017):

“It was known as *A. persicus* until late 2011 when it was reclassified due to that name being preoccupied by a Late Miocene fossil species previously referred to as *Brachylebias persicus* Priem 1908. This change was necessary because Gaudant (2011) had earlier demonstrated that *Brachylebias* is a junior synonym of *Aphanius*. *B. persicus* thus became *A. persicus* and the extant fish was assigned the new name *A. farsicus*.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2017):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Cyprinodontiformes
Suborder Cyprinodontoidei
Family Cyprinodontidae
Subfamily Cyprinodontinae
Tribe Orestiini
Genus *Aphanius* Nardo, 1827”

From Eschmeyer et al. (2017):

“Current status: Valid as *Aphanius farsicus* Teimori, Esmaeili & Reichenbacher 2011.
Cyprinodontidae: Cyprinodontinae.”

Size, Weight, and Age Range

From Froese and Pauly (2017):

“Max length : 4.9 cm TL male/unsexed; [Esmaeili and Ebrahimi 2006]”

Environment

From Froese and Pauly (2017):

“Brackish; benthopelagic.”

From Seriously Fish (2017):

“Endemic to the Lake Maharlu basin [...] Maharlu [...] is hypersaline with particularly high concentrations of chlorides and is unable to support any plant or animal life other than algae and *Artemia* brine shrimp. *A. farsicus* is therefore unable to colonise the lake itself and is restricted to surrounding springs as well as associated pools, lagoons and marshes (some temporary) containing fresh to brackish water. [...] The water in the springs is usually clear and slow-flowing [...] Despite not being able to survive in the lake this species is highly tolerant of saline conditions and in one spring was recorded living in water with a salinity value of 14.4% (seawater is around 3.5% on average).”

From Esmaeili et al. (2016):

“Conditions in October at three different sites were [...] pH 6.70-6.74, dissolved oxygen 3.96-6.11 mg/l, nitrate 0.9-1.6 mg/l, nitrite 0.029-0.062 mg/l, phosphate 0.35-0.65 mg/l and ammonium 1.55-2.60 mg/l.”

Climate/Range

From Froese and Pauly (2017):

“Subtropical, preferred ?; 30°N - 29°N, 52°E - 53°E”

Distribution Outside the United States

Native

From Froese and Pauly (2017):

“Western Indian Ocean: endemic to the Gulf Coast of Iran. [Coad 1998]. *Aphanius farsicus* has been recorded and collected only from the Maharlu Lake Basin, near Shiraz, Fars province [...]”

Introduced

This species has not been reported as introduced or established outside its native range.

From Esmaeili and Freyhof (2014):

“Two captive populations of *A. farsicus* exist in Europe and a third one in Iran.”

Means of Introduction Outside the United States

From Esmaeili et al. (2016):

“Our investigation in spring 2013 showed a metapopulation existed in one locality in the Maharlu Lake basin [...] A rescue mission started immediately, and part of the wild population (founder population) was collected for special stocking and propagating programs. A few months later, in 2013, the first breeding took place successfully in small glass aquariums and large plastic tanks in Shiraz University Aquatic Animal Breeding Center (ABCSU) [...]”

Short Description

From Esmaeili et al. (2016):

“**Key characters:** Females of this species are barred while; all the other *Aphanius* species in this area of southern Iran have spotted females (Coad 2016).”

“**Morphology:** Although populations are isolated in springs and streams around Lake Maharlu, Coad (1996) found them to be relatively homogenous. Lateral line scales 24(3), 25(34), 26(69), 27(176), 28(100) or 29(22). Scales above the lateral line 4-6, scales between lateral line and the anal fin 4-8, scales between the lateral line and the pelvic fin 5-9, and scales around the caudal peduncle 12-17. [...] Total dorsal fin rays 8(1), 10(8), 11(97), 12(204), 13(89), or 14(7); total anal fin rays 9(3), 10(111), 11(225), 12(64) or 13(3); total pectoral fin rays 13(9), 14(82), 15(211), 16(94), 17(9) or 18(1); total pelvic fin rays 4(11), 5(181) or 6(213); total gill rakers 9(5), 10(51), 11(220), 12(108), 13(19) or 14(3); abdominal vertebrae 9(1), 10(1), 11(27), 12(355), or 13(22); and caudal vertebrae 12(1), 14(16), 15(285) or 16(104) (Coad 2016).”

“**Sexual dimorphism:** Most apparent in colour and pigmentation detailed below. Females are longer and heavier than males (Esmaeili & Shiva 2006).”

“**Colour:** The flank in females bears numerous alternating light and dark bars, the light bars varying in width from about one half to twice that of dark bars. The bars gradually merge with background pigmentation anteriorly on the flank and while clearly defined on the rear flank are difficult to distinguish anteriorly.”

“The caudal fin spot in females can be oval, teardrop shaped or elongate but is usually in the form of a lozenge. Occasionally, single, smaller, dark, subsidiary spots may be found antero-dorsally and antero-ventrally to the basal spot or scattered spots may be found irregularly before and behind the basal spot.”

“Males have a pigmentation very similar to that of *A. sophiae* and the description here is identical. Some minor observed variation is attributed to variation in size and maturity of the fish compared. Males have light flank bars half the width or much narrower than alternating dark bars. The margins of the dorsal, anal and caudal fins are clear while the rest of these fins is dark. Some fish have up to 3, but usually 2, thin, light bars on the basal half of the caudal fin; these are generally larger fish. The margin of the lower half of the pectoral fin has concentrations of pigment on the membranes such that this area is darker than the rest of the fin. The anal fin is darkest posteriorly where pigment is concentrated on membranes. The distal third of the fin is

pigmented to form a dark band, becoming lighter proximally. The dorsal fin is the darkest fin (except for the clear margin) and the anterior base is the darkest part of the fin. Bands are not always evident but pigment spots are large proximally. Some fish have 2, sometimes 3, thin light bars at the base separated by thin dark bars and paralleling the body profile while others have none. The dorsal fin base may have instead a series of lighter spots, sometimes irregular and not paralleling the body profile.”

Biology

From Esmaeili et al. (2016):

“Esmaeili & Shiva (2006) found the gonado-somatic index in females to increase from November to June, decreasing slowly from late June to November. The reproductive period lasted six months. Males had two peaks, in April and August. Egg diameters reached 1.71mm, absolute fecundity ranged from 45 to 250 eggs (average 115.7 eggs) and relative fecundity was 21.6 to 244.1 eggs with a mean of 90.01 eggs per gram body weight. [...] Monsefi et al. (2009) found that this species is a batch spawner in the Barm-e Shur spring with a spawning period from April to November. This species lives in unstable environments such as temporary lagoons or very small pools and batch spawning of relatively large eggs gives a greater chance of survival.”

“Fars tooth-carp diet is based on detritus, algae (particularly diatoms, green algae, and cyanobacteria), and small invertebrates. Seasonal variation in diet is more important than variation due to fish size and the Fars tooth-carp consume more green algae in spring and early summer and more diatoms and insects the rest of the year. Herbivory was considerable, similar to a few other tooth-carps, and increased with fish size, particularly because of higher consumption of green algae (Alcaraz et al. 2015).”

Human Uses

From Seriously Fish (2017):

“You’re unlikely to find it on sale in aquatic stores although it may be available via specialist breeders or associations from time-to-time.”

Diseases

From Esmaeili et al. (2016):

“Mokhayer (1989) reported metacercariae of the eye fluke, *Diplostomum spathaceum* from *Aphanius sophiae*, probably this species, in Iran. The fluke can cause complete blindness and death in commercially important species of fish. This fish was also infested with yellow grub, *Clinostomum complanatum*. González-Solís et al. (1997) report *Contracaecum* sp. larvae from this species in the Lake Maharlu drainage, Fars. Amin et al. (2013) described *Acanthogyrus (Acanthosentis) barmeshoori* (Acanthocephala: Quadrigyridae) from the Fars tooth-carp, *A. farsicus* in the Barm-e-Shoor Spring, the Maharlu Lake basin, southern Iran based on the collected fish specimens during July 2006 to June 2007. According to them, the parasite was observed all year, with the highest abundance and intensity in May while the prevalence was highest in February. The prevalence of acanthocephalans decreased with increasing fish size.”

No OIE-reportable diseases have been documented for this species.

Threat to Humans

From Froese and Pauly (2017):

“Harmless”

3 Impacts of Introductions

No information available. The only introductions documented are ex situ captive populations.

4 Global Distribution



Figure 1. Known global distribution of *Aphanius farsicus*. Map from GBIF (2016).

5 Distribution Within the United States

This species has not been recorded as introduced or established in the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high only in two isolated locations in California. Medium climate matches occurred in central and southern California, and parts of Idaho, Oregon, Wyoming, Utah, Nevada, and Arizona. The climate match was low across the remainder of the contiguous U.S. Climate 6 score indicated a medium

climate match overall for the contiguous U.S. Scores between 0.005 and 0.103 indicate a medium match; Climate 6 score for *A. farsicus* was 0.015.

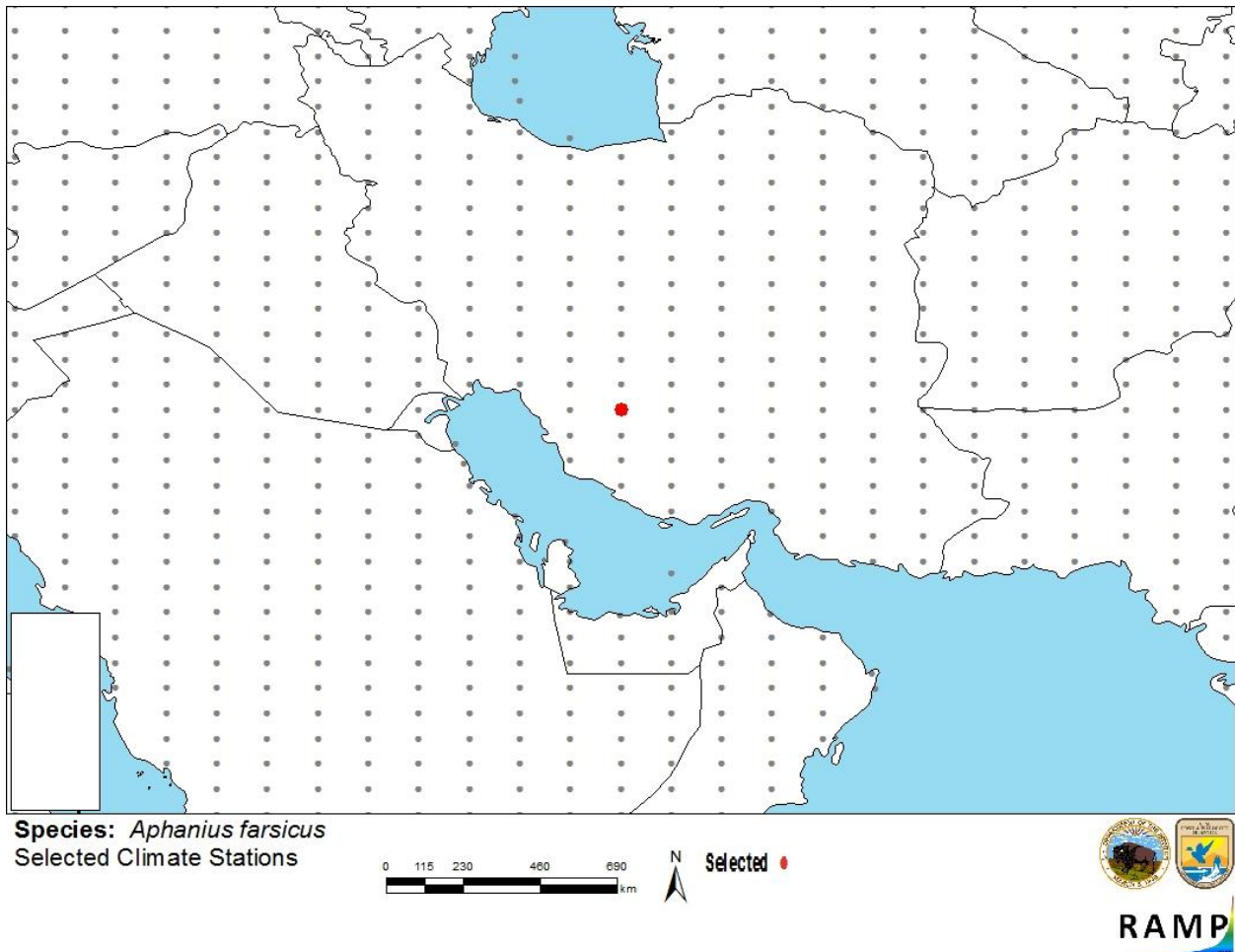


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Aphanius farsicus* climate matching. Source locations from GBIF (2016).

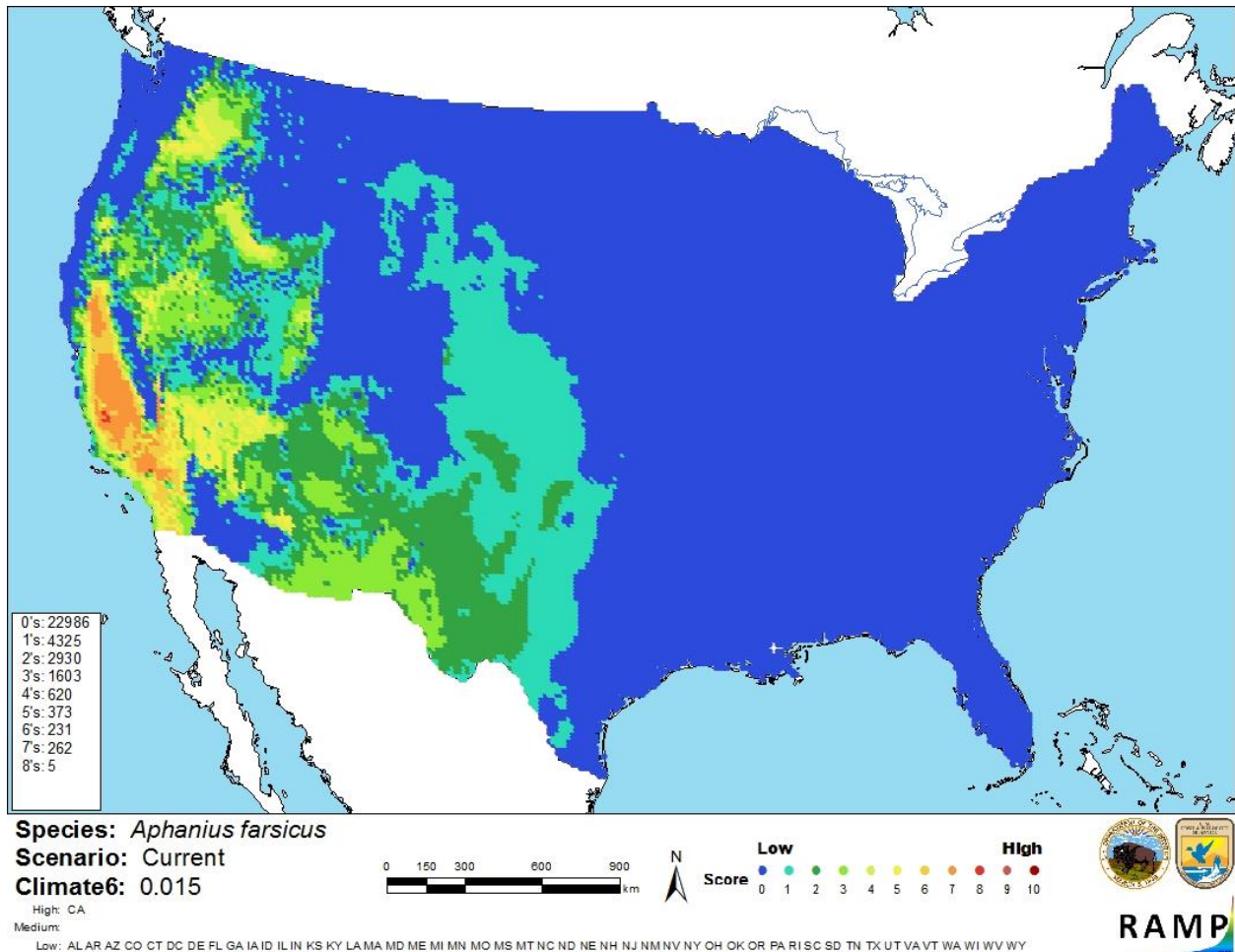


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Aphanis farsicus* in the contiguous United States based on source locations reported by GBIF (2016). 0=Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

The “High”, “Medium”, and “Low” climate match categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

Information on the biology and distribution of *A. farsicus* is readily available. Outside its native range, the species is only known from captivity, so no information is available on potential impacts of introduction. Certainty of assessment for this species is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Aphanius farsicus is endemic to southwestern Iran and may be extinct in the wild. It has not become established in the wild outside its native range, although three captive populations exist for conservation purposes within and outside of Iran. Additionally, *A. farsicus* may be available in low numbers in the aquarium trade. Climate match to the contiguous U.S. was medium overall, with the areas of highest match occurring in central California. Without data on impacts of introductions or lack thereof, overall risk posed by *A. farsicus* is uncertain.

Assessment Elements

- **History of Invasiveness: None Documented**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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