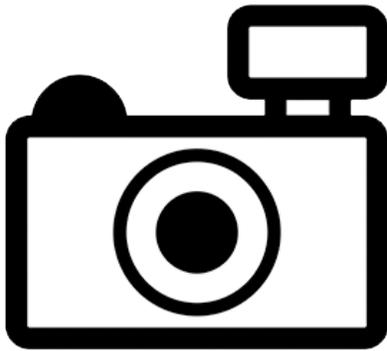


# Anatolian Giant Killifish (*Aphanius anatoliae*)

## Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2017  
Revised, June 2017  
Web Version, 10/30/2017



No Photo Available

## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2016):

“Asia: endemic to Turkey.”

From Freyhof (2014):

“The species is known from freshwater springs and streams around Lake Tuz, and several streams, springs and marshes around Konya and eastward to Nigde. Also in spring Eflatun Pınarı in Lake Beyşehir basin.”

From Çiçek et al. (2015):

“Lakes and wetlands in western and central Anatolia.”

### Status in the United States

This species has not been reported as introduced or established in the U.S.

## Means of Introductions in the United States

This species has not been reported as introduced or established in the U.S.

## Remarks

From Freyhof (2014):

“Many *Aphanius* populations from the area outside the Tuz and Beysehir basins are usually also identified as this species. Conclusive molecular data strongly support the view, that they represent other species.”

“Red List Category & Criteria: Near Threatened ver 3.1”

“Water abstraction and the desiccation of small streams and springs are the main threats to this species. Already, many springs known to be inhabited by the species in the 20<sup>th</sup> century have dried out and these subpopulations are lost. The growing human population will increase water abstraction in future and reduction in rainfall induced by climate change will shrink the available water resources.”

“The species is also impacted by introduced *Gambusia* species (competitors). Currently the distribution of *Gambusia* is restricted to the southern part of the species' range by the low winter temperatures in central Anatolia, but it is predicted that in the future (more than 10 years) winter temperatures will rise due to climate change to such an extent that will allow *Gambusia* to spread across the range.”

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2017):

“Kingdom Animalia  
Subkingdom Bilateria  
Infrakingdom Deuterostomia  
Phylum Chordata  
Subphylum Vertebrata  
Infraphylum Gnathostomata  
Superclass Osteichthyes  
Class Actinopterygii  
Subclass Neopterygii  
Infraclass Teleostei  
Superorder Acanthopterygii  
Order Cyprinodontiformes  
Suborder Cyprinodontoidei  
Family Cyprinodontidae  
Subfamily Cyprinodontinae

Tribe Orestiini  
Genus *Aphanius*  
Species *Aphanius anatoliae* (Leidenfrost, 1912)”

From Eschmeyer et al. (2017):

“Current status: Valid as *Aphanius anatoliae* (Leidenfrost 1912). Cyprinodontidae: Cyprinodontinae.”

### **Size, Weight, and Age Range**

From Froese and Pauly (2016):

“Max length : 5.0 cm TL male/unsexed; [Baensch and Riehl 1991]”

### **Environment**

From Froese and Pauly (2016):

“Freshwater; benthopelagic. [...] Requires clear, well-oxygenated and, if possible running, water.”

### **Climate/Range**

From Froese and Pauly (2016):

“Temperate; 10°C - 25°C [Baensch and Riehl 1991], preferred ?”

### **Distribution Outside the United States**

#### **Native**

From Froese and Pauly (2016):

“Asia: endemic to Turkey.”

From Freyhof (2014):

“The species is known from freshwater springs and streams around Lake Tuz, and several streams, springs and marshes around Konya and eastward to Nigde. Also in spring Eflatun Pınarı in Lake Beyşehir basin.”

From Çiçek et al. (2015):

“Lakes and wetlands in western and central Anatolia.”

#### **Introduced**

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

## Means of Introduction Outside the United States

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

## Short Description

From Baensch and Riehl (2004):

“[Males] are light gray with dark gray vertical stripes. [Females] are frequently larger and gray-brown with dark gray to blackish dots. Unpaired fins are mostly transparent.”

## Biology

From Baensch and Riehl (2004):

“Substrate spawner. [...] After about one week, depending on temperature, the fry hatch. [...] Growth is slow.”

From Guclu (2012):

“Aquatic insecta, Amphipoda (*Gammarus pulex*) and Bacillariophyta are the major food resources for *A. anatoliae*. The population of *A. anatoliae* living in the water column were determined [*sic*] that summer and autumn months mainly benthic, winter and spring months were the preferred style of nutrition zooplanktonic.”

From Freyhof (2014):

“This species exists in more than 10 isolated populations. Most of them are believed to have declined due to many threats in the area.”

From Küçük et al. (2009):

“It is a native fish of [Lake Eğirdir], forming small schools, especially in the littoral zone where submerged plants are dense. The population has instantaneously increased and in 2006-2007 became dominant, together with *A. boyeri*, presumably after the disappearance of the predatory effects of pike-perch in recent years.”

## Human Uses

From Froese and Pauly (2016):

“Fisheries: of no interest; aquarium: commercial”

## Diseases

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

## Threat to Humans

From Froese and Pauly (2016):

“Harmless.”

## 3 Impacts of Introductions

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

## 4 Global Distribution

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**Figure 1.** Known global distribution of *Aphanius anatoliae*. Map from GBIF (2016). Points in the Aegean and Mediterranean Regions of Turkey were excluded from climate matching because they are not within the described range for *A. anatoliae* (see “Native Range”), and may represent former subspecies of *A. anatoliae* that are now considered separate species (see “Remarks”).

## 5 Distribution Within the United States

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This species has not been reported as introduced or established in the U.S.

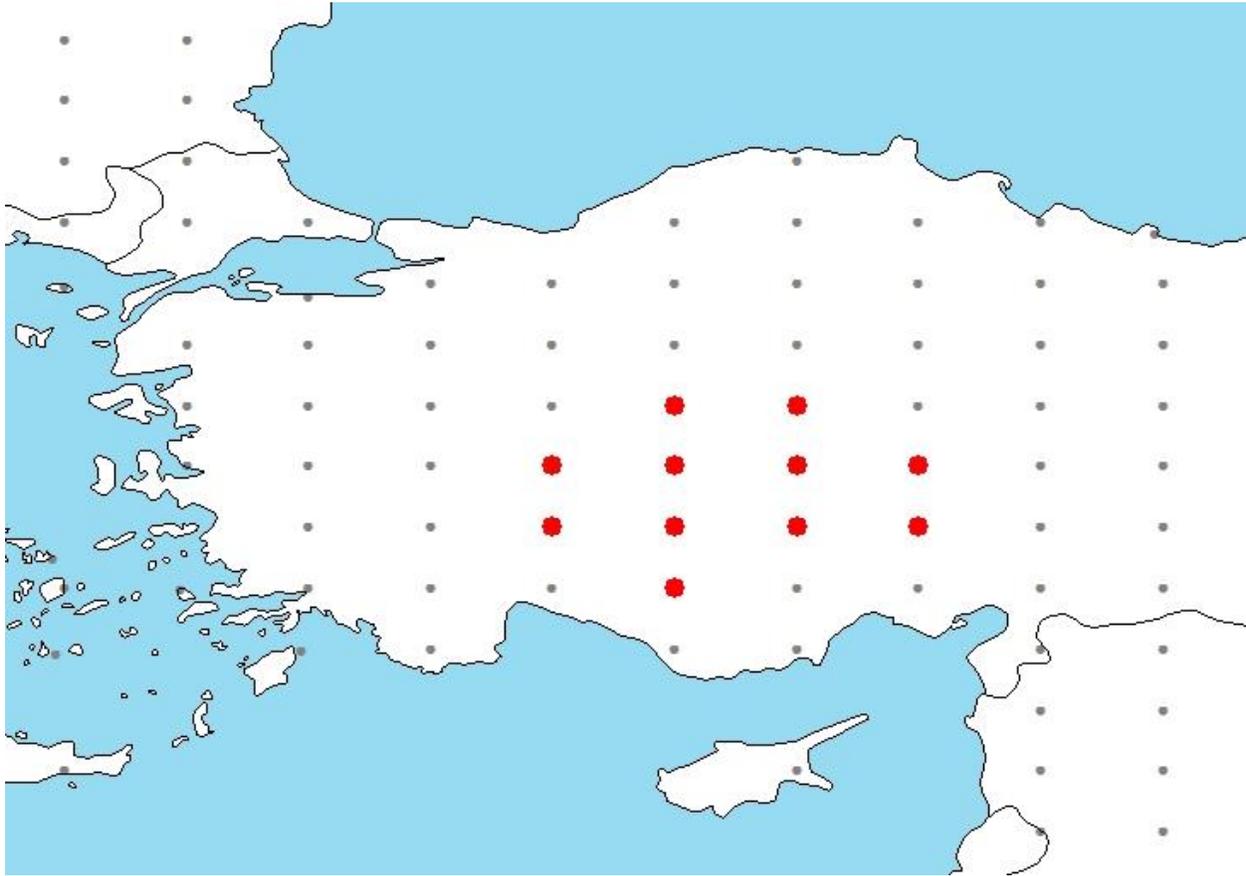
## 6 Climate Matching

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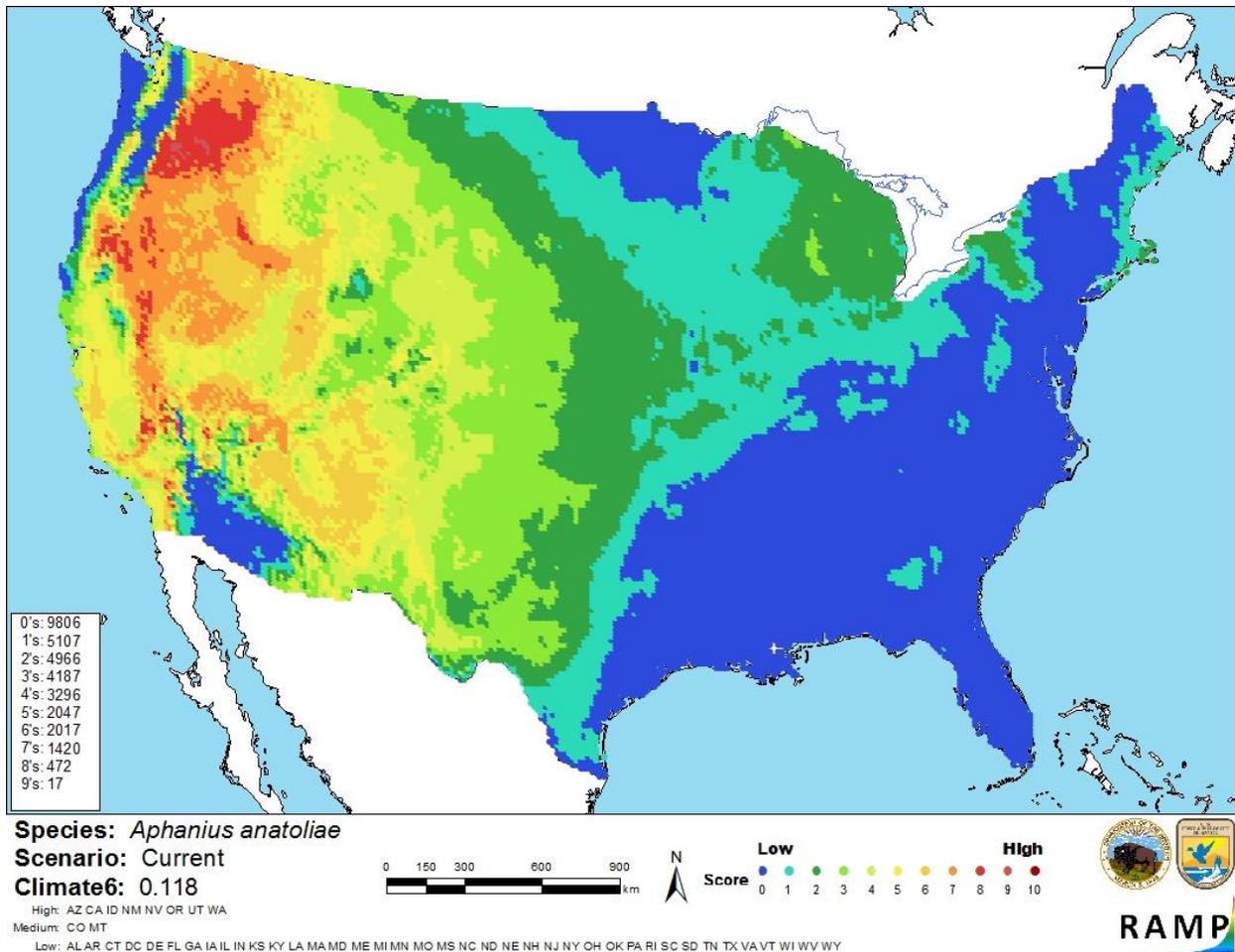
### Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous U.S. was high. Scores  $\geq 0.103$  are classified as high; Climate 6 score for *A. anatoliae* was 0.118. High matches occurred along the eastern side of the Sierra Nevada mountains and on

the Columbia Plateau. Exclusively low matches occurred east of the Mississippi River, with medium values through the Rocky Mountain region and much of California.



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



**Figure 3.** Map of RAMP (Sanders et al. 2014) climate matches for *Aphanius anatoliae* 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
$0.000 < X < 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

There is limited information available on *Aphanius anatoliae*. No introductions of this species outside of its native range have been documented. More information is needed on the biology and impacts of introduction of *A. anatoliae*. Certainty of this assessment is low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Aphanius anatoliae* is a killifish native to Turkey. This species has a high climate match with the contiguous United States, with the locations of highest match occurring in the western U.S. No introductions of this species have been documented, and more information is needed to adequately assess the risk this species poses. Overall risk posed by *A. anatoliae* is uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 3):** Uncertain
- **Climate Match (Sec. 6):** High
- **Certainty of Assessment (Sec. 7):** Low
- **Overall Risk Assessment Category:** Uncertain

## 9 References

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

- Baensch, H. A., and R. Riehl. 2004. Aquarium atlas, volume 3. Translated from the German by G. W. Fischer, and S. E. Borrer. MERGUS-Verlag, Melle, Germany.
- Çiçek, E., S. S. Birecikligil, and R. Fricke. 2015. Freshwater fishes of Turkey: a revised and updated annotated checklist. *Biharean Biologist* 9(2):141-157.
- Eschmeyer, W. N., R. Fricke, and R. van der Laan, editors. 2017. Catalog of fishes: genera, species, references. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (March 2017).
- Freyhof, J. 2014. *Aphanius anatoliae*. The IUCN Red List of Threatened Species 2014: e.T1843A19005979. Available: <http://www.iucnredlist.org/details/1843/0>. (March 2017).
- Froese, R., and D. Pauly, editors. 2016. *Aphanius anatoliae* (Leidenfrost, 1912). FishBase. Available: <http://www.fishbase.org/summary/Aphanius-anatoliae.html>. (March 2017).
- GBIF (Global Biodiversity Information Facility). 2016. GBIF backbone taxonomy: *Aphanius anatoliae* (Leidenfrost, 1912). Global Biodiversity Information Facility, Copenhagen. Available: <http://www.gbif.org/species/4284442>. (March 2017, June 2017).
- Guclu, S. S. 2012. Population structure of killifish, *Aphanius anatoliae* (Cyprinodontidae) endemic to Anatolia in Lake Eğirdir-Isparta (Turkey). *Iranian Journal of Fisheries Sciences* 11(4):786-795.

ITIS (Integrated Taxonomic Information System). 2017. *Aphanius anatoliae* (Leidenfrost, 1912). Integrated Taxonomic Information System, Reston, Virginia. Available: [https://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=647059#null](https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=647059#null). (March 2017).

Küçük, F., H. M. Sari, O. Demir, and I. Güllü. 2009. Review of the ichthyofaunal changes in Lake Eğirdir between 1915 and 2007. *Turkish Journal of Zoology* 33:277-286.

Sanders, S., C. Castiglione, and M. H. Hoff. 2014. Risk Assessment Mapping Program: RAMP. U.S. Fish and Wildlife Service.

## **10 References Quoted But Not Accessed**

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**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.**

Baensch, H. A., and R. Riehl. 1991. *Aquarien atlas*, volume 3. Mergus, Verlag für Natur-und Heimtierkunde, Melle, Germany.