

# Arawana (*Osteoglossum bicirrhosum*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011

Revised, August 2017

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<https://commons.wikimedia.org/w/index.php?curid=226294>. (August 2017).

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## 1 Native Range and Status in the United States

## Native Range

From Schofield et al. (2017):

“Tropical America; northern South America including the Amazon basin and the Guianas (Robins et al. 1991).”

From Froese and Pauly (2017):

“South America: Amazon River basin, Rupununi and Oyapock Rivers.”

## Status in the United States

From Schofield et al. (2017):

**“Nonindigenous Occurrences:** Three specimens have been recorded from **California**. The first was a single fish taken from Lake Berryessa, Napa County, by an angler ca. 1972 (Shapovalov et al. 1981; Courtenay et al. 1991); a second specimen was netted from Lake Merced, San Francisco County, by anglers in August 1994 (Dill and Cordone 1997); a third specimen was collected from Adobe Creek in Petaluma in July 2000 (D. Logan, personal communication). A single fish was collected from the Denver, **Colorado** area in 2004 (Walker, pers. comm.). A fish was photographed at Blue Hole on Big Pine Key, **Florida** in 2003 (Loftus, pers. comm.); a single individual was collected by an angler from a retention pond adjacent to East Lake Tohopekaliga (K. McDaniel, Florida Fish and Wildlife Conservation Commission, pers. comm.). An *Osteoglossum* species was reported from a freshwater reservoir in O'ahu, **Hawaii'i** in 1988-1989, but no specimen was collected and the species was not identified. That sighting is provisionally allocated to *O. bicirrhosum* as it is more frequently imported than *O. ferreirai* (Mundy 2005). One individual was taken in Lake George, **Indiana** in October 2000 (Keller, pers. comm.). The species was unsuccessfully introduced at Forest Spring in Ash Meadows, Nye County, **Nevada**, during the early 1960s (Soltz and Naiman 1978; Deacon and Williams 1984; Vinyard 2001). One individual was taken in a small pond in Bensalem, **Pennsylvania** in July 2005 (DeVicaris, personal communication). A specimen in a Chicago, **Illinois** canal was electrofished in 2013 (A. Plauck, personal communication).”

**“Status:** All reported introductions of arawana have failed to establish viable populations.”

## Means of Introductions

From Schofield et al. (2017):

“Aquarium releases in most locations. Juveniles and small adults are found in the ornamental fish trade. They quickly reach sizes too large for most hobbyists. Introduced by an illegal ornamental fish-farming operation in Nevada (Soltz and Naiman 1978).”

## Remarks

From Schofield et al. (2017):

“Conventionally, most arawanas (especially in the aquarium trade) have been referred to as *O. bicirrhosum*. Some of these (including our own records) may have actually been *O. ferreirai*; however, this is unlikely because *O. bicirrhosum* is most commonly imported and sold in the U.S. and is easily distinguishable as juveniles/subadults [sic] [...]”

## 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 Actinopterygii

Class Teleostei

Superorder Osteoglossomorpha

Order Osteoglossiformes

Suborder Osteoglossoidei

Family Osteoglossidae

Subfamily Osteoglossinae

Genus *Osteoglossum* Cuvier, 1829

Species *Osteoglossum bicirrhosum* (Cuvier, 1829)”

“Taxonomic Status:

Current Standing: valid”

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

From Froese and Pauly (2017):

“Max length: 90.0 cm TL male/unsexed; [Ferraris 2003]; max. published weight: 6.0 kg [Machacek 2007]”

## **Environment**

From Froese and Pauly (2017):

“Freshwater; benthopelagic.”

“It is capable of adapting to environments with low oxygen levels [Planquette et al. 1996].”

## **Climate/Range**

From Froese and Pauly (2017):

“Tropical; 24°C - 30°C [Riehl and Baensch 1991]”

## Distribution Outside the United States

### Native

From Schofield et al. (2017):

“Tropical America; northern South America including the Amazon basin and the Guianas (Robins et al. 1991).”

From Froese and Pauly (2017):

“South America: Amazon River basin, Rupununi and Oyapock Rivers.”

### Introduced

From Froese and Pauly (2017):

<b>Year/Period</b>	<b>From</b>	<b>To</b>	<b>Established</b>
unknown	Unknown	Philippines	unknown
[...]	[...]	[...]	[...]
1990	unknown	China	unknown”

## Means of Introduction Outside the United States

From Froese and Pauly (2017):

“Reason: ornamental [...] Assumed to be introduced for aquaria. [Chen 2002]”

## Short Description

From Froese and Pauly (2017):

“Body covered with very big scales; dorsal and anal fins almost fused with the caudal fin; 2 barbels at the extremity of the lower jaw; adult silvery, juvenile with blue glints and a yellow-orange bar [Planquette et al. 1996].”

## **Biology**

From Froese and Pauly (2017):

“Is an omnivore with a tendency to feed on fish at the surface. The superior position of the mouth allows it to capture its prey while swimming from below. Also jumps out of the water to feed on large insects (Coleoptera; [Ferreira et al. 1998]).”

“The male carries eggs, larvae and early juveniles (alevinos) in his mouth [Riehl and Baensch 1991], which lasts for nearly six weeks [Verba et al. 2014].”

From Tavares-Dias et al. (2014):

“A benthopelagic fish with a sedentary life-style, it can jump out of water to catch prey in nearby branches, which allows this species exploring a variety of arboreal preys, such as insects, arachnids and other small vertebrates. A small portion of its diet consists of small fish; it is an omnivorous species and also feeds on crustaceans and mollusks, showing no variations in the type of food from a hydrological period to another (SANTOS et al., 2006; AGUDELO-ZAMORA et al., 2007; SOARES et al., 2008). All these characteristics indicate that this is a carnivore-insectivore fish. Reproduction occurs between the end of the dry season (December) and the beginning of the flooding season (January). The females begin the process of sexual maturity at 55 cm out of standard length (SOARES et al., 2008).”

## **Human Uses**

From Froese and Pauly (2017):

“Fisheries: commercial; gamefish: yes; aquarium: commercial”

## **Diseases**

From Froese and Pauly (2017):

“*Camallanus* Infection 14, Parasitic infestations (protozoa, worms, etc.)”

From Mood et al. (2010):

“[...] metacercariae of the heterophyid trematode *Centrocestus formosanus* were found encysted in the gills of [...] Arowana (*Osteoglossum bicirrhosum*). [...] *C. formosanus* is a trematode that produces severe alterations in the gills of many freshwater fishes, most notably cartilage proliferation around the encysted trematode in the branchial tissues. It has caused significant losses among cichlids, characids, and cyprinids.”

From Kritsky et al. (1996):

“*Telethecium nasalis* sp. n. [...] HOST AND LOCALITY: Nasal cavity of *Osteoglossum bicirrhosum* Vandelli (Osteoglossidae); Furo do Catalao, near Manaus, Amazonas, Brazil (10 January 1989).”

From Mehdizadeh Mood and Rassouli (2016):

“In this research, 35 *O. bicirrhosum* [...] with clinical signs were collected from different ornamental fish markets in Semnan, Iran and transferred alive to the Lab. Fish skin and gills were examined for monogenean infestations. No monogenea was observed on the skin specimens, but *Gonocleithrum cursitans* [...] infested 54.28% [...] of gills in *O. bicirrhosum* [...]”

From Tavares-Dias et al. (2014):

“From the examined arowana *O. bicirrhosum*, 87.5% had their gills parasitized by *Gonocleithrum aruanae* Kristy & Thatcher, 1983 (Monogenoidea, Dactylogyridae), but no other parasite was found.”

## Threat to Humans

From Froese and Pauly (2017):

“Harmless”

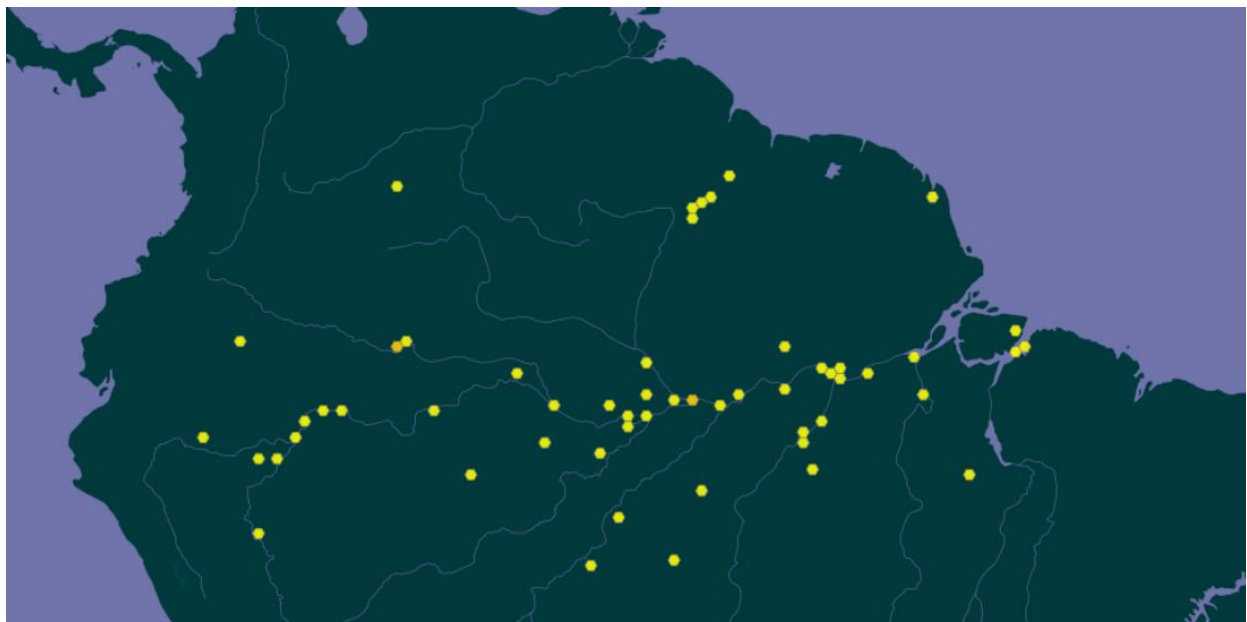
### 3 Impacts of Introductions

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From Schofield et al. (2017):

“Impact of Introduction: Unknown.”

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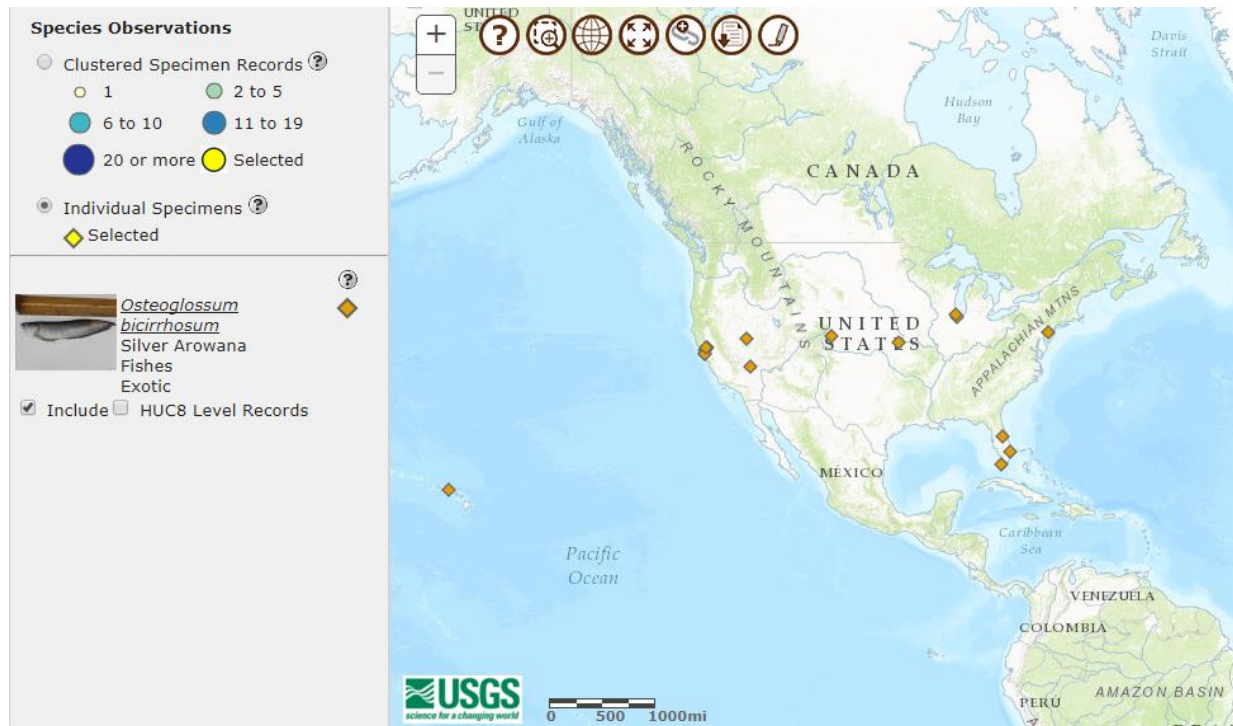


### 4 Global Distribution

**Figure 1.** Known global established locations of *O. bicirrhosum*. Map from GBIF (2016). Points in southern South America, North America, and the Eastern Hemisphere were excluded from this map and the climate matching analysis because they do not represent known established populations.



## 5 Distribution Within the United States

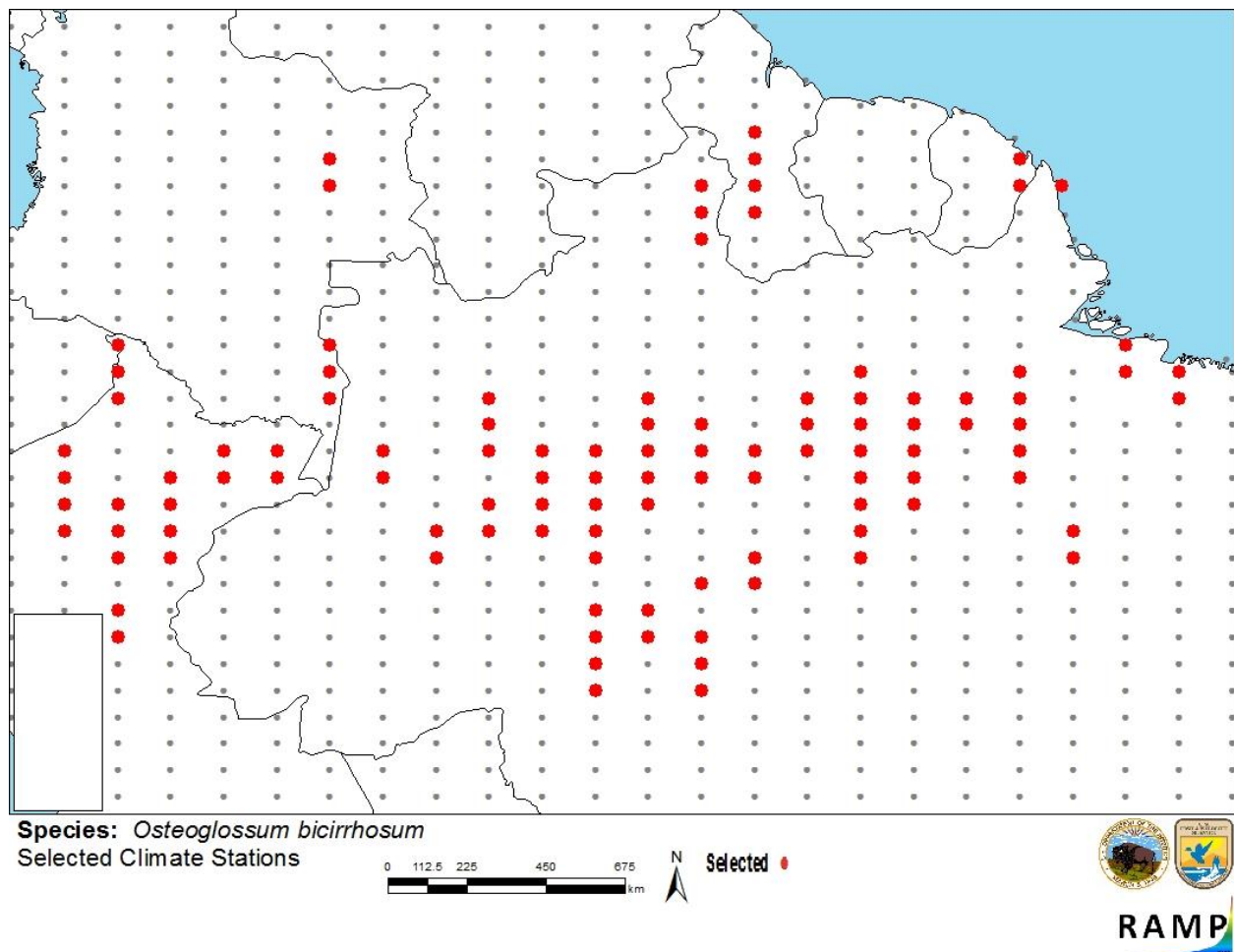


**Figure 2.** Known distribution of *O. bicirrhosum* in the United States. No locations represent established populations. Map from Schofield et al. (2017).

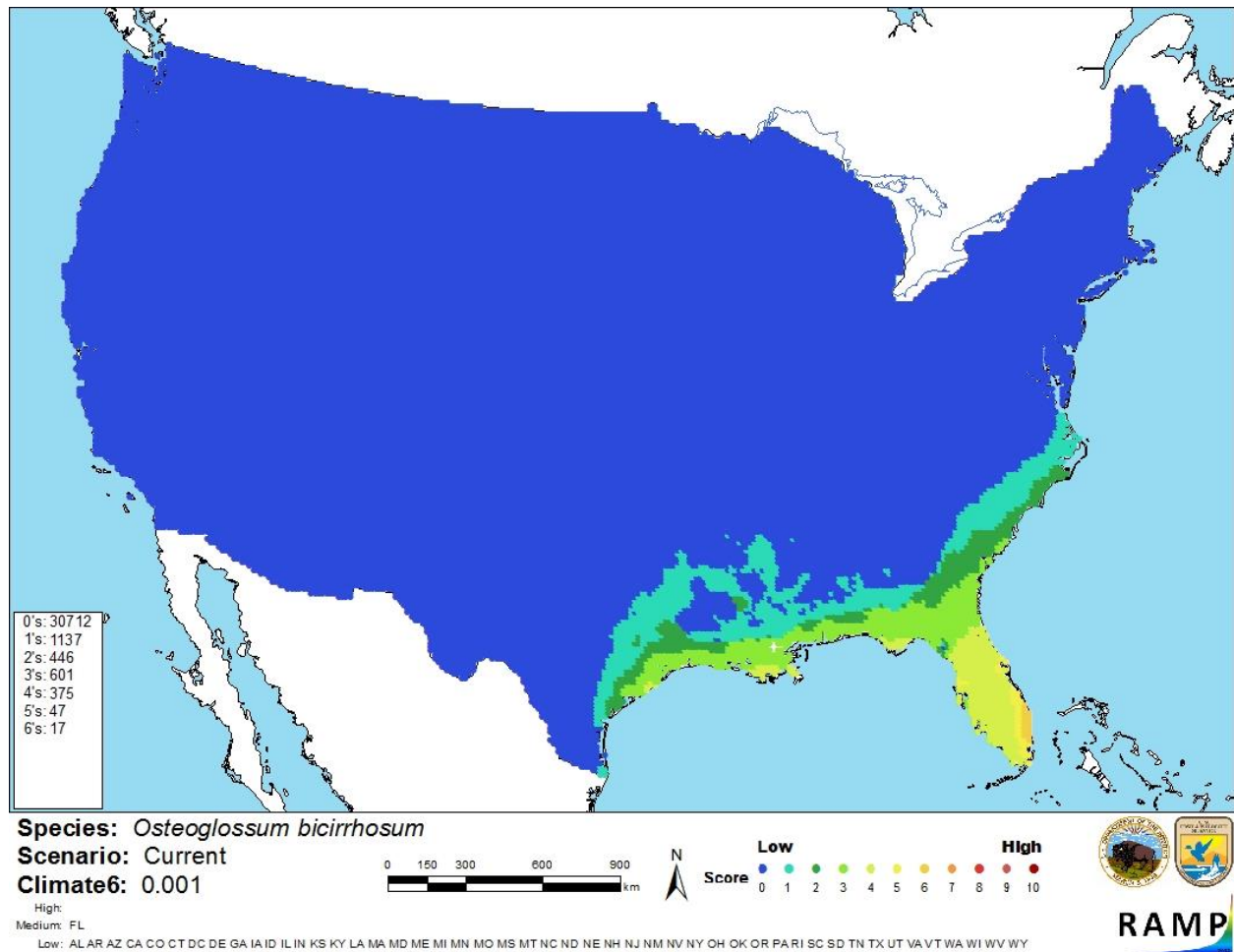
## 6 Climate Matching

### Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was medium in peninsular Florida, in the Florida panhandle south and west of Tallahassee, and in coastal Louisiana. The remainder of the contiguous U.S. showed low match. Climate 6 score indicated that the contiguous U.S. has a low climate match overall. The score range for a low climate match is 0.000-0.005; Climate 6 score for *O. bicirrhosum* was 0.001.



**Figure 3.** RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *O. bicirrhosum* climate matching. Source locations from GBIF (2016). Only established locations were used.



**Figure 4.** Map of RAMP (Sanders et al. 2014) climate matches for *O. bicirrhosum* in the contiguous United States based on source locations reported by GBIF (2016). 0=Lowest match, 10=Highest match.

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
$\geq 0.103$	High

## 7 Certainty of Assessment

Information is available on the biology, ecology, and distribution of *O. bicirrhosum*. Introductions of the species have been documented but no information is available on impacts of introduction. More information on impacts is needed for accurate risk assessment. Certainty of this assessment is low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Osteoglossum bicirrhosum* is a large, omnivorous fish native to northern South America. It has been introduced to locations in the U.S., China, and the Philippines; all introductions were likely associated with the aquarium trade. No introductions have resulted in confirmed established populations, and no information is available on impacts of introduction. Climate match to the contiguous U.S. is low overall, with areas of medium match occurring in Florida and Louisiana. Further information is needed to determine the risk that *O. bicirrhosum* poses to the contiguous U.S. Overall risk assessment category is uncertain.

### Assessment Elements

- **History of Invasiveness: Uncertain**
- **Climate Match: Low**
- **Certainty of Assessment: Low**
- **Overall Risk Assessment Category: Uncertain**

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## 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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