U.S. Fish & Wildlife Service

Small-scaled Pacu (*Piaractus mesopotamicus*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011
Revised, January 2018
Web Version, 9/20/2019

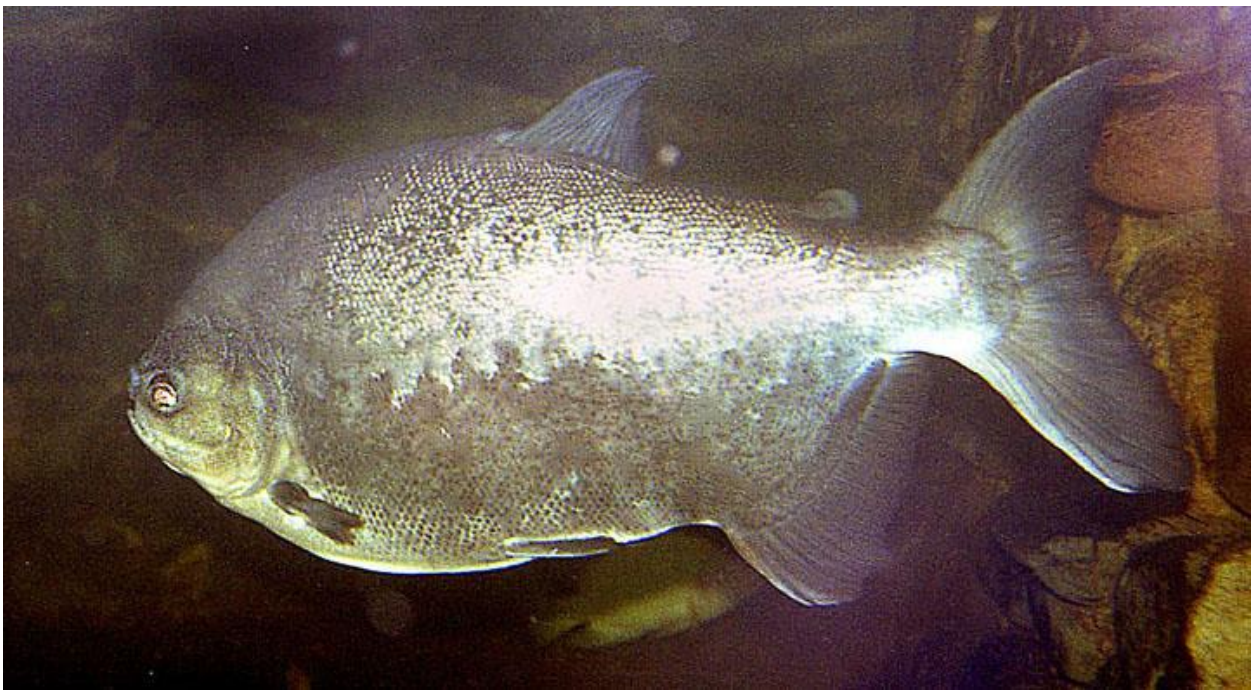

Photo: D. Culbert. Licensed under CC BY 2.0. Available: https://commons.wikimedia.org/wiki/File:Piaractus_mesopotamicus_-_Flickr_-_Dick_Culbert.jpg. (January 2018).

1 Native Range and Status in the United States

Native Range

From Nico and Loftus (2018):

"Tropical America. Restricted to the La Plata Basin, South America (Machado-Allison 1982), including the Paraguay/Parana rivers [Argentina, Bolivia, Brazil, Paraguay, Uruguay]."

Status in the United States

From Nico and Loftus (2018):

"A single fish (56 cm and 3515 g) was reported as taken in Florida by an angler from a brackish-water canal at Sunshine Parkway bridge near town of Cape Coral, Charlotte Bay drainage, Lee County, on 4 July 1987 (Courtenay, personal communication). A single specimen (identified as *Piaractus mesopotamicus*) was taken in Oregon from Herbert's Pond near Canyonville, Douglas County, in the Umpqua River drainage on 21 August 1989 (Logan et al. 1996)."

"Failed in Florida and Oregon."

From Ruiz-Carus and Davis (2003):

"There are also a few reports of *Piaractus mesopotamicus* taken in Florida, but most of these records should be considered unconfirmed (Fuller et al., 1999)."

Information on trade in this species within the United States could not be found. However, because Nico and Loftus (2018) attribute introductions of *P. mesopotamicus* in the United States to the aquarium trade pathway, *P. mesopotamicus* may have been in trade in the United States in the past if not in the present.

From New Mexico Department of Game and Fish (2010):

"Species importation list group IV may be for live non-domesticated animals that are considered dangerous, invasive, undesirable, state or federal listed threatened, endangered, a furbearer or any other species of concern as identified by the director. The importation of these species are prohibited for the general public but may be allowed for, scientific study, department approved restoration and recovery plans, zoological display, temporary events/entertainment, use as service animal or by a qualified expert."

All piranha and pacu (family Characidae) are listed in Group IV of the Director's Species Importation List.

Means of Introductions in the United States

From Nico and Loftus (2018):

"All records probably represent aquarium releases."

Remarks

From Nico and Loftus (2018):

"The Florida specimen, originally reported as a piranha in newspaper accounts, was not preserved. That specimen was apparently destroyed and the fish was later identified as *Colossoma metrei* (= *Piaractus mesopotamicus*) based on a photograph (Courtenay, personal

communication). Because of the close resemblance with other pacus, that identification should be considered tentative."

"At least some, and perhaps all, specimens taken in United States waters and identified as this species may actually have been the closely related *Piaractus brachypomus*. In addition, *Piaractus* specimens taken in United States waters have frequently been misidentified as red piranhas *Pygocentrus nattereri*."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Animalia
  Subkingdom Bilateria
    Infrakingdom Deuterostomia
      Phylum Chordata
        Subphylum Vertebrata
          Infraphylum Gnathostomata
            Superclass Actinopterygii
              Class Teleostei
                Superorder Ostariophysi
                  Order Characiformes
                    Family Characidae
                      Genus *Piaractus*
                        Species *Piaractus mesopotamicus* (Holmberg, 1887)"

From Eschmeyer et al. (2018):

"Current status: Valid as *Piaractus mesopotamicus* (Holmberg 1887). Serrasalmidae."

Size, Weight, and Age Range

From Froese and Pauly (2017):

"Max length : 40.5 cm SL male/unsexed; [Jégu 2003]; max. published weight: 20.0 kg [Lovshin 1995]"

From Nico and Loftus (2018):

"To about 85 cm SL, and reaches 20 kg in weight (Lovshin 1995)."

Environment

From Froese and Pauly (2017):

"Freshwater; demersal; potamodromous [Riede 2004]."

From Milstein et al. (2000):

"Pacu, *Piaractus mesopotamicus* (= *Colossoma mitrei*), is a South American warm water fish species found in the temperature range of 15–35° C."

"Short term exposures at lower temperatures down to 7–7.5^{O} C seem to represent the lower tolerance limit of this species, at least for one-year-old fish."

Climate/Range

From Froese and Pauly (2017):

"Subtropical; 15°S - 38°S, 66°W - 42°W"

Distribution Outside the United States

Native

From Nico and Loftus (2018):

"Tropical America. Restricted to the La Plata Basin, South America (Machado-Allison 1982), including the Paraguay/Parana rivers [Argentina, Bolivia, Brazil, Paraguay, Uruguay]."

Introduced

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

Means of Introduction Outside the United States

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Short Description

From Froese and Pauly (2017):

"Dark grey to silver dorsally and laterally and white ventrally with a yellow breast."

From Ruiz-Carus and Davis (2003):

"*Piaractus mesopotamicus* can be distinguished from the other two pacu by the number of scales in the lateral line […]. Usually, *P. mesopotamicus* has > 110, […]"

From Mirande (2010):

"Branching of laterosensory canals of fourth or fifth infraorbitals […] present."

"Canal of lateral line on caudal-fin membrane […] present."

“Interdigitations between premaxillae […] present.”

“Form of interdigitations between dentaries […] undulate lamellae.”

“Anterior extension of interopercle […] not extending anteriorly beyond terminus of horizontal arm of preopercle.”

“Number of gill rakers on first hypobranchial and ceratobranchial […] 16 or more.”

“Teeth on third pharyngobranchial […] absent.”

“Number of branchiostegal rays […] five.”

Biology

From Galetti et al. (2008):

“The Pantanal is a large, seasonally flooded area located in central-western Brazil, eastern Bolivia, and northeastern Paraguay, which comprises *ca* 3 percent of the world's wetlands (Swarts 2000). In the upper Paraguay River, a major drainage of the Pantanal, various frugivorous fish species are found, including the piraputanga (*Brycon hilarii*, Characidae) and the pacu, but little is known about their role as seed dispersers (Pott & Pott 1994, Sabino & Sazima 1999, Reys *et al.* in press).”

“The most important food item in the pacu diet was fruit of the palm *B. glaucescens*, found in the guts of 51 out of 70 fish (almost 73%).”

“Transport of seeds upstream by fishes has also been observed in Costa Rica (Horn 1997; Banack et al. 2002) and western Brazil (Reys et al. in press). In fact, the pacu is the primary seed disperser of many important fleshy-fruited plants in the gallery forests of the Pantanal, where at least 43 fruit species are fish-dispersed (mostly *P. mesopotamicus* and *B. hilarii*; Pott & Pott 1994).”

Human Uses

From Froese and Pauly (2017):

“Aquaculture: commercial”

From Singh (2018):

“[…] three pacu species, *Piaractus brachypomus*, *P. mesopotamicus* and *Colossoma macropomum*, are common species available in Hungary in the aquarium fish trade […]”

Diseases

No OIE-listed diseases (OIE 2019) have been reported for this species.

Poelen et al. (2014) list the following as parasites of *Piractus mesopotamicus*: *Anacanthorus penilabiatus*, *Proteocephalus vazzolerae*, *Mymarothecium viatorum*, and *Rondonia rondoni* (Strona et al. 2013).

Threat to Humans

From Froese and Pauly (2017):

"Harmless"

3 Impacts of Introductions

From Nico and Loftus (2018):

"Unknown."

The importation of *P. mesopotamicus* is restricted by the New Mexico Department of Game and Fish (2010).

4 Global Distribution

Figure 1. Known global distribution of *Piaractus mesopotamicus*, reported from Brazil. Map from GBIF Secretariat (2018). A point in Oregon was excluded due to not being a record of an established population. A point in India was excluded due to invalid coordinates. No georeferenced occurrences were reported for parts of the species native range in Bolivia, Paraguay, Uruguay, or Argentina.

5 Distribution Within the United States

Figure 2. Known occurences of *Piaractus mesopotamicus* in the United States. Map from Nico and Loftus (2018). These points represent failed introductions, not established populations.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.037, which is a medium climate match. (Scores between 0.005 and 0.103 are classified as medium.) In general, the Southeastern States had a medium to high climate match, while the rest of the United States had a low climate match. The following States had a high climate score: Alabama, Florida, Georgia, Louisiana, and Mississippi. North Carolina, South Carolina, and Texas each had a medium climate score, and all other States had a low climate score.

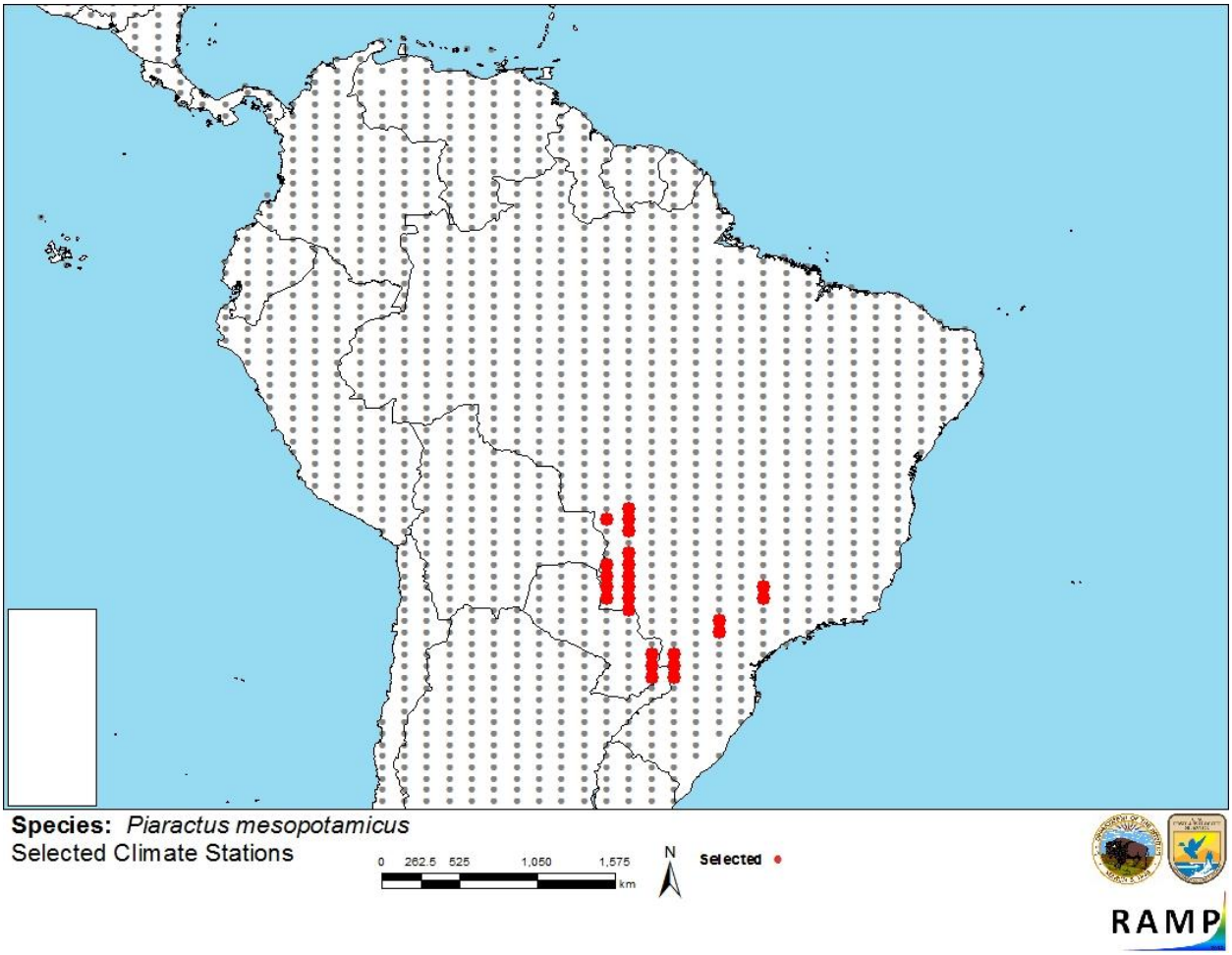

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; Brazil, Paraguay) and non-source locations (gray) for *Piaractus mesopotamicus* climate matching. Source locations from GBIF Secretariat (2018). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

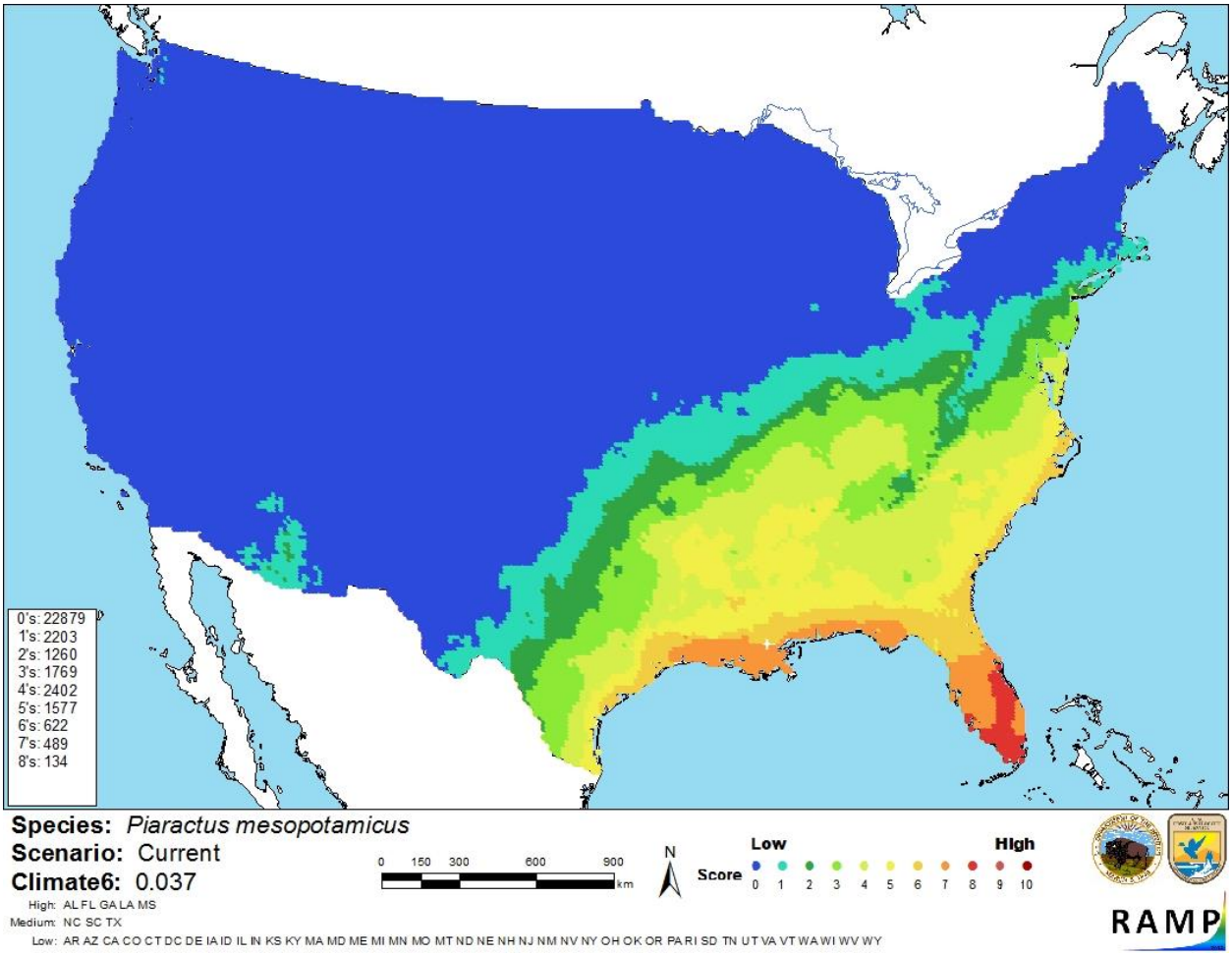

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Piaractus mesopotamicus* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 0 = Lowest match, 10 = Highest match.

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≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

Information on the biology and distribution of this species is readily available. No information is available on impacts of introductions of this species because there have been no confirmed established populations of this species. Misidentification of this species is also common. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Piaractus mesopotamicus, Small-scaled Pacu, is a species of fish native to Argentina, Bolivia, Brazil, Paraguay, and Uruguay. This species is used in the aquarium trade and in aquaculture. It has been found Oregon and Florida, likely as a result of aquarium releases, although species identification has been challenging. These reported introductions seem to represent released specimens, not established populations. Without a confirmed established population outside its native range, the history of invasiveness for *P. mesopotamicus* is "Uncertain." *P. mesopotamicus* has an overall medium climate match with the contiguous United States, with a high match in coastal areas of the Southeast. Because impacts of introductions of this species have not been studied, further information is needed to adequately assess the risk this species poses. Certainty of this assessment is low, and the overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **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

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