

San Francisco Piranha (*Pygocentrus piraya*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, May 2012
Revised, March 2019
Web Version, 3/9/2021

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

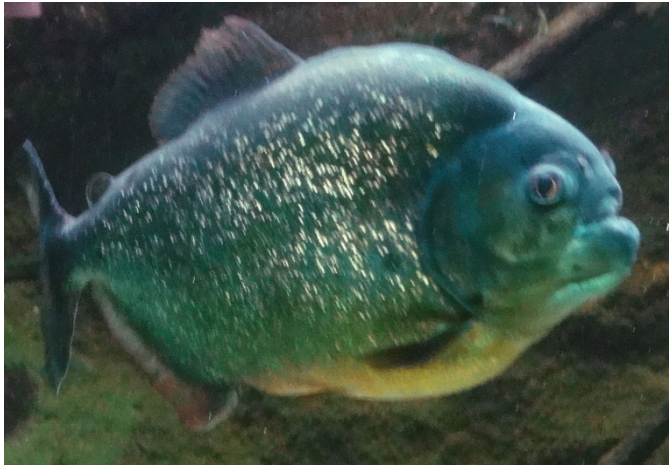


Photo: Jutta234. Licensed under Creative Commons Attribution-Share Alike 3.0 Unported. Available: https://commons.wikimedia.org/wiki/File:Pygocentrus_piraya_-_Zoo_Frankfurt_4.jpg. (March 2019).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

“South America: Sao Francisco River basin in Brazil.”

From Belei et al. (2012):

“This species, widely distributed throughout the São Francisco River basin (Britski et al. 1986), [...]”

Status in the United States

No records of *Pygocentrus piraya* in the wild or in trade in the United States were found.

Pygocentrus piraya is a prohibited species in Alabama (Alabama DCNR 2019). “No person, firm, corporation, partnership, or association shall possess, sell, offer for sale, import, bring, release, or cause to be brought or imported into the State of Alabama” a prohibited species.

From Arizona Office of the Secretary of State (2013):

“I. Fish listed below are considered restricted live wildlife:

[...]

33. All species of the genera *Pygocentrus*, *Pygopistis*, and *Serrasalmus*. Common name: piranha.”

Piranhas are prohibited species in Arkansas (Arkansas GFC 2019). *Pygocentrus piraya* is a species of piranha.

From California Department of Fish and Wildlife (2019):

“It is unlawful to import, transport, possess, or release alive into this state, except under a revocable, nontransferable permit as provided in this chapter and the regulations pertaining thereto, any wild animal of the following species:

[...]

Family Characidae (characins): Banded tetra, *Astyanax fasciatus*, All species of piranhas”

From Connecticut Secretary of State (2016):

“The importation or possession of piranha of the subfamily: Serrasalminae, genera *Serrasalmus*, *Serrasalmo*, *Pygocentrus*, *Teddyella*, *Rooseveltiella* and *Pygopristus*, and walking catfish of the family Clariidae, genera *Clarias*, *Heteropneustes*, *Dinotoplerus* and *Heterobranchus* is prohibited except that the Commissioner may at his discretion issue permits for the importation and possession, when it is in the public interest, for public display purposes, of specimens of piranha and walking catfish.”

The Florida Fish and Wildlife Conservation Commission has listed the piranha *Pygocentrus piraya* as a prohibited species. Prohibited nonnative species (FFWCC 2020), “are considered to be dangerous to the ecology and/or the health and welfare of the people of Florida. These species are not allowed to be personally possessed or used for commercial activities.”

Species of piranha (including *Pygocentrus piraya*) are prohibited as pets in Georgia (Georgia DNR 2020).

All species in the genus *Pygocentrus* are on Hawaii’s Prohibited Animal List (Hawaii Department of Agriculture 2019).

All species in the genus *Pygocentrus* are listed as invasive species in Idaho (Idaho Office of the Administrative Rules Coordinator 2019). “No person may possess, cultivate, import, ship, or transport any invasive species, into or through the state of Idaho following the effective date of

this rule, unless the person possessing, importing, shipping or transporting has obtained a permit under Section 103 or unless otherwise exempt by this rule, as set forth in Section 104.”

From Kentucky General Assembly (2019):

“The live aquatic organisms established in subsections (1) through (7) of this section shall not be imported, bought, sold, or possessed in aquaria:

(1) Subfamily Serrasalminae [which includes the genus *Pygocentrus*] -piranha, piraya, pirae, or tiger characins;”

Possession of species of piranha (including *Pygocentrus piraya*) is prohibited in Louisiana (Louisiana State Legislature 2019).

From Massachusetts Division of Fisheries and Wildlife (2014):

“All aquarium trade fish may be kept without a permit except species categorically non-exempt pursuant to 321 CMR 9.01(3), and except that the following species are prohibited without a permit:

[...]

(b) Piranha (*Pygocentrus* spp. and *Serrasalmus* spp.)”

From Mississippi Secretary of State (2019):

“All species of the following animals and plants have been determined to be detrimental to the State's native resources and further sales or distribution are prohibited in Mississippi. No person shall import, sell, possess, transport, release or cause to be released into the waters of the state any of the following aquatic species or hybrids thereof. [...]

Piranha and pirambebas Subfamily Serrasalminae [includes genus *Pygocentrus*] **[includes all the piranhas] ****[all species]”

Pygocentrus piraya falls within Group IV of New Mexico’s Department of Game and Fish Director’s Species Importation List (New Mexico Department of Game and Fish 2010). Group IV 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.”

From State of Nevada (2018):

“Except as otherwise provided in this section and NAC 504.486, the importation, transportation or possession of the following species of live wildlife or hybrids thereof, including viable embryos or gametes, is prohibited: [...] All species in the genera *Serrasalmus*, *Serrasalmo*, *Pygocentrus*, *Teddyella*, *Rooseveltiella* and *Pygopristis*”

From Oklahoma Secretary of State (2019):

“Until such time as is necessary for the Department of Wildlife Conservation to obtain adequate information for the determination of other harmful or potentially harmful exotic species, the importation into the State and/or the possession of the following exotic fish or their eggs is prohibited:

[...]

Piranha group: *Serrasalmus* spp., *Pygocentrus* spp., *Rooseveltiella* spp., *Catoprion* spp., *Hydrocynus* spp., and *Salminus* spp.”

From South Carolina Legislature (2019):

“A person may not possess, sell, offer for sale, import, bring, or cause to be brought or imported into this State or release into the waters of this State the following fish or eggs of the fish: [...] (5) piranha (all members of *Serrasalmus*, *Rooseveltiella*, and *Pygocentrus* genera);”

From Texas Parks and Wildlife (2020):

“The organisms listed here [including all species of *Pygocentrus*] are legally classified as exotic, harmful, or potentially harmful. No person may possess or place them into water of this state except as authorized by the department. Permits are required for any individual to possess, sell, import, export, transport or propagate listed species for zoological or research purposes; for aquaculture (allowed only for Blue, Nile, or Mozambique tilapia, Triploid Grass Carp, or Pacific White Shrimp); or for aquatic weed control (for example, Triploid Grass Carp in private ponds).”

From Virginia DWR (2020):

“A special permit is required, and may be issued by the Department, if consistent with the Department’s fish and wildlife management program, to import, possess, or sell the following non-native (exotic) amphibians, fish, mollusks, aquatic invertebrates, and reptiles: [...] piranhas,”

All species of the genus *Pygocentrus* are considered Prohibited Level 3 species in Washington (Washington State Senate 2014, 2019). A Prohibited Level 3 species “pose a moderate to high invasive risk and may be appropriate for prevention, rapid response, or other prohibited species management plan actions by the department, another agency, a local government, tribes, or the public.”

Means of Introductions in the United States

No records of *Pygocentrus piraya* in the wild in the United States were found.

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

“**Current status:** Valid as *Pygocentrus piraya* (Cuvier 1819).”

From ITIS (2019):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Characiformes
Family Characidae
Genus *Pygocentrus*
Species *Pygocentrus piraya* (Cuvier, 1819)

Size, Weight, and Age Range

From Froese and Pauly (2019):

“Max length : 34.0 cm SL male/unsexed; [Jégu 2003]; max. published weight: 3.2 kg [IGFA 2001]”

Environment

From Froese and Pauly (2019):

“Freshwater; pelagic.”

Climate

From Froese and Pauly (2019):

“Tropical”

Distribution Outside the United States

Native

From Froese and Pauly (2019):

“South America: Sao Francisco River basin in Brazil.”

From Belei et al. (2012):

“This species, widely distributed throughout the São Francisco River basin (Britski et al. 1986), [...]”

Introduced

From Belei et al. (2012):

“We collected 12 individuals of the black piranha *P. piraya* in only three regions during the inventory of the ichthyofauna made between the middle and lower reaches of the Doce River [Brazil] [...]”

“It is likely that the black piranha has become established in the region [Doce River] due to a preference for regions of lentic water, as can be found in the hydroelectric reservoirs of the middle and lower Doce River, as observed in the study by Luz (2009) for Lake Curralinho (middle São Francisco), and in Três Marias reservoir (Pinto-Coelho 2006).”

From Trindade and Jucá-Chagas (2008):

“Among the different exotic fish species found in the Barragem de Pedra Reservoir [Brazil], the species [...] *Pygocentrus piraya* (Cuvier, 1819) were accidentally introduced into the reservoir about 10 years ago [...]”

Means of Introduction Outside the United States

From Belei et al. (2012):

“Through information obtained from local fishermen, it is possible that the black piranha [*Pygocentrus piraya*] may have been introduced into the region due to accidental escapes from regional breeding farms. However, we cannot rule out the possibility that this species has been introduced through stocking actions.”

From Trindade and Jucá-Chagas (2008):

“Among the different exotic fish species found in the Barragem de Pedra Reservoir, the species [...] and *Pygocentrus piraya* (Cuvier, 1819) were accidentally introduced into the reservoir about 10 years ago due to probable rupture of private tanks in marginal areas during floods.”

Short Description

From Belei et al. (2012):

“*Pygocentrus piraya* (Cuvier 1819) is popularly known as the black piranha [...] and has a medium-sized tall body which is extremely laterally compressed (Britski et al. 2007). This species, [...] differs from the other species by a rayed adipose fin (Fink 1993).”

Biology

From Froese and Pauly (2019):

“Dangerous, import prohibited in some countries. Largest of the piranhas.”

From Trindade and Jucá-Chagas (2008):

“*Serrasalmus brandtii* and *P. piraya* are carnivorous species with a preferentially ichthyophagous feeding habit and are known as mutilating predators because they remove parts of the body of live prey without killing it. They feed on fins, scales and other parts of the body of their prey, and may also ingest small intact organism when available (Sazima & Pombal-Jr, 1988; Bistoni & Haro, 1995).”

From Belei et al. (2012):

“[...] since this species [*Pygocentrus piraya*] has the ability to reproduce throughout the year in areas with lentic characteristics (Pinto-Coelho 2006).”

Human Uses

From Froese and Pauly (2019):

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

From Belei et al. (2012):

“Through information obtained from local fishermen, it is possible that the black piranha [*Pygocentrus piraya*] may have been introduced into the region due to accidental escapes from regional breeding farms. However, we cannot rule out the possibility that this species has been introduced through stocking actions.”

Diseases

No records of OIE-reportable diseases (OIE 2021) were found for *P. piraya*.

From Moravec et al. (2008):

“The cystidicolid nematode *Cystidicoloides fischeri* (Travassos, Artigas and Pereira, 1928) is redescribed from specimens collected from the stomach of the San Francisco piranha, *Pygocentrus piraya* (Cuvier), [...] (new host records), from the Tres Marias Reservoir, Upper Sao Francisco River, Minas Gerais state, Brazil”

From Santos et al. (2009):

“A total of 59 specimens (27 in *P. piraya*, 30 in *S. brandtii* and two in *C. kelberi*) of nematode larvae found in the three hosts were identified as third stage (L3) *Spiroxys* sp.; prevalence was higher in *S. brandtii* and the mean intensity and mean abundance were higher in *P. piraya* [...].”

From Santos et al. (2007):

“*Brasergasilus bifurcatus* sp. nov. (Copepoda, Ergasilidae, Abergasilinae) is described. Specimens of the new species were collected from the gills and nasal fossae of the serrasalmid fishes, known as ipiranhasê, *Pygocentrus piraya* (Cuvier, 1819) [...]”

Threat to Humans

From Froese and Pauly (2019):

“Traumatogenic”

“Dangerous, import prohibited in some countries. Largest of the piranhas.”

3 Impacts of Introductions

From Belei et al. (2012):

“The introduction of this species adversely affects the fish community, mainly through competition and predation of native species.”

From Trindade and Jucá-Chagas (2008):

“The species studied here [*Serrasalmus brandtii* and *Pygocentrus piraya*] are particularly important because, in addition to fish hatchery resources, they cause losses to fishermen because of damage to fishing nets and other fish species captured. In addition, the fact that these species are predators suggests their importance for the control of other fish populations of the ecosystem.”

Pygocentrus piraya is regulated in multiple States, see section 1.

4 History of Invasiveness

Pygocentrus piraya has been introduced to small areas outside of its native range, likely through accidental escapes. It is established in the Doce River and most likely established in the Barragem de Pedra Reservoir. Impacts of introduction have been reported, including adverse impacts on native fish species and economic losses to fishermen. However, no supporting evidence or references were provided for those statements. Due to this lack of supporting information the history of invasiveness is classified as Data Deficient.

5 Global Distribution



Figure 1. Known global distribution of *Pygocentrus piraya*. Map from GBIF Secretariat (2021). Only observations within the São Francisco River and the Doce River basins in eastern Brazil were used to select source locations for climate matching. The remaining points outside of Brazil and in the Amazon River basin within Brazil cannot be confirmed as belonging to *Pygocentrus piraya*. No records in the literature or scientific databases were found indicating the presence of *Pygocentrus piraya* outside the São Francisco River basin. In the few records with images of the specimens in GBIF (GBIF Secretariat 2021) outside of the the São Francisco River and the Doce River basins, the adipose fin does not appear to have rays which is a key characteristic of *Pygocentrus piraya*; supporting the conclusion that those observations belong to other Characidae species.



Figure 2. Map of the São Francisco River basin in eastern Brazil. Map from Shannon1/Wikimedia, license CC BY-SA 4.0 International. Available: https://commons.wikimedia.org/wiki/File:S%C3%A3o_Francisco_basin_map.png (March 8, 2021).

6 Distribution Within the United States

No records of *Pygocentrus piraya* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Pygocentrus piraya* was low for the majority of the contiguous United States with small patches of medium match along the coast from South Carolina to Texas, throughout peninsular Florida, and along the coast in Southern California. There was a high match in southern Florida. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.008, medium (scores greater than 0.005, but less than 0.103, are classified as medium). All States had low individual climate scores except for Florida, which had a high individual climate score.

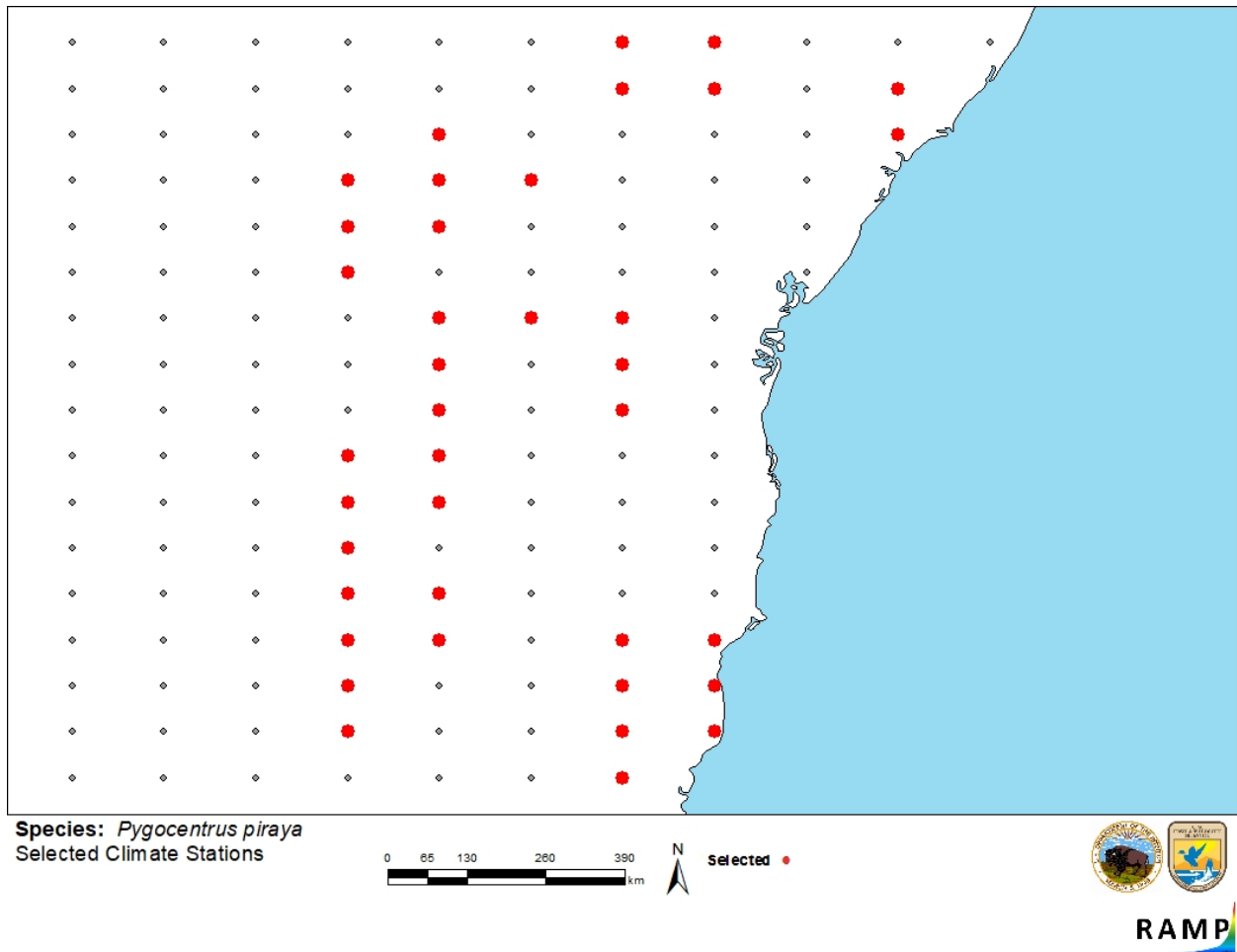


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in eastern Brazil selected as source locations (red; Brazil) and non-source locations (gray) for *Pygocentrus piraya* climate matching. Source locations from GBIF Secretariat (2021). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

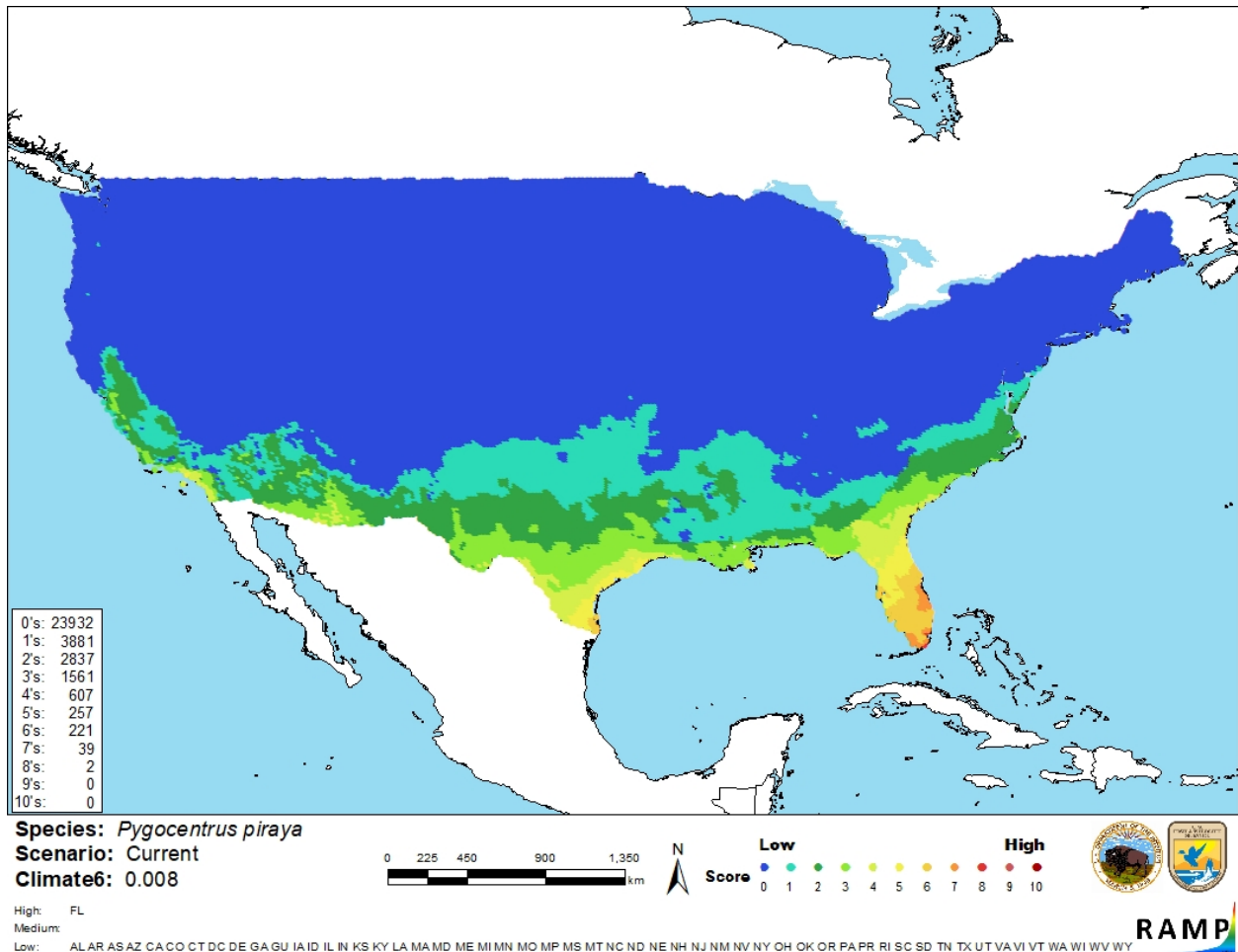


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Pygocentrus piraya* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

The certainty of assessment for *Pygocentrus piraya* is low. There is some biological information available for this species. *P. piraya* has been introduced outside of its native range. General statements regarding impacts were found but supporting information for those statements was not available.

9 Risk Assessment

Summary of Risk to the Contiguous United States

The San Francisco Piranha (*Pygocentrus piraya*) is a fish native to the São Francisco River basin in eastern Brazil. *Pygocentrus piraya* has been introduced outside of its native range through accidental escapes from regional breeding farms and possibly stocking actions. This fish is found in the aquarium trade, may be a recreational target species, and bred in captivity. *Pygocentrus piraya* is regulated in multiple States. There are general statements that introductions have had an impact (damage to fishing nets, and competition with or predation on native fish) but no supporting information was available. The history of invasiveness is classified as Data Deficient. The climate match for the contiguous United States is medium. Most of the contiguous United States had a low match, except for small patches of medium match scattered along the coast of southern California, the Gulf Coast, and the southern Atlantic Coast. Southern Florida had a high match. The certainty of assessment is low due to a lack of supporting information about impacts. The overall risk assessment category for *Pygocentrus piraya* is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **Overall Climate Match Category (Sec. 7): Medium**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information: No additional remarks**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

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11 Literature Cited in Quoted Material

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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