

***Serrasalmus serrulatus* (a piranha, no common name)**

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2012
Revised, August 2018
Web Version, 8/7/2020

Organism Type: Fish
Overall Risk Assessment Category: Uncertain



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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

“South America: Amazon River basin; occurrence in the Essequibo River basin is uncertain [Jégu 2003]. Reported from Argentina [Lopez et al. 1987].”

From Eschmeyer et al. (2018):

“Amazon River basin and ? Essequibo River basin: Amazon (?), Brazil, Guyana (?) and Peru (not Argentina on [Azpelicueta and Koerber 2015]).”

Watkins et al. (2005) report *S. serrulatus* from the Essequibo, Siparuni, and Burro-Burro river basins in Guyana.

Status in the United States

This species has not been documented as introduced or established in the United States. It is unclear whether *S. serrulatus* is currently in trade in the United States. The species is mentioned occasionally on aquarium hobbyist online forums, but the species was not found for sale from various online aquarium retailers.

Possession or importation of fish of the genus *Serrasalmus*, or fish known as “piranha” in general, is banned or regulated in many States. Every effort has been made to list all applicable State laws and regulations pertaining to this species, but this list may not be comprehensive.

From Alabama Department of Conservation and Natural Resources (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 any of the following live fish or animals: [...] Any Piranha or any fish of the genera *Serrasalmus*, *Pristobrycon*, *Pygocentrus*, *Catorprion*, or *Pygopristus*; [...]”

From Alaska State Legislature (2019):

“Except as provided in (b) - (d) of this section, no person may import any live fish into the state for purposes of stocking or rearing in the waters of the state.

(b) Live oysters native to and originating from the Pacific Coast of North America may be imported [...]

(c) Ornamental fish not raised for human consumption or sport fishing purposes may be imported into the state, but may not be reared in or released into the waters of the state. Fish wastes and waste water from ornamental fish may not be released directly into the waters of the state.

(d) Weathervane scallops originating from wild stocks or cultured stocks in the Southeastern Alaska and Yakutat Areas may be imported for aquaculture purposes and may be released only into the waters of the Southeastern Alaska and Yakutat Areas under a stock transport permit required by this chapter [...]

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

““Restricted live wildlife” means wildlife that cannot be imported, exported, or possessed without a special license or lawful exemption.”

“Fish listed below are considered restricted live wildlife [...]

Piranha, all species of the genera *Serrasalmus*, *Serrasalmo*, *Phygoctrus*, *Teddyella*, *Rooseveltiella*, and *Pygoprists* [...]"

From Arkansas Game and Fish Commission (2019):

"It is unlawful to import, transport, or possess any species commonly known as [...] piranha [...]"

"EXCEPTION: These species may be possessed for display and educational purposes by written permit approved by the Commission."

From California Department of Fish and Wildlife (2019):

"All species of piranha are on California's list of restricted animals and cannot be imported, transported, or possessed without a permit."

From Colorado Secretary of State (2019):

"For the following aquatic species or viable gametes thereof, because of the potential for a detrimental affect [sic] on existing fish and their habitat in Colorado, and except as enumerated in these regulations, or as authorized in writing by the Division of Wildlife for management purposes only; the release or the importation, transportation, stocking, sale, acquisition or possession for release is prohibited. Persons who have proof of possession issued prior to January 1, 1978 or who obtain prior approval from the Division of Wildlife may possess the following species:

a. Piranha: including members of the genera *Serrasalmus*, *Roosevelthiella*, and *Pygocentrus*."

From Connecticut Secretary of State (2016):

"The importation or possession of piranha of the subfamily: Serrasalminae, genera *Serrasalmus*, *Serrasalmo*, *Pygocentrus*, *Teddyella*, *Rooseveltiella* and *Pygopristus*, [...] 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 [...]"

FFWCC (2019) lists *S. serrulatus* as a prohibited nonnative species in Florida.

From Georgia Department of Natural Resources (2019):

"The animals listed below are examples of the exotic species regulated under Georgia Law. [...] The exotic species listed below, except where otherwise noted, may not be held as pets in Georgia. [...] Piranha; all species"

From Hawaii Department of Agriculture (2019):

"For example, the following are prohibited from entry or possession by private individuals in the State. [...] *Piranhas*"

From 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.”

“INVASIVE SPECIES – FISH. [...]

05. Piranhas, *Serrasalmus* spp., *Rosseveltiella* spp., *Pygocentrus* spp. [...]

From Illinois Department of Natural Resources (2015):

“For the purposes of Section 20-90 of the Fish and Aquatic Life Code [515 ILCS 5/20-90], the Aquatic Life Approved Species List is established. The following aquatic life categories will be considered approved for aquaculture, transportation, stocking, importation and/or possession in the State of Illinois.”

Serrasalmus serrulatus does not appear on the Aquatic Life Approved Species List for Illinois.

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 - piranha, piraya, pirae, or tiger characins; [...]

From Louisiana State Legislature (2019):

“No person shall have in possession or sell in this state [Louisiana] a piranha or Rio Grande Cichlid; except that, piranha may be possessed and displayed at the Aquarium of the Americas, Audubon Institute, New Orleans, as authorized by a special permit issued by the department, under conditions the department deems necessary to prevent their introduction into waters of the state.”

From Maine Department of Inland Fisheries and Wildlife (2019):

“Unrestricted List [...] (no permit needed): Maine law allows the Department to maintain a list of species of fish and wildlife, including tropical fish and invertebrates, which do not require an importation, exhibition, or possession permit, and may be traded by commercial pet shops.”

Serrasalmus serrulatus does not appear on the Maine Department of Inland Fisheries and Wildlife’s Unrestricted List.

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. However, species listed as prohibited may be allowed under a permitting process where environmental impact has been assessed.”

“[The list includes all piranhas and all species of] Subfamily Serrasalminae”

From State of Nevada (2018):

“Except as otherwise provided in this section and NAC [Nevada Administrative Code] 504.486, the importation, transportation or possession of the following species of live wildlife or hybrids thereof, including viable embryos or gametes, is prohibited: [...]

Piranhas..... All species in the genera *Serrasalmus*, *Serrasalmo*, *Pygocentrus*, *Teddyella*, *Rooseveltiella* and *Pygopristis*”

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 for New Mexico.

From New York State Senate (2019):

“No person shall import, export, own, possess, acquire or dispose of live piranha fish (*Serrasalmus*, *Rooseveltiella* or *Pyrocentrus* [sic]), grass carp (*Ctenopharyngodon idella*) or hybrid grass carp within the state without a license or permit issued at the discretion of the department for scientific, biological or exhibition purposes.”

From North Carolina Office of Administrative Hearings (2019):

“It shall be unlawful to transport, purchase, possess, sell, or stock in the public or private waters of North Carolina any live individuals of [...] piranha; [...]”

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, cause to be brought or imported into this State [South Carolina], or release in this State the following species at any stage of its life cycle: [...] piranha (all members of *Serrasalmus*, *Rooseveltiella*, and *Pygocentrus* genera) [...]

From Texas Parks and Wildlife (2019):

“The organisms listed here 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.”

“Piranhas, Family Characidae

All species of genera *Catoprion*, *Pristobrycon*, *Pygocentrus*, *Pygopristis*, and *Serrasalmus*”

From Utah Office of Administrative Rules (2019):

“All species of fish listed in Subsections (2) through (30) are classified as prohibited for collection, importation and possession [...]

(22) Piranha, (*Serrasalmus*, All species) family Characidae.”

From Virginia Department of Game and Inland Fisheries (2019):

“A special permit is required, and may be issued [sic] 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 [...]

Means of Introductions in the United States

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

Remarks

From Seriously Fish (2018):

“*S. serrulatus* occupies a particularly confusing taxonomic position and is very tricky to identify positively. According to scientific literature it is very close in appearance to several congeners, most notably *S. eigenmanni*, *S. hollandi*, *S. humeralis* and *S. nalseni*. The separation of these is largely based on geographical range and it’s possible that some of them may turn out to be synonymous with one another or even different species in the future. *S. scapularis*, synonymised with *S. serrulatus* by Géry is also suspected to be a distinct species. Most experts place this group (often referred to as the “*humeralis* group”) as being very closely related to the genus *Pristobrycon*.”

“Most experts agree that a detailed revision of *Serrasalmus* is necessary, as historically the genus has been viewed as something of a “catch-all” for similar-looking fin-biting/predatory characins. The juvenile forms of numerous species look broadly similar, characteristically developing the more distinctive adult patterning as they mature. This has resulted in new species being erected erroneously and there have been several attempts to reorganise the group. The most recent major revision was undertaken by Géry in the late 1970s, but a handful of new species have been described since then.”

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 *Serrasalmus*
Species *Serrasalmus serrulatus* (Valenciennes in Cuvier and Valenciennes, 1850)”

From Eschmeyer et al. (2018):

“**Current status:** Valid as *Serrasalmus serrulatus* (Valenciennes 1850). Serrasalmidae.”

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 19.0 cm SL male/unsexed; [Jégu 2003]”

Environment

From Froese and Pauly (2018):

“Freshwater; benthopelagic.”

From Seriously Fish (2018):

“[Aquarium Water] Temperature: 76 – 82° [F] /24 – 28°C

pH: 6.5 – 7.5

Hardness: 5 – 15°H”

Climate

From Froese and Pauly (2018):

“Tropical”

Distribution Outside the United States

Native

From Froese and Pauly (2018):

“South America: Amazon River basin; occurrence in the Essequibo River basin is uncertain [Jégu 2003]. Reported from Argentina [Lopez et al. 1987].”

From Eschmeyer et al. (2018):

“Amazon River basin and ? Essequibo River basin: Amazon (?), Brazil, Guyana (?) and Peru (not Argentina on [Azpelicueta and Koerber 2015]).”

Watkins et al. (2005) report *S. serrulatus* from the Essequibo, Siparuni, and Burro-Burro river basins in Guyana.

Introduced

No introductions of this species have been reported.

Means of Introduction Outside the United States

No introductions of this species have been reported.

Short Description

From Goulding (1980):

“*Serrasalmus serrulatus* are small piranhas [...] characterized by their spotted bodies, orange trim on the anal, humeral and cheek regions, white-tipped tails, and dark humeral blotches [...]”

“These fishes have small mouths and their dentition, with the exception of lacking palatine teeth, is nearly the same as that of *Serrasalmus rhombeus* and *elongatus*. The only difference is that the median cusps of the front teeth are relatively lower but are still high and sharp [...]”

Biology

From Goulding (1980):

“Twelve of the twenty-four specimens [of *S. serrulatus*] caught in the flooded forest had masticated seeds, and in ten of them this was the dominant item [in the stomach]. The only seed that could be identified was *Burdachia prismatocarpa* (Malpighiaceae), and, as with the *pacu* characins, the *piranhas* remove the mesocarp/pericarp before crushing and ingesting the seed. Two specimens were examined that had bitten out small pieces of fish, whereas another three had removed caudal fins. One individual was full of *Triportheus* scales, and the quantity involved strongly suggested that they were purposefully removed in a manner similar to the habit of *S. elongatus*.”

Human Uses

From Seriously Fish (2018):

“Should only be considered as a specimen fish for the enthusiast.”

It is unclear whether *S. serrulatus* is currently in trade in the United States. The species is mentioned occasionally on aquarium hobbyist online forums, but the species was not found for sale from various online aquarium retailers.

Diseases

No information available. No OIE-reportable diseases (OIE 2020) have been documented for this species.

Threat to Humans

From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions

No information available. No introductions of this species have been reported.

The importation, possession, or trade of the piranha *Serrasalmus sanchezi* is prohibited or restricted in the following states: Alabama (Alabama Department of Conservation and Natural Resources 2019), Alaska (Alaska State Legislature 2019), Arizona (Arizona Office of the Secretary of State 2013), Arkansas (Arkansas Game and Fish Commission 2019), California (California Department of Fish and Wildlife 2019), Colorado (Colorado Secretary of State 2019), Connecticut (Connecticut Secretary of State 2016), Florida (FFWCC 2019), Georgia (Georgia Department of Natural Resources 2019), Hawaii (Hawaii Department of Agriculture 2019), Idaho (Idaho Office of the Administrative Rules Coordinator 2019), Illinois (Illinois Department of Natural Resources 2015), Kentucky (Kentucky General Assembly 2019), Louisiana (Louisiana State Legislature 2019), Maine (Maine Department of Inland Fisheries and Wildlife 2019), Massachusetts (Massachusetts Division of Fisheries and Wildlife 2014), Mississippi (Mississippi Secretary of State 2019), Nevada (State of Nevada 2018), New Mexico (New Mexico Department of Game and Fish 2010), New York (New York State Senate 2019), North Carolina (North Carolina Office of Administrative Hearings 2019), Oklahoma (Oklahoma Secretary of State 2019), South Carolina (South Carolina Legislature 2019), Texas (Texas Parks and Wildlife 2019), Utah (Utah Office of Administrative Rules 2019), and Virginia (Virginia Department of Game and Inland Fisheries 2019).

4 History of Invasiveness

No introductions of this species have been reported and it is rare or absent in trade. Import, possession, and trade are prohibited or restricted in many U.S. States. History of invasiveness is classified as No Known Nonnative Population.

5 Global Distribution



Figure 1. Known global distribution of *Serrasalmus serrulatus*, reported from northern South America. Map from GBIF Secretariat (2017). The reported occurrence in the Orinoco basin in eastern Colombia is outside the known established range of the species and was not included in the climate matching analysis. No georeferenced occurrences were available for the species established range in Peru.

6 Distribution Within the United States

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

7 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2018; 16 climate variables; Euclidean Distance) was medium in southeastern Florida and low elsewhere in the contiguous United States. Climate 6 score indicated that the contiguous United States has a low climate match overall (scores between 0.000 and 0.005, inclusive, are classified as low). The Climate 6 score for *S. serrulatus* was 0.000. All States had low individual climate scores.

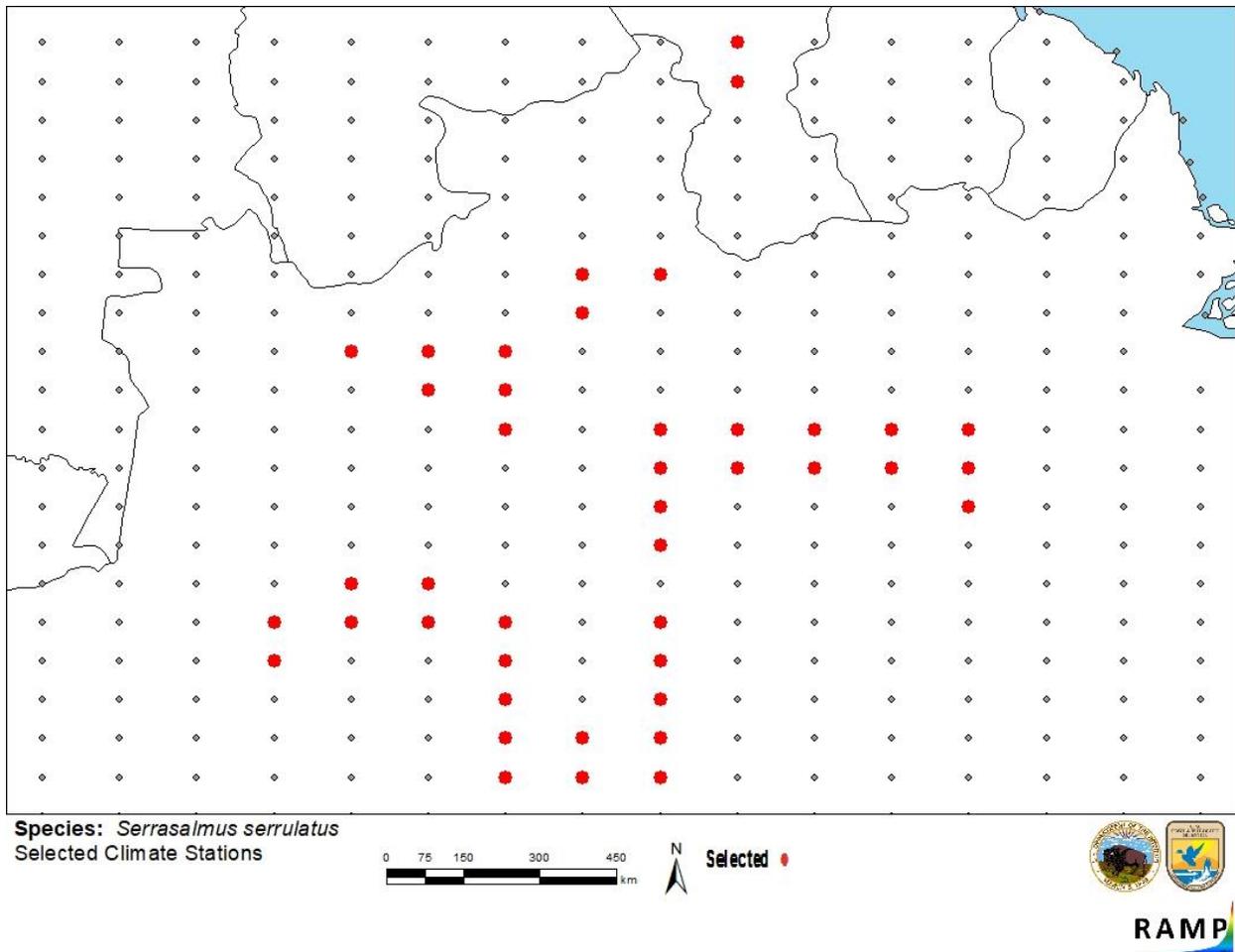


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in northern South America selected as source locations (red; Brazil, Guyana) and non-source locations (gray) for *S. serrulatus* climate matching. Source locations from GBIF Secretariat (2017). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

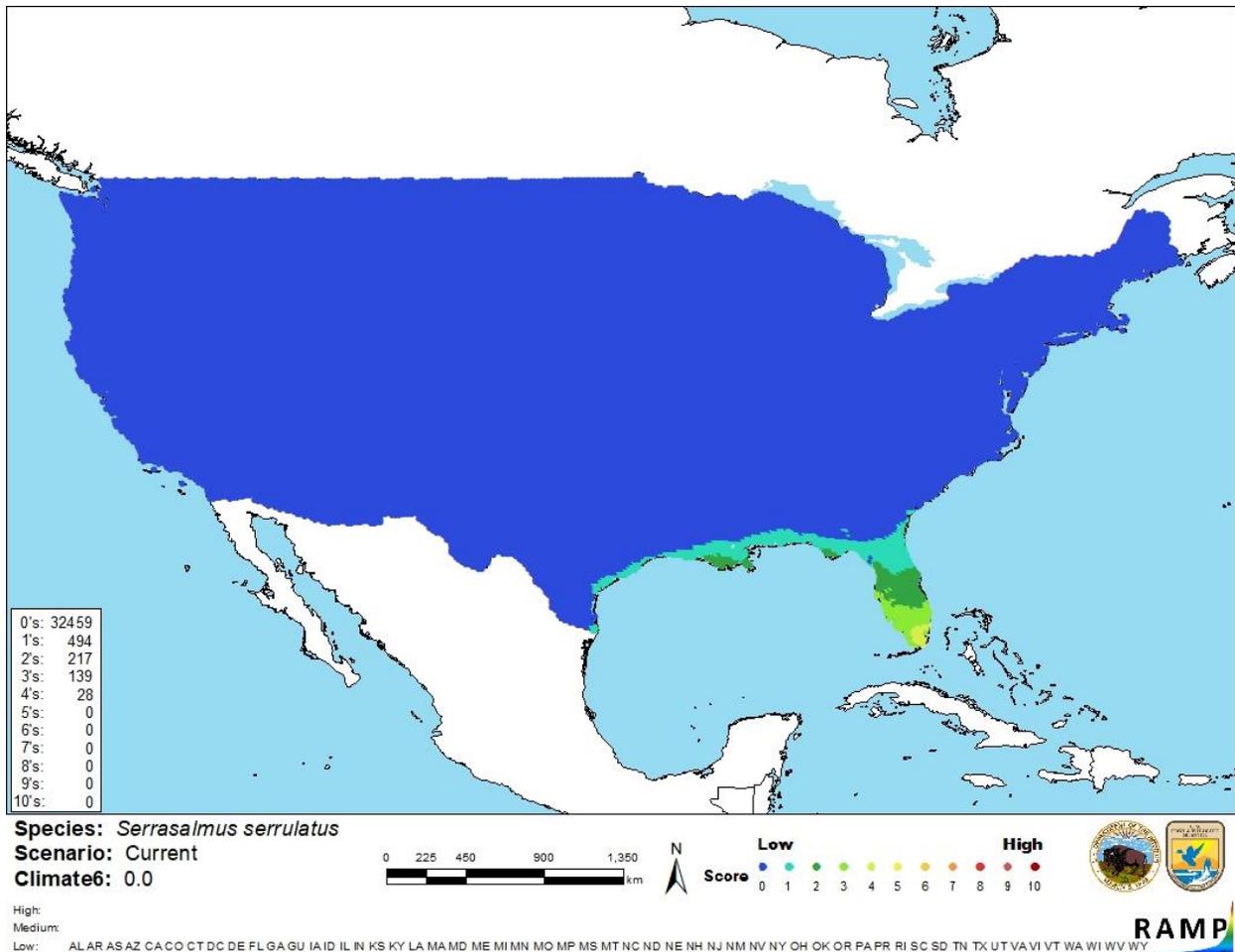


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *S. serrulatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2017). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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
$0.000 \leq X < 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

Limited information was available on the biology and ecology of *S. serrulatus*. There is considerable uncertainty and disagreement about where the species is native within South America. It is reportedly difficult to distinguish *S. serrulatus* from closely related congeners and future taxonomic revisions may synonymize some of these species. No introductions of

S. serrulatus have been reported, so any impacts of introduction remain unknown. Certainty of this assessment is low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Serrasalmus serrulatus is a species of piranha native to the Amazon River basin and likely the Essequibo River basin in Guyana. There is disagreement about the extent of the native range. *S. serrulatus* is difficult to distinguish from some congeners, making misidentification a possibility. *S. serrulatus* appears to be present in the aquarium hobby in the United States, but the species was not found for sale from U.S.-based aquarium hobbyist online retailers. Possession or trade of piranhas is prohibited in numerous U.S. States. No introductions of this species have been reported, so its potential for invasiveness remains uncertain. History of invasiveness is classified as No Known Nonnative Population. The certainty of assessment is low. The climate match to the contiguous United States is low overall, with the only area of medium match occurring in southeastern Florida. Overall risk posed by *S. serrulatus* is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population**
- **Climate Match (Sec. 7): Low**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks, Important additional information: None**
- **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.

Alabama Department of Conservation and Natural Resources. 2019. Restrictions on possession, sale, importation and/or release of certain animals and fish. Alabama Department of Conservation and Natural Resources Administrative Code, Chapter 220-2-.26.

Alaska State Legislature. 2019. Prohibitions on importation and release of live fish. Alaska Administrative Code, Title 5, Chapter 41, Section 70.

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Arkansas Game and Fish Commission. 2019. Certain exotic species prohibited. Arkansas Game and Fish Commission Code of Regulations 26.13.

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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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Lopez HL, Menni RC, Miguelarena AM. 1987. Lista de los peces de agua dulce de la Argentina. *Biologia Acuatica* 12. (Instituto de Limnologia "Dr. Raul A. Ringuelet").