Serrasalmus marginatus (a piranha, no common name)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, November 2016
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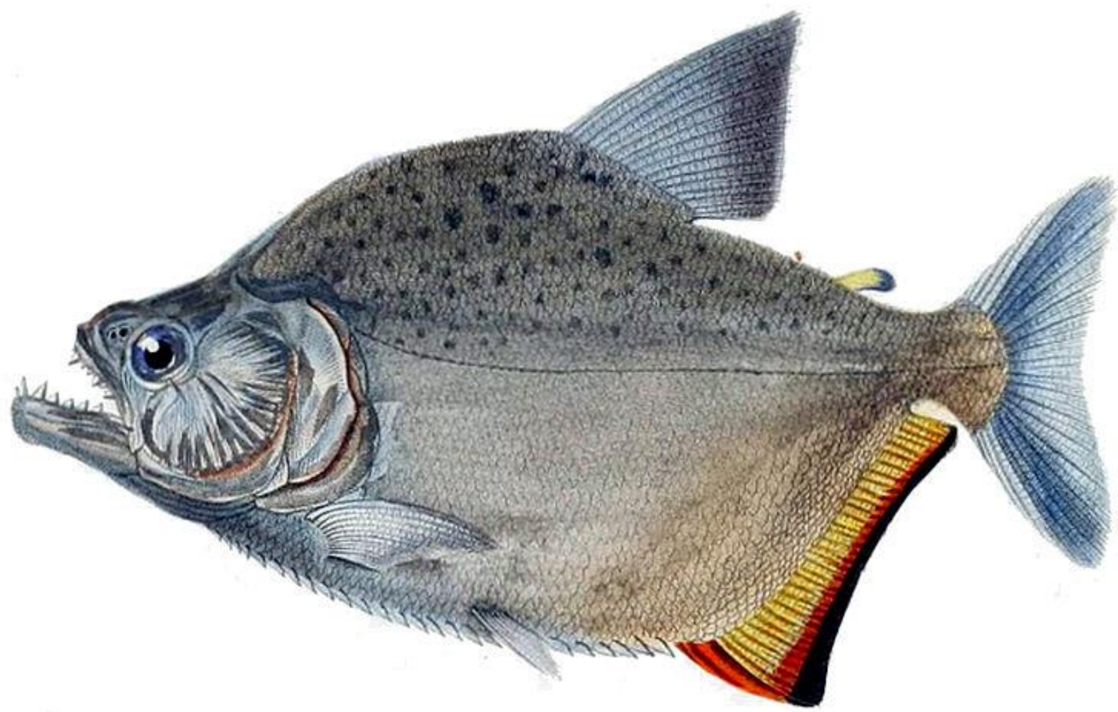

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2016):

"South America: Paraguay-Paraná River basin."

Status in the United States

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

Means of Introductions in the United States

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

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2016):

“Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Characiformes
Family Characidae
Genus Serrasalmus Lacepède, 1803
Species *Serrasalmus marginatus* Valenciennes, 1836”

“Current Standing: valid”

Size, Weight, and Age Range

From Froese and Pauly (2016):

“Max length : 27.0 cm SL male/unsexed; [Britski et al. 2007]”

Environment

From Froese and Pauly (2016):

“Freshwater; benthopelagic”

Climate/Range

From Froese and Pauly (2016):

“Tropical”

Distribution Outside the United States

Native

From Froese and Pauly (2016):

“South America: Paraguay-Paraná River basin.”

Introduced
From Agostinho and Júlio (2002):

"Upper Paraná River"

Means of Introduction Outside the United States
From Agostinho and Júlio (2002):

"The building of Itaipu Dam, 150 km downstream from Sete Quedas Falls, resulted in the natural geographical barrier drowning, with subsequent mixing of the fish faunas. *Serrasalmus marginatus* (Osteichthyes, Serrasalmidae), a species that had been restricted to the river segment downstream from Sete Quedas, invaded the Upper Paraná River."

Short Description
From Ferreira et al. (2014):

"*Pygocentrus nattereri* Kner, 1858 and *Serrasalmus marginatus* Valenciennes, 1837 are piranhas, are widely distributed in rivers of the Pantanal, and are the most abundant predators in the Negro River (unpublished data). Both species are of medium size, with a high, strongly compressed body. They have a single row of teeth in each jaw and a serrated keel formed by spines on the belly (Britski et al., 2007).

Biology
From Ferreira et al. (2014):

"Piranhas are predators that feed chiefly on pieces of fins, scales and other body parts of their prey (Agostinho and Marques, 2001; Pompeu and Godinho, 2003; Costa et al., 2005)."

From Froese and Pauly (2016):

"Feeds mainly during the daytime, though some large fish (15-20 cm SL) extend their foraging activity to dusk (about 1800-1900H). Night is spent sheltered among vegetation. Small-sized to medium-sized fish (7-10 cm) are solitary and patrol feeding territories (3-4 square m.) in a way similar to that reported for the scale-eating *Catoprion mento*. Stalking with some use of plant cover is a frequent mode of hunting employed by *S. marginatus*. It approaches its prey with a slow, stealthy movement from behind or below. It strikes its prey on the tail or anal fin, of which a piece is clipped out with a jerking motion of the body. This clipping is audible underwater. Lurking is also employed during daytime [Sazima and Machado 1990]."

Human Uses
From OPEFE (2012):

"The fish are rarely imported for the aquarium trade. Often times, the species is confused for *S. irritans*. The species is a fin biter. Recommend keeping as solitary species in home aquarium."

Diseases

From Vicentin et al. (2011):

"Studies on the parasitofauna of piranha *Serrasalmus marginatus* (Valenciennes, 1837) are scarce and mostly have focused on the taxonomy of some groups. The most remarkable reports on endoparasites in *S. marginatus* include that of Tanaka (2000) who reported *Procamallanus* (*Spirocamallanus*) *inopinatus*, specimens of Capilariidae, Railliet, 1915, and *Kritskyia* sp. and that of Böeger et al. (2001) who described *Kritskyia annakohnae* in ureters and urinary bladder, both studies in the Paraná River basin."

"In order to inventory the metazoan endoparasites of *Serrasalmus marginatus*, 91 specimens were examined. They were captured in the Negro River in Pantanal wetland, State of Mato Grosso do Sul, Central-Western Brazil, from October 2007 to August 2008. Parasites of six taxa were recovered: *Procamallanus* (*Spirocamallanus*) *inopinatus*, *Contracaecum* sp. (Nematoda), metacercarial type *Diplostomulum* (Digenea), *Brevimulticaecum* sp. (Nematoda) and *Sebekia oxycephala*, *Subtriquetra* sp. 1 and *Subtriquetra* sp. 2 (Pentastomida)."

From Fontana et al. (2012):

"Branchiura are fish ectoparasites. They attach themselves to the body surface, fin base, branchial and mouth cavities of their hosts (Castro, 1950; Yamaguti, 1963; Malta, 1982a, b). Attachment to the host is facilitated by suckers or hooks on the maxillulae as well as the hooks on the antennulae (Piasecki & Oldewage, 1992).In this study, six Branchiura species: *Dolops bidentata*, *D. longicauda*, *Dolops* sp., *Argulus multicolor*, *A. chicomendesi*, and *D. hirundo*, were recorded for the first time parasitizing three species of piranhas, *Pygocentrus nattereri*, *Serrasalmus maculatus* and *S. marginatus* captured in the upper Paraguay river."

No OIE-reportable diseases documented for this species.

Threat to Humans

Sources disagree on the degree of threat this species poses to humans.

From Froese and Pauly (2016):

"Harmless"

From Agostinho (2003):

"The parental care and aggressiveness of *S. marginatus* were observed in the Itaipu Reservoir (at the Santa Helena artificial beach), when individuals of this species, sheltering with their young in the banks of submersed macrophytes (*Nytella*), began to attack human swimmers (Agostinho et al., 2000)."

3 Impacts of Introductions

From Agostinho and Júlio (2002):

"The building of Itaipu Dam, 150 km downstream from Sete Quedas Falls, resulted in the natural geographical barrier drowning, with subsequent mixing of the fish faunas. *Serrasalmus marginatus* (Osteichthyes, Serrasalmidae), a species that had been restricted to the river segment downstream from Sete Quedas, invaded the Upper Paraná River. The catching of *Serrasalmus spilopleura*, a resident species, decreased drastically after the invasion, contrary to *S. marginatus*, which increased in abundance. In the Piquiri River, where the latter species does not occur, the abundance of *S. spilopleura* remained high, due to the presence of Nhá Bárbara and Apertado Falls."

"Analysis of the abundance of *S. spilopleura* per length class demonstrates a drastic reduction in the number of adults, as well as low recruitment in the first 2 years of collection, and almost no adults or recruitment during the last 2 years. The juveniles of *S. marginatus* abundance, in turn, increased markedly from the first 2 collection years to the last 2 […]"

"However, these two species occur sympatrically in other parts of the basin. In the Middle Paraná floodplain near Yaciretá, *S. spilopleura* and *S. marginatus* occur together in a proportion of 1:4.5 (CIDET, 1996). This appears to indicate the possibility that these species can coexist in the Upper Paraná. If this is confirmed, *S. spilopleura* will remain much less abundant than *S. marginatus*."

From Agostinho (2003):

"In the 1987-1988 period there was a marked decline in reproductive activity of *S. spilopleura* reflecting the negative effects of its interaction with the invading species, *S. marginatus*. The assertiveness of *S. marginatus* in caring for its offspring and aggressiveness in establishing its feeding territory may be the determining factor for its competitive superiority over *S. spilopleura*, and consequently its success in colonizing the Upper Paraná River. In addition to the negative interference of *S. marginatus*, a possible recruitment failure of *S. spilopleura* could have benefited the colonization of the floodplain by the invader species."

4 Global Distribution

Figure 1. Distribution of *Serrasalmus marginatus* in South America. Map from GBIF (2016). An erroneous point in the Pacific Ocean was excluded from the extent of this map. Points in northern Bolivia, northern Brazil, Ecuador, and Venezuela were also excluded from climate matching as these locations are outside the known range of the species (see Distribution Outside the United States, above).

5 Distribution Within the United States

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

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high along the Gulf of Mexico coastline and Atlantic coast as far north as Maryland, with highest match occurring in peninsular Florida. The climate match was medium in other parts of the south, and low in the rest of the United States. Climate 6 proportion indicated that the contiguous U.S. has a medium climate match. The range for a medium climate match is 0.005-0.103; the Climate 6 proportion of *Serrasalmus marginatus* is 0.064.

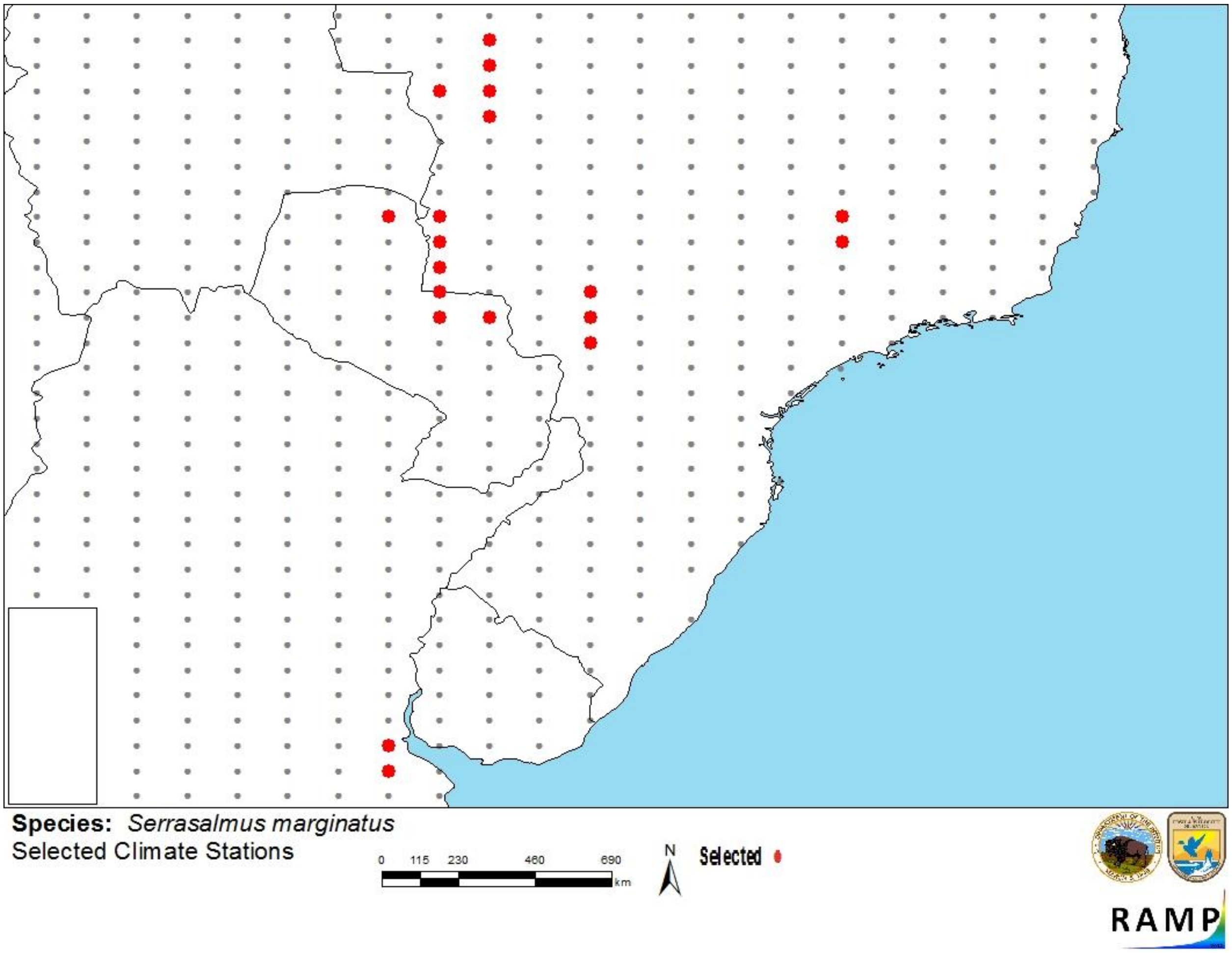

Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected in southern South America as source locations (red) and non-source locations (gray) for *Serrasalmus marginatus* climate matching. Source locations from GBIF (2016).

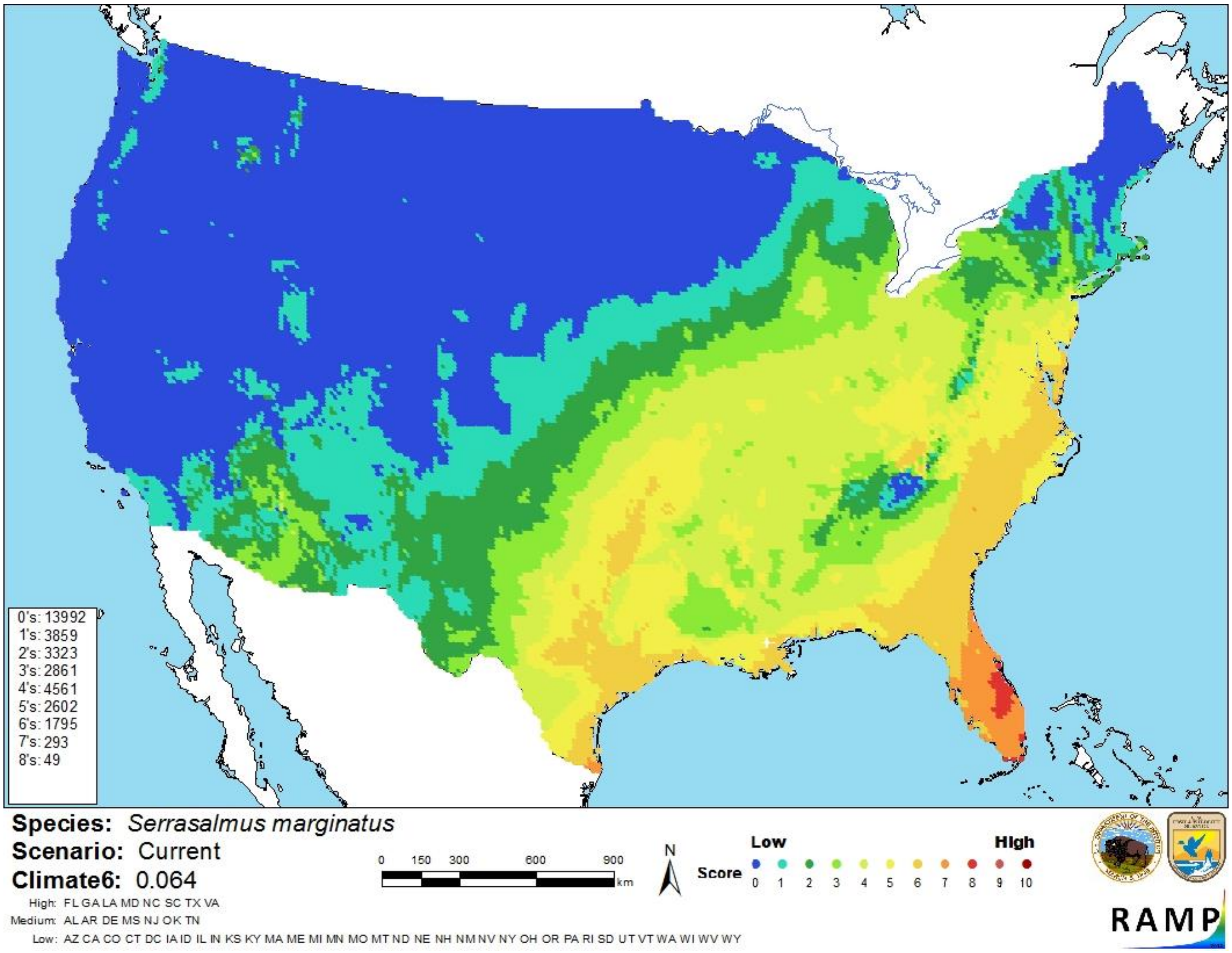

Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Serrasalmus marginatus* in the contiguous United States based on source locations reported by GBIF (2016). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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
≥0.103	High

7 Certainty of Assessment

There is some documentation of the biology and ecology of *Serrasalmus marginatus*, most notably its feeding behavior and diet. There is one instance reported in the literature of *S. marginatus* possibly dominating a native species when introduced to a new stretch of river following the construction of a dam, although cause and effect was not clearly shown. No other introductions of this species outside of its native range have been documented, and further information is needed to improve confidence in this risk assessment. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Serrasalmus marginatus is a piranha species native to the Paraguay-Paraná River basin of South America. The colonization of the Upper Paraná River by *S. marginatus* following the construction of a dam is the only documented introduction of this species outside of its native range. In that case, introduction of *S. marginatus* correlated with a substantial population decline of native congener *S. spilopleura*. However, it was not clearly demonstrated that *S. marginatus* caused the decline in *S. spilopleura*; construction of the dam likely resulted in other changes to the habitat. *S. marginatus* has a medium climate match with the contiguous United States, with highest match occurring in peninsular Florida. Overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Medium**
- **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

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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