

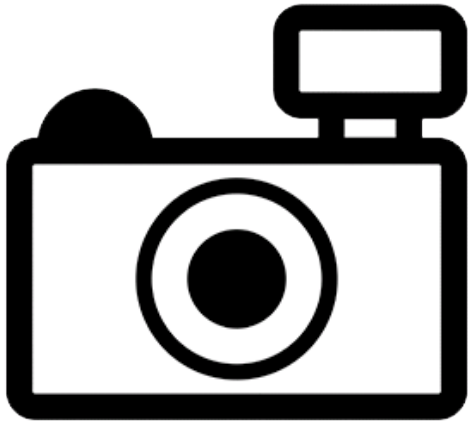
Twospot astyanax (*Astyanax bimaculatus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, September 2017

Revised, April 2018

Web Version, 5/15/2018



No Photo Available

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

“South America: Panama to the Amazon basin.”

Froese and Pauly (2018) list *Astyanax bimaculatus* as native to Panama, Trinidad Tobago, Argentina, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela; and potentially native in Paraguay and Uruguay.

Status in the United States

No records of *Astyanax bimaculatus* in the wild in the United States were found.

This species is in trade in the U.S. as indicated by a pet shop specimen listed by GBIF Secretariat (2018).

Means of Introductions in the United States

No records of *Astyanax bimaculatus* in the wild in the United States were found.

Remarks

From Prioli et al. (2002):

“*Astyanax* fishes are among the most important food-web components of South America rivers. In the Iguazu River basin, the *Astyanax* genus is represented mainly by endemic species. For millions of years, that hydrographic basin has been geographically isolated from the Paraná River basin by the Iguazu Falls. Recently, a species from the Upper Paraná River basin identified as *Astyanax bimaculatus* was revised and described as a new species named *Astyanax altiparanae* Garutti & Britski, 2000. Fauna endemism and geographic isolation triggered interest in investigations to evaluate the identification and genetic relatedness among two *A. altiparanae* populations from the Upper Paraná River basin and the population identified as *A. bimaculatus* in the Iguazu River, upstream from the Iguazu Falls. Mitochondrial DNA sequences and RAPD markers revealed high genetic diversity within each population, as well as low genetic distance, high gene flow, and high mitochondrial DNA similarity among all three populations. In conjunction with morphological similarities, these results demonstrated that the population presently known as *Astyanax bimaculatus* in the Iguazu River should actually be stated as *Astyanax altiparanae*. Furthermore, it could be inferred that the *A. altiparanae* population is not endemic and most likely it was recently introduced in the Iguazu River basin, maintaining the ancestral genetic identity.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Eschmeyer et al. (2018), *Astyanax bimaculatus* (Linnaeus 1758) is current valid name for this species. *A. bimaculatus* was originally described as *Salmo bimaculatus* Linnaeus 1758.

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 *Astyanax*”

Species *Astyanax bimaculatus* (Linnaeus, 1758)”

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 17.5 cm TL male/unsexed; [Zaniboni et al. 2004]; max. published weight: 91.60 g [Zaniboni et al. 2004]; max. reported age: 18 years [Hinton 1962]”

Environment

From Froese and Pauly (2018):

“Freshwater; benthopelagic; pH range: 5.5 - 7.5; dH range: ? - 25; potamodromous [Riede 2004]. [...]; 20°C - 28°C [assumed to be recommended aquarium temperature range] [Baensch and Riehl 1985]”

Climate/Range

From Froese and Pauly (2018):

“Subtropical; [...]”

Distribution Outside the United States

Native

From Froese and Pauly (2018):

“South America: Panama to the Amazon basin.”

Froese and Pauly (2018) list *Astyanax bimaculatus* as native to Panama, Trinidad Tobago, Argentina, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela; and potentially native in Paraguay and Uruguay.

Introduced

No records of introductions of *Astyanax bimaculatus* were found.

Means of Introduction Outside the United States

No records of introductions of *Astyanax bimaculatus* were found.

Short Description

Information on a short description of *Astyanax bimaculatus* was not available.

Biology

From Froese and Pauly (2018):

“Inhabits large free flowing clear rivers, small streams, drainage ditches and artificial ponds and impoundments [Kenny 1995]. Feeds on zooplankton, detritus, higher plants and sometimes on the scales of fish. Gametogenesis takes place during the dry season in time for reproduction to begin during the rainy season [Planquette et al. 1996]. Reproduction could be carried out in captivity [Boujard et al. 1997].”

From Pavia et al. (2006):

“*A. bimaculatus* is considered a generalist (Costa & Braga, 1993; Esteves & Galetti, 1995) well adapted to both running and stagnant waters (Agostinho et al., 1997). It is migratory (Uieda, 1984; Garutti, 1988), although its partial spawning reproductive regime and adhesive eggs (Bazzoli et al., 1991) are shared with other nonmigratory Neotropical freshwater fishes (Lamas, 1993).”

From Arcifa et al. (1991):

“The competitive interactions between two species of characins (*Astyanax fasciatus* and *Astyanax bimaculatus*) were investigated by studying their horizontal distribution, relative abundance and feeding habits in littoral and limnetic zones of Americana Reservoir, southern Brazil.

Differences in horizontal distribution of the species mainly as adults led to their partial habitat segregation. Most adult *A. bimaculatus* were littoral dwellers, whereas *A. fasciatus* adults were distributed from inshore to offshore waters, but with most in the latter region.

Both are facultative zooplanktivores in the reservoir, feeding mostly on planktonic crustaceans, insects (chiefly chironomids), some higher plant material, detritus and even fish scales (*A. bimaculatus*). Food overlap coefficients, considering adult and juvenile stages of both species are large in dry as well as wet seasons, although in the dry season the overlaps are significantly reduced for juveniles of both species and for juveniles of *A. bimaculatus* versus adults of *A. fasciatus* [sic]. Both species prey more on cladocerans than on cyclopoid copepods, and the adults selectively take larger forms (*Daphnia gessneri* and *Moina micrura*) in the reservoir (as in previously reported enclosure experiments). Juveniles prey heavily on *Bosmina longirostris*.

These two formerly riverine species may reduce competition, in the reservoir, by partial habitat segregation in older stages, a mechanism to avoid competition, which may have existed in their previous interactive history in rivers.”

Human Uses

From Froese and Pauly (2018):

“Fisheries: of no interest; aquarium: commercial”

Diseases

No records of OIE reportable diseases were found for *Astyanax bimaculatus*.

From Froese and Pauly (2018):

“Paraseuratum Infestation, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 10, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 10, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 10, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 25, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 25, Parasitic infestations (protozoa, worms, etc.)
Rhabdochona Infestation 8, Parasitic infestations (protozoa, worms, etc.)
Rhabdochona Infestation 8, Parasitic infestations (protozoa, worms, etc.)
Spinitectus Infestation 9, Parasitic infestations (protozoa, worms, etc.)
Spinitectus Infestation 9, Parasitic infestations (protozoa, worms, etc.)”

From Barroso de Malgahães (2006):

“The study detected, for the first time, the occurrence of lernaecosis in indigenous characid *Astyanax bimaculatus* of the Santo Antônio creek, Paraíba do Sul River basin, Minas Gerais state [Brazil].”

Poelen et al. (2014) lists *Genarchella parva*, *Saccocoelioides bacilliformis*, *Genarchella overstreeti*, *Genarchella genarchella*, *Parspina bagre*, *Magnivitellinum simplex*, *Spirocamallanus hilarii*, and tapeworms (Cestoda) as parasites of *Astyanax bimaculatus*.

Threat to Humans

From Froese and Pauly (2018):

“Harmless.”

3 Impacts of Introductions

No records of introductions of *Astyanax bimaculatus* were found.

4 Global Distribution



Figure 1. Known global distribution in South America of *Astyanax bimaculatus*. Map from GBIF Secretariat (2018). Map does not include locations reported in Panama.

The location in Alabama was not used as a source point for the climate match. It is the result of a specimen collected from a pet shop and is not representative of an established wild population (GBIF 2018).

5 Distribution Within the United States

No records of *Astyanax bimaculatus* in the wild in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Astyanax bimaculatus* was high in the southeastern U.S. Portions of the Southwest were a medium match. It was low in the West, northern central U.S., and upper portions on the Northeast. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous U.S. was 0.099, medium. The following states had a high individual climate score: Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Texas, and Virginia.

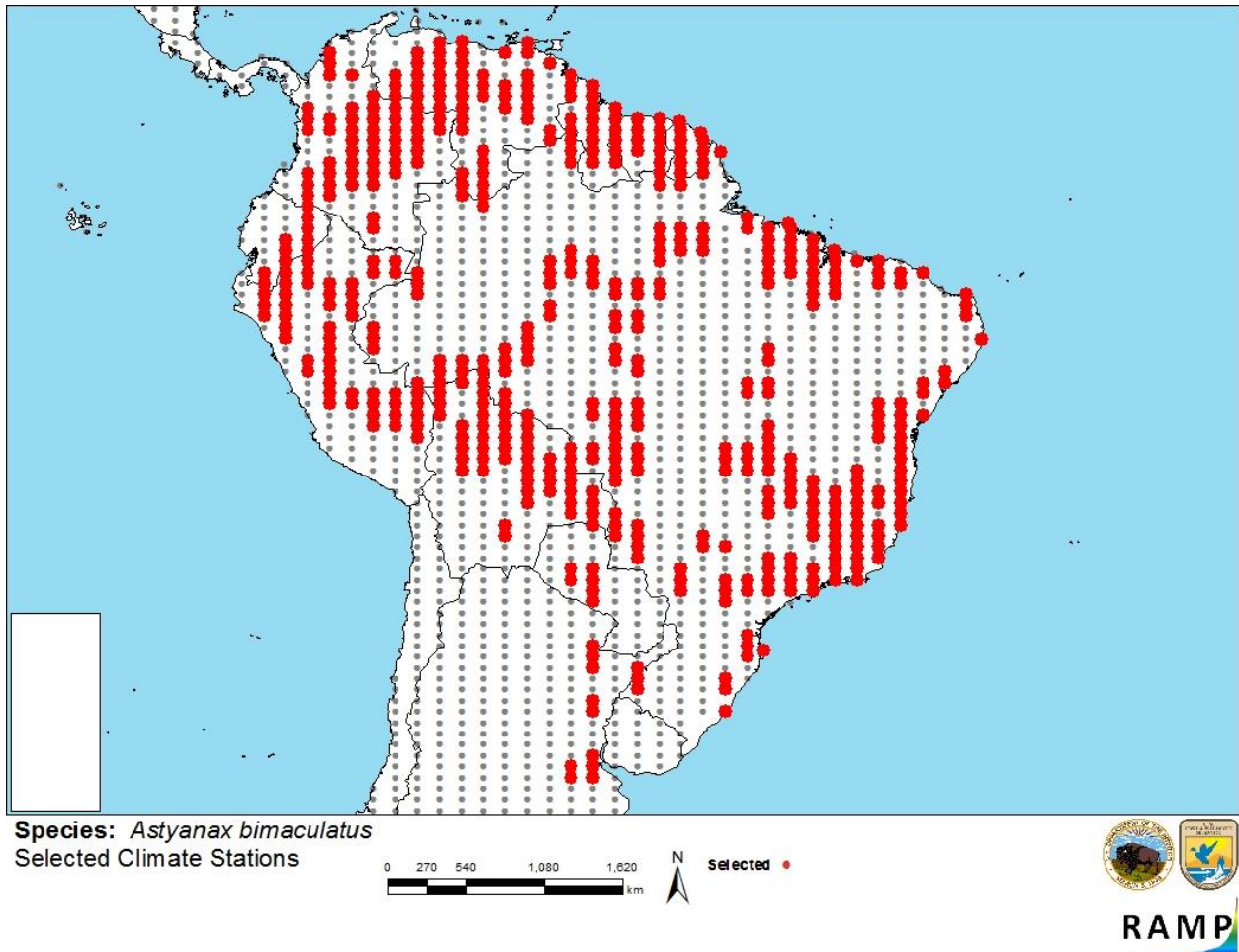


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations in Argentina, Brazil, Bolivia, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, and Venezuela selected as source locations (red) and non-source locations (gray) for *Astyanax bimaculatus* climate matching. Source locations from GBIF Secretariat (2018).

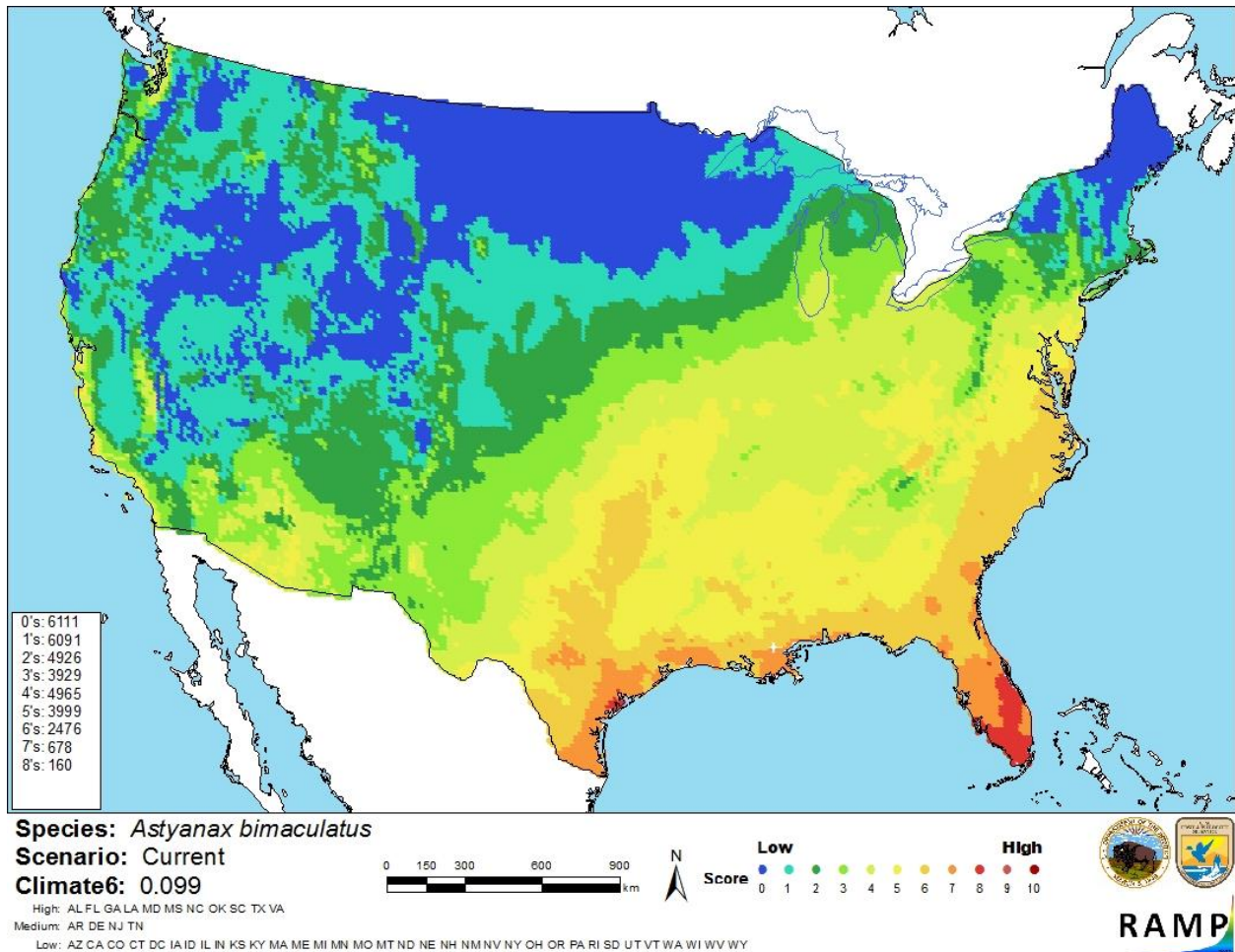


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Astyanax bimaculatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 0 = Lowest match, 10 = Highest match.

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

7 Certainty of Assessment

The certainty of this assessment is low. There was adequate biological and ecological information available about *Astyanax bimaculatus*. No records of introductions into the wild were found. Therefore no information was available on the impacts of introduction of *A. bimaculatus*. Without the ability to learn from past introductions, certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Astyanax bimaculatus is a freshwater fish native to South America. It consumes zooplankton, detritus, plant material, and fish scales. Numerous parasites have been recorded on the species. It has not established outside of its native range, although it is in limited trade as an aquarium fish. The history of invasiveness is not documented. There were no records of *Astyanax bimaculatus* introduced into the wild. The climate match for the contiguous U.S. was medium. The uncertain history of invasiveness and low certainty of this assessment lead to an overall risk category of uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Low**
- **Remarks/Important additional information:** No additional comments
- **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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