U.S. Fish & Wildlife Service

Cichla monoculus (a fish, no common name)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, August 2011
Revised, September 2012, May 2018
Web Version, 9/7/2018

Photo: Ernst Mayr Library. Licensed under Creative Commons (CC BY-NC-SA 2.0). Available: http://eol.org/data_objects/24867406. (May 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"South America: Rio Solimões-Amazonas along the main channel and lower courses of tributaries; Peru, Colombia and Brazil; including Araguari and lower Oyapock rivers north of the Amazon. Probably much more widespread in the lowland Amazon basin."

Willis et al. (2010) describe the distribution of *C. monoculus* as encompassing "the Amazon, Orinoco, and Casiquiare" basins.

Status in the United States

According to Froese and Pauly (2018), this species was introduced to Florida but no other information is available, including whether a population was established.

Means of Introductions in the United States

According to Froese and Pauly (2018), it is not known how it was introduced into Florida.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphlyum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Labroidei
Family Cichlidae
Genus *Cichla*
Species *Cichla monoculus* (Spix and Agassiz, 1831)"

"Taxonomic Status:
Current Standing: valid"

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Max length: 70.0 cm SL male/unsexed; [Chellappa et al. 2003]; max. published weight: 9.0 kg [Keith et al. 2000]"

Environment

From Froese and Pauly (2018):

"Freshwater; benthopelagic; pH range: 7.0 - ?. […] 25°C - 28°C [Baensch and Riehl 1997; presumed to represent aquarium water temperature]"

Climate/Range

From Froese and Pauly (2018):

"Tropical; […]"

Distribution Outside the United States

Native

From Froese and Pauly (2018):

"South America: Rio Solimões-Amazonas along the main channel and lower courses of tributaries; Peru, Colombia and Brazil; including Araguari and lower Oyapock rivers north of the Amazon. Probably much more widespread in the lowland Amazon basin."

Willis et al. (2010) describe the distribution of *C. monoculus* as encompassing "the Amazon, Orinoco, and Casiquiare" basins.

Introduced

According to Froese and Pauly (2018), *Cichla monoculus* has been introduced to Singapore, where it is established, and Malaysia where it is probably established.

According to Gomiero and Braga (2004), *C. monoculus* has been introduced to the Volta Grande Reservoir on the Rio Grande, southern Brazil.

According to Frankel et al. (2015), *C. monoculus* is established in Gatun Lake, Panama.

Means of Introduction Outside the United States

Froese and Pauly (2018) report that *C. monoculus* was introduced to Singapore for sport angling reasons, and to Malaysia for sport angling and ornamental reasons.

Short Description

From Froese and Pauly (2018):

"This species is similar to *C. kelberi* and *C. pleiozona* in having three dark vertical bars on side, presence of a pronounced occipital bar in large specimens, absence of black or ocellated markings laterally on head, and presence of irregular dark blotches on anterior abdominal side. Differs from *C. pleiozona* by having less scales in a lateral row (68-87 vs. 84-93 in C. pleiozona) and typical absence of dark vertical bar anteriorly on caudal peduncle, and from *C. kelberi* by absence of light spots on anal and pelvic fins and lower caudal fin [Kullander and Ferreira 2006]."

Biology

From Froese and Pauly (2018):

"Specimens collected were from flood prone areas, but in the Amazon the biotopes are more varied. This fish forays along the shore where small fishes may be concentrated. Juveniles feed on shrimps, while adults are almost exclusively piscivore. Oviparous [Breder and Rosen 1966]. Males are sexually mature after one year while females mature after two years. During reproduction which is not markedly seasonal, large males develop a frontal hump and become territorial [Keith et al. 2000]."

Human Uses

From Froese and Pauly (2018):

"Fisheries: minor commercial; aquarium: public aquariums"

From Kullander and Ferreira (2006):

"Species of the genus *Cichla* are among the major food and game fishes in South America."

Diseases

No OIE reportable diseases.

From Machado et al. (2000):

"We examined 136 specimens of *Cichla monoculus* Spix, 1831, collected in the Paraná River near Porto Rico, State of Paraná, Brazil, from July 1996 through October 1997. Of the total number of fish, 133 (97.8%) were infected with at least 1 species of helminth. A total of 8 helminth species was recorded: 3 Digenea, *Clinostomum* sp., *Diplostomum* (*Austrodiplostomum*) *compactum* (Lutz, 1928), and *Diplostomum* sp.; 3 Cestoda, *Proteocephalus microscopicus* Woodland, 1935, *Proteocephalus macrophallus* (Diesing, 1850), and *Sciadocephalus megalodiscus* Diesing, 1850; 1 Nematoda, *Contracaecum* sp.; and 1 Acanthocephala, *Quadrigyrus machadoi* Fábio, 1983. *Proteocephalus microscopicus* and *P. macrophallus* showed the highest values of prevalence and intensity of infection, followed by *Contracaecum* sp. […] There were significant differences in the prevalence of *P. macrophallus* and *Q. machadoi* in males and females of *C. monoculus*. *Clinostomum* sp., *Diplostomum* sp., *D. (A.) compactum*, and *Q. machadoi* were found for the first time in *C. monoculus*."

From Frankel et al. (2015):

"Infection surveys across three field sites in Gatun Lake, Panama, revealed that the invasive peacock bass, *Cichla monoculus*, was more commonly infected by the introduced trematode parasite *Centrocestus formosanus* than were three other common cichlid fishes."

Threat to Humans

From Froese and Pauly (2018):

"Harmless"

3 Impacts of Introductions

From Froese and Pauly (2018):

"Following its introduction [to Singapore], very significant reductions in the abundance of other fish species in the reservoirs were noticed by anglers. They breed too fast and have few predators in the country."

From Chellappa et al. (2003):

"The success of this fish (*Cichla monoculus*) is attributed to its reproductive capacity and to the phenotypic plasticity that allows it to adapt to the harsh ecological conditions that prevail in the semi-arid region of Northeast Brazil."

According to Brinn et al. (2004), *Cichla monoculus* is known to hybridize with *Cichla temensis* in the Amazon basin.

From Gomiero and Braga (2004):

"Individuals of its own genus were the main food item of two species of tucunares (*Cichla cf. ocellaris* and *Cichla monoculus*) introduced into the Volta Grande Reservoir. The abundance of adult tucunares may cause intra-specific competition, possibly leading to the high cannibalism rates found."

From Gomiero et al. (2010):

"The genus *Cichl*a adapts well in locations in which it is introduced, however this adaptation shows itself to be strongly adjusted to each particular location, determining great plasticity and establishment capacity."

4 Global Distribution

Figure 1. Known global distribution of *Cichla monoculus*, reported from northern South America. Map from GBIF Secretariat (2017). Occurrences on the Atlantic coast of Brazil were excluded from the climate matching analysis because the existence of established populations in these areas could not be confirmed.

5 Distribution Within the United States

No information available.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean Distance) for the contiguous United States was 0.028, indicating a medium overall climate match. Scores between 0.005 and 0.103 are classified as medium match. The highest climate match occurred in peninsular Florida. The climate match was medium in the southeastern contiguous United States from Virginia to coastal Texas. The northern and western United States had low match.

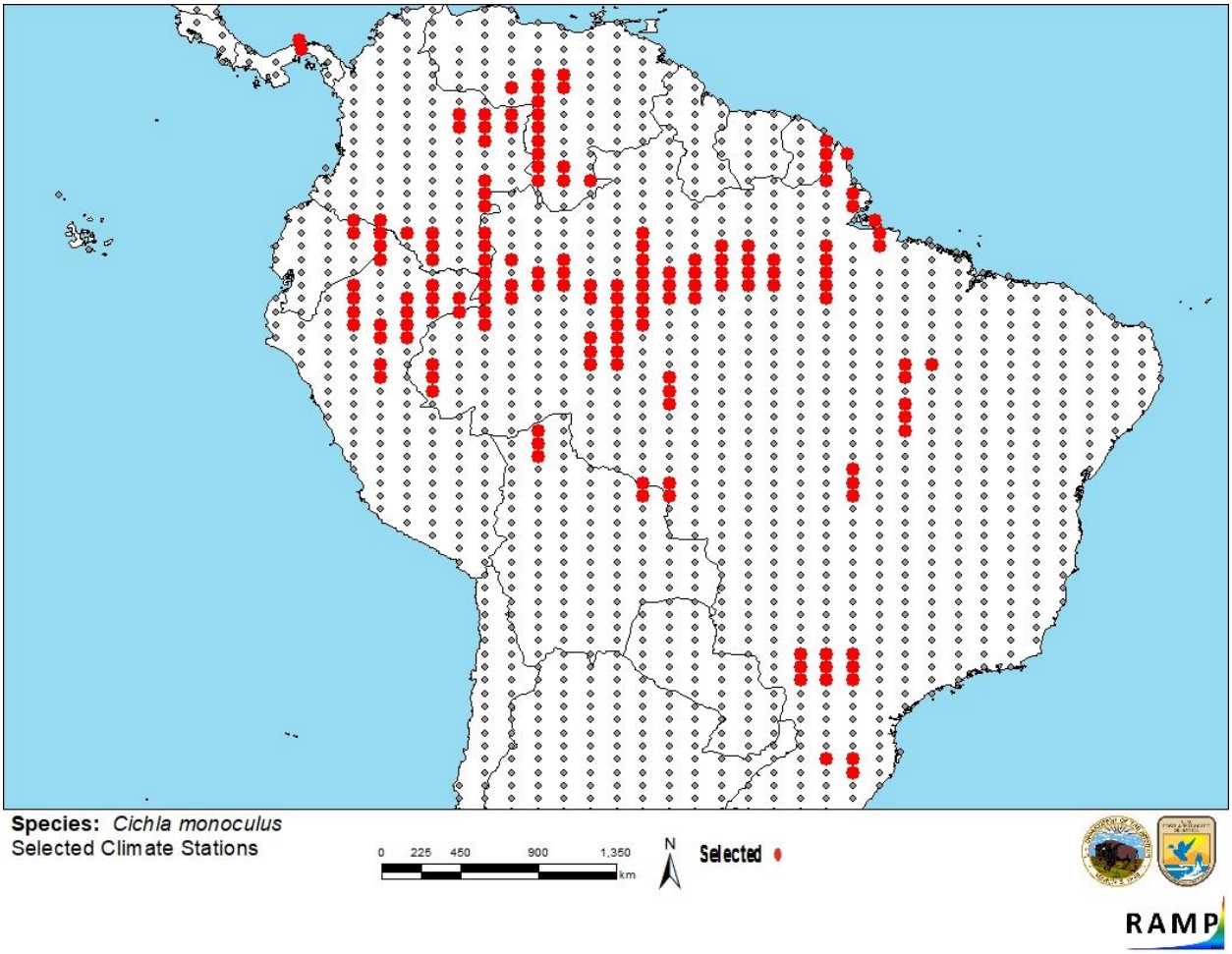

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red; Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, French Guiana, Panama) and non-source locations (gray) for *Cichla monoculus* climate matching. Source locations from GBIF Secretariat (2017).

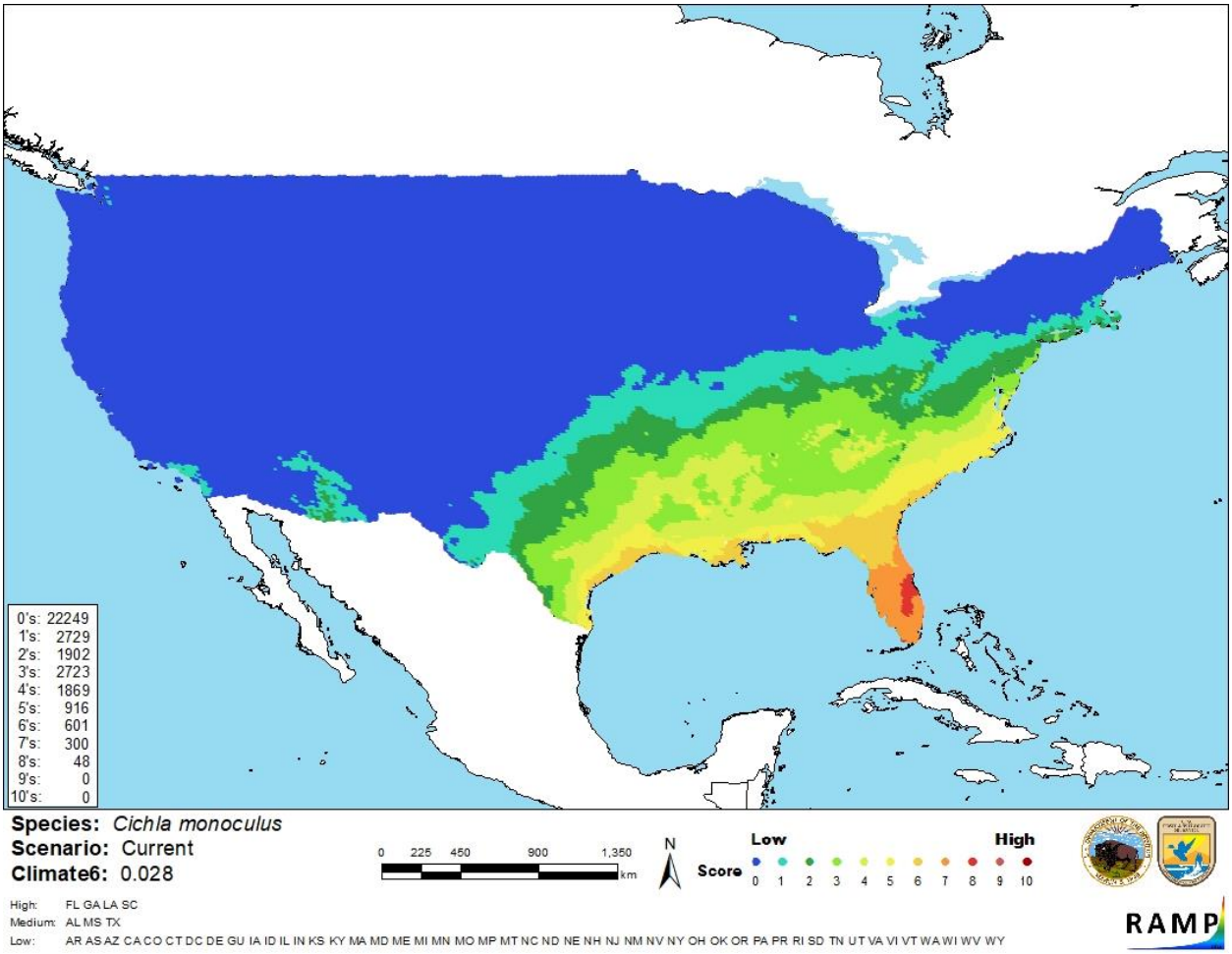

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Cichla monoculus* in the contiguous United States based on source locations reported by GBIF Secretariat (2017). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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 information about the biology and ecology for *Cichla monoculus*. It was reported that this species was introduced to Florida as well as Singapore and Malaysia but little information about these introductions is available, making it difficult to conclude what kind of effect it could have within the contiguous United States. Due to lack of information, the certainty of assessment is low. More information is needed to elevate the assessment certainty.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Cichla monoculus is native to the Amazon, Orinoco, and Casiquiare River basins in northern South America. It has been reported as introduced in other parts of Brazil, Panama, Malaysia, and Singapore, as well as within the United States in Florida. Little information about these introductions is available, including any impacts of introduction. *C. monoculus* has been reported by some authors to have biological traits that would help it establish successfully where introduced, and it is known to hybridize with at least one congener. *C. monoculus* has a medium climate match with the contiguous United States. Florida has the highest match within the United States and the rest of the Southeast has a medium to high match. More information about introductions is needed. The overall risk assessment is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **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.

Breder, C. M., and D. E. Rosen. 1966. Modes of reproduction in fishes. T. F. H. Publications, Neptune City, New Jersey.

Brinn, M. N. A., J. I. R. Porto, and E. Feldberg. 2004. Karyological evidence for interspecific hybridization between *Cichla monoculus* and *C. temensis* (Perciformes, Cichlidae) in the Amazon. Hereditas 141:252-257.

Chellappa, S., M. R. Câmara, N. T. Chellappa, M. C. M. Beveridge, and F. A. Huntingford. 2003. Reproductive ecology of a neotropical cichlid fish, *Cichla monoculus* (Osteichthyes: Cichlidae). Brazilian Journal of Biology 63:17-26.

Frankel, V. M., A. P. Hendry, G. Rolshausen, and M. E. Torchin. 2015. Host preference of an introduced 'generalist' parasite for a non-native host. International Journal of Parasitology 45(11):703-709.

Froese, R., and D. Pauly, editors. 2018. *Cichla monoculus* Agassiz, 1831. FishBase. Available: https://www.fishbase.de/summary/Cichla-monoculus.html. (May 2018).

GBIF Secretariat. 2017. GBIF backbone taxonomy: *Cichla monoculus* Agassiz, 1831. Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/5208154. (May 2018).

Gomiero, L. M., A. L. Carmassi, G. R. Rondineli, G. A. Villares Jr., and F. M. S. Braga. 2010. Growth and mortality of Cichla spp. (Perciformes, Cichlidae) introduced in Volta Grande Reservoir (Grande River) and in a small artificial lake in Southeastern Brazil. Brazilian Journal of Biology 70: 1093-1101.

Gomiero, L. M., and F. M. S. Braga. 2004. Cannibalism as the main feeding behaviour of tucunares introduced in Southeast Brazil. Brazilian Journal of Biology 64:625-632.

ITIS (Integrated Taxonomic Information System). 2018. *Cichla monoculus* (Spix and Agassiz, 1831). Integrated Taxonomic Information System, Reston, Virginia. Available: https://itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=648358#null. (May 2018).

Kullander, S. O., and E. J. Ferreira. 2006. A review of the South American cichlid genus *Cichla*, with descriptions of nine new species. Ichthyological Exploration of Freshwaters 17:289-398.

Machado, P. M., S. C. De Almeida, G. C. Pavanelli, and R. Massato Takemoto. 2000. Ecological aspects of endohelminths parasitizing *Cichla monoculus* Spix, 1831 (Perciformes: Cichlidae) in the Paraná River near Porto Rico, State of Paraná, Brazil. Comparative Parasitology 67:210-217.

Sanders, S., C. Castiglione, and M. H. Hoff. 2018. Risk Assessment Mapping Program: RAMP, version 3.1. U.S. Fish and Wildlife Service.

Willis, S. C., M. Nunes, C. G. Montaña, I. P. Farias, G. Ortí, and N. R. Lovejoy. 2010. The Casiquiare river acts as a corridor between the Amazonas and Orinoco river basins: biogeographic analysis of the genus *Cichla*. Molecular Ecology 19:1014-1030.

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.

Baensch, H. A., and R. Riehl. 1997. Aquarien Atlas, volume 5. Mergus Verlag, Melle, Germany.

Keith, P., P. Y. Le Bail, and P. Planquette. 2000. Atlas des poissons d'eau douce de Guyane (tome 2, fascicule I). Publications scientifiques du Muséum national d'Histoire naturelle, Paris.