Tucunaré Amarela (*Cichla kelberi*)
Ecological Risk Screening Summary

Web Version—07/23/2014

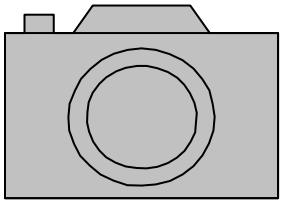

Photo not available.

1 Native Range, and Status in the United States

Native Range
From Kullander and Ferreira (2006):

"South America: Brazil."

Status in the United States
This species has not been reported as introduced into the United States.

Means of Introductions in the United States
This species has not been reported as introduced into the United States.

Remarks
Tucunaré Amarela is the Portuguese common name for this species. Several English names are used interchangeably, but are usually some variation on Peacock Bass.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Kullander and Ferreira (2006):

"Kingdom Animalia
Phylum Chordata
Class Actinopterygii
Order Perciformes
Family Cichlidae
Genus Cichla
Species Cichla kelberi Kullander and Ferreira, 2006

Taxonomic Status: Valid."

Size, Weight, and Age Range

From Kullander and Ferreira (2006):

"Maturity: Lm 20.7 range ? - ? cm; Max length : 27.6 cm SL male/unsexed."

Environment

From Kullander and Ferreira (2006):

"Freshwater; benthopelagic."

Climate/Range

From Kullander and Ferreira (2006):

"Tropical."

Distribution Outside the United States

Native

From Kullander and Ferreira (2006):

"South America: Brazil."

Introduced

From Espínola et al. (2010):

"The target species of the present study, the peacock-bass *Cichla kelberi* (Kullander and Ferreira 2006), was introduced into several Brazilian watersheds as well as into other world regions."

Means of Introduction Outside the United States

From Espínola et al. (2010):

"*Cichla kelberi* is appreciated in sport fishing because of its characteristics as a fighting fish."

"…The largest, deepest, most transparent and warmest reservoirs are the most likely to be colonized by *Cichla kelberi*. It is possible that other environments with similar characteristics to these reservoirs, such as the lagoons from the Upper Paraná River Basin floodplain, can also be colonized by *Cichla kelberi*."

Short description

From Kullander and Ferreira (2006):

"Diagnosis: Differs from its congeners by presence in adults of small light spots on pelvic and anal fins, and lower lobe of caudal fin. It is similar to *C. monoculus* and *C. pleiozona* in possessing three dark vertical bars on the 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 less scales in a lateral row (76-83 vs. 84-93 in *pleiozona*) and typical absence of bar 4."

Biology

No information reported for this species.

Human uses

From Espínola et al. (2010):

"*Cichla kelberi* is appreciated in sport fishing because of its characteristics as a fighting fish."

A quick Internet search shows that there is also interest in this species among aquarists.

Diseases

There are no known OIE-reportable diseases for this species.

Threat to humans

Harmless.

3 Impacts of Introductions

From Pelicice and Agostinho (2009):

"In South America, the introduction of peacock-bass (*Cichla*), a voracious predator fish, has been an underestimated threat for native fish communities. Although this predator is widespread in many reservoirs, few studies have explored its impact on biodiversity. To investigate the

relationship between invasion and fish diversity, the present study followed a natural experiment in the Rosana Reservoir (Paraná River basin), where *Cichla kelberi* were introduced in 2004. We monitored fish assemblages associated with submerged macrophytes between 2003 and 2007, using a 1 m^2 throw trap. In the years following the introduction, fish diversity dramatically changed. For example, in March 2007, mean fish density and richness were reduced by ca. 95 and 80%, respectively, and many small-sized species had vanished. One aspect was the gradual change of biodiversity, which unfolded at two times during each year: (1) impacts during summer/autumn periods, which coincided with large shoals of young *C. kelberi* in the patches; and (2) assemblage recovery during the spring. The sequence of extinction-colonization events, however, might not be able to maintain fish assemblages due to the decrease in recovery intensity each spring; assuming a constant decline rate in the coming years, we predict complete assemblage extinction by the summer of 2010. Results from this natural experiment provided evidence supporting the collapse of fish assemblages soon after the introduction of *C. kelberi*. Such rapid destruction (2 years) reveals an important homogenizing force behind this predator and stresses the need for control measures that prevent new transferences among South American basins."

From Kovalenko et al. (2010):

"The non-native peacock bass (*Cichla kelberi*) is causing freshwater fish extinctions in the tropical regions around the world, but there are very few studies on its interaction with native species. This study, based on a mesocosm experiment, examined direct and indirect effects of a non-native peacock bass on the native prey in Paraná River, Brazil, and tested whether these effects were mitigated by aquatic vegetation. Feeding activity of most prey was unaffected by the presence of peacock bass. All prey were consumed in the absence of vegetation; whereas a marginally significant decrease in mortality was observed in the vegetated habitats. Overall, peacock bass had minor indirect effects on prey foraging, but very significant direct effects on prey survival. As aquatic plants provide very limited protection to native prey, vegetated habitats are unlikely to slow down the decline in biodiversity resulting from this invasive species and conservation measures may need to consider other ways to ensure survival of the source populations."

From Fugi et al. (2008):

"In order to investigate trophic interactions, the diets of peacock bass (*Cichla kelberi*) and dogfish (*Galeocharax knerii*) were studied in the Corumbá Reservoir between 1997 and 2000. This dietary study was performed to assess the niche breadth of each species and to determine the degree of niche overlap during different phases of reservoir colonization. During Period I, peacock bass were absent or recorded only in low numbers; during Periods II and III, peacock bass reached high abundances in the reservoir. Interactions between the species were weak during period I, but, during Periods II and III, they were found to interact intensively. The diet overlap was highest during Period II. The niche breadth fluctuated for both species in the different phases. Greater niche breadth was observed for dogfish during periods of low peacock abundance (i.e., Period I), and the lowest niche breadth value was observed during Period II. During the same period, the peacock bass exhibited a wide foraging niche. During Period III, the dogfish showed an increase of its niche breadth, while for the peacock bass a simultaneous

decrease in the niche breadth, caused by increasing rates of cannibalism, was recorded. These results show that the presence of peacock bass induces changes in the diet of dogfish, probably due to a restricted number of prey items."

From Almeida-Ferreira et al. (2011):

"RAPD molecular marker research showed that there are two species (*Cichla kelberi* and *C. piquiti*) belonging to the genus *Cichla* in the rivers of the Paraná basin. Different morphotypes in the region may also be due to hybridization. Since exclusive SPAR molecular markers were obtained for *Cichla kelberi* and *C. piquiti* populations, the introduction of the two species in the region has been confirmed. Identification of the markers in specimens of the Paraná river basin confirmed hybridization between these exotic species."

Important note: *Cichla kelberi* is known to interbreed with congeners, but no fish of the genus *Cichla* are native to the United States. Non-native species *Cichla ocellaris* and *Cichla temensis* have been introduced to the United States (Nico and Loftus 2014, Nico and Neilson 2014).

4 Global Distribution

Figure 1. Map of known global distribution of *Cichla kelberi*. Map from GBIF (2014).

5 Distribution within the United States

This species has not been reported as introduced into the United States.

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2008; 16 climate variables; Euclidean Distance) in the United States was high in the Florida panhandle and along the Gulf Coast, medium throughout the Southeast and Florida peninsula, and low in the rest of the United States. Climate 6 match indicated that the contiguous U.S. has a medium climate match. The range for a medium climate match is 0.005 - 0.103, climate match of *Cichla kelberi* is 0.024.

Figure 2. CLIMATCH (Australian Bureau of Rural Sciences 2008) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *Cichla kelberi* climate matching. Source locations from GBIF (2014).

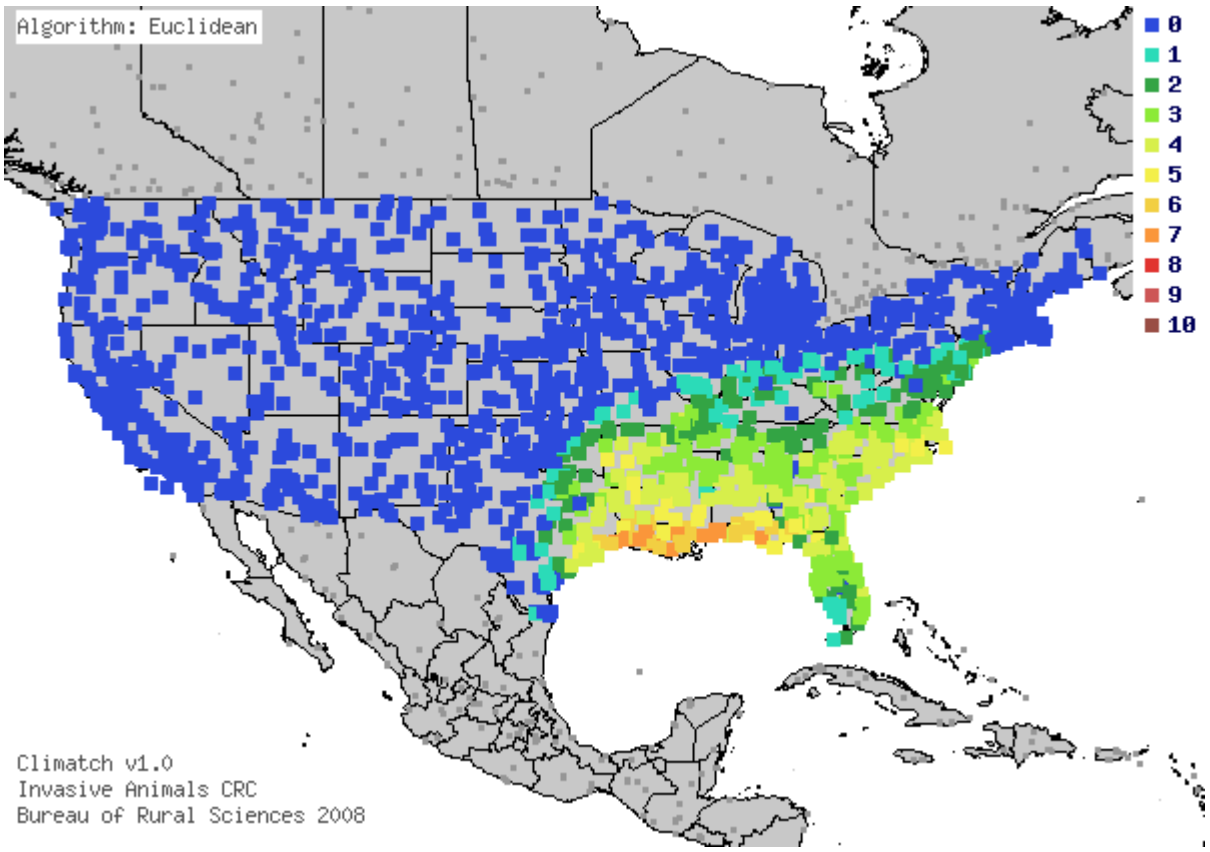

Figure 3. Map of CLIMATCH (Australian Bureau of Rural Sciences 2008) climate matches for *Cichla kelberi* in the contiguous United States based on source locations reported by GBIF (2014). 0= Lowest match, 10=Highest match.

Table 1. CLIMATCH (Australian Bureau of Rural Sciences 2008) climate match scores.

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	1299	108	156	173	144	46	30	18	0	0	0
Climate 6 Proportion =		0.024									

7 Certainty of Assessment

Information on the impacts of introduction for this species are fairly well documented. However, questions still exist as this species has only been introduced in locations close to its native range. Information on the extent of the introduced range is also limited. For these reasons the certainty of assessment is medium.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Cichla kelberi is a freshwater tropical fish native to an isolated region of Brazil. The introduced range of this species appears to be limited to reservoirs in non-native areas of Brazil, where it has been introduced for recreational angling. This species also appears to be used as an aquarium fish. *Cichla kelberi* is a piscivorous generalist. This species negatively impacts native species through predation and competition; it has been implicated in the extirpation of small prey fish in its introduced range. The history of invasiveness for this species is high. Other *Cichla* species have already been introduced to the United States. Hybridization with other species is possible, although it should be noted that congeners are not native to the United States. Climate match with the United States is medium with most likely habitat in the Southeast. The overall risk for this species is high.

Assessment Elements

- **History of Invasiveness (Sec. 3):** High
- **Climate Match (Sec.6):** Medium
- **Certainty of Assessment (Sec. 7):** Medium
- **Overall Risk Assessment Category: High**

9 References

Note: The following references were accessed for this ERSS.

Almeida-Ferreira, G.C., A.V. Oliveira, A.J. Prioli, and S.M.A.P. Prioli. 2011. SPAR genetic analysis of two invasive species of *Cichla* (Tucunaré) (Perciformes: Cichlidae) in the Paraná river basin. Acta Scientiarum - Biological Sciences 33(1): 79-85.

Australian Bureau of Rural Sciences. CLIMATCH. 2008. Available: http://data.daff.gov.au:8080/Climatch/. (July 2014).

Espínola, L.A., C.V. Minte-Vera, and H.F. Júlio Jr. 2010. Invasibility of reservoirs in the Paraná Basin, Brazil, to *Cichla kelberi* Kullander and Ferreira. Biological Invasions 12(6): 1873-1888.

Froese, R., and D. Pauly. Editors. 2011. FishBase. Available: http://www.fishbase.us/summary/Cichla-kelberi.html. (August 2011).

Fugi, R., K.D. Luz-Agostinho, and A.A. Agostinho. 2008. Trophic interaction between an introduced (peacock bass) and a native (dogfish) piscivorous fish in a Neotropical impounded river. Hydrobiologia 607(1): 143-150.

Global Biodiversity Information Facility (GBIF). 2014. Available: http://www.gbif.org/species/5208140. (July 2014).

Kovalenko, K.E., E.D. Dibble , A.A. Agostinho, and F.M. Pelicice. 2010. Recognition of nonnative peacock bass, *Cichla kelberi* by native prey: testing the naiveté hypothesis. Biological Invasions 12: 3071–3080.

Kullander, S.O., and E.J.G. Ferreira. 2006. A review of the South American cichlid genus *Cichla*, with descriptions of nine new species. Ichthyological Exploration of Freshwaters 17(4): 289-398.

Nico, L., and B. Loftus. 2014. *Cichla temensis*. USGS Nonindigenous Aquatic Species Database. Available: http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=438. (July 2014).

Nico, L., and M. Neilson. 2014. *Cichla ocellaris*. USGS Nonindigenous Aquatic Species Database. Available: http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=437. (July 2014).

Pelicice, F.M., and A.A. Agostinho. 2009. Fish fauna destruction after the introduction of a non-native predator (*Cichla kelberi*) in a Neotropical reservoir. Biological Invasions 11: 1789-1801.