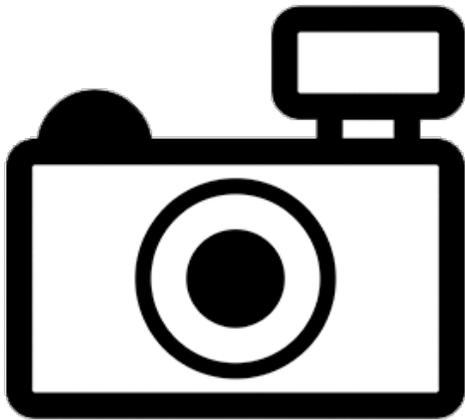


Fissi (*Sarotherodon caroli*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, May 2012
Revised, August 2018
Web Version, 2/17/2021

Organism Type: Fish
Overall Risk Assessment Category: Uncertain



No Photo Available

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

“Africa: endemic to Lake Barombi Mbo, Cameroon [Lamboj 2004, Stiassny et al. 2008]”.

Status in the United States

No records of *Sarotherodon caroli* in the wild or in trade in the United States were found.

The Florida Fish and Wildlife Conservation Commission has listed the tilapia *Sarotherodon caroli* as a prohibited species. Prohibited nonnative species (FFWCC 2020), “are considered to be dangerous to the ecology and/or the health and welfare of the people of Florida. These species are not allowed to be personally possessed or used for commercial activities.”

From Louisiana State Legislature (2019):

“No person, firm, or corporation shall at any time possess, sell, or cause to be transported into this state by any other person, firm, or corporation, without first obtaining the written permission of the secretary of the Department of Wildlife and Fisheries, any of the following species of fish: freshwater electric eel (*Electrophorus* sp.); rudd (*Scardinius erythrophthalmus*); all members of the families *Synbranchidae* (Asian swamp eels); *Channidae* (snakeheads); *Clariidae* (walking catfishes); *Trichomycteridae* (pencil catfishes); all species of tilapia [*Sarotherodon caroli* is a species of tilapia], [...]”

Sarotherodon caroli falls within Group IV of New Mexico’s Department of Game and Fish Director’s Species Importation List (New Mexico Department of Game and Fish 2010). “The importation of these species [Group IV] 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.”

From State of Nevada (2018):

“Except as otherwise provided in this section and NAC 504.486, the importation, transportation or possession of the following species of live wildlife or hybrids thereof, including viable embryos or gametes, is prohibited: [...] All species in the genera *Tilapia* and *Sarotherodon*”

Tilapia species are prohibited to be sold and used as bait or stocked in heated-water reservoirs in the State of Oklahoma (Oklahoma Secretary of State 2019).

All species in the genus *Sarotherodon* are listed as prohibited in Texas (Texas Parks and Wildlife 2020).

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, [...] (30) *Tilapia*, (*Tilapia* and *Sarotherodon*) (All species) family Cichlidae.”

A permit is required to import, possess, or sell any species of tilapia in Virginia (Virginia Department of Game and Inland Fisheries 2020).

All species in the genus *Sarotherodon* are considered regulated Type A species in Washington. Regulated Type A species (Washington State Senate 2019) are “nonnative aquatic animal species that pose a low to moderate invasive risk that can be managed based on intended use or geographic scope of introduction, have a beneficial use, and are a priority for department-led or department-approved management of the species' beneficial use and invasive risks.”

Means of Introductions in the United States

No records of *Sarotherodon caroli* in the wild in the United States were found.

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Eschmeyer et al. (2018), *Sarotherodon caroli* (Holly 1930) is the current valid name for this species. *Sarotherodon caroli* was originally described as *Tilapia caroli* (Holly 1930).

From ITIS (2018):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Labroidei
Family Cichlidae
Genus *Sarotherodon*
Species *Sarotherodon caroli* (Holly, 1930)

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 18.6 cm SL male/unsexed [Stiassny et al. 2008]”

Environment

From Froese and Pauly (2018):

“Freshwater; demersal.”

Climate

From Froese and Pauly (2018):

“Tropical; 5°N - 4°N”

Distribution Outside the United States

Native

From Froese and Pauly (2018):

“Africa: endemic to Lake Barombi Mbo, Cameroon [Lamboj 2004, Stiassny et al. 2008]”.

Introduced

No records of introductions of *Sarotherodon caroli* were found.

Means of Introduction Outside the United States

No records of introductions of *Sarotherodon caroli* were found.

Short Description

From Froese and Pauly (2018):

“Dorsal spines (total): 15 - 16; Dorsal soft rays (total): 10-12; Anal spines: 3; Anal soft rays: 9 - 11; Vertebrae: 29 - 30. Diagnosis: 17-20 rakers on lower limb of first arch; length of lower pharyngeal jaw < 43.5% of head length; 30-32 scales in lateral line; head length 39-48% of standard length [Stiassny et al. 2008]. Toothed area of lower pharyngeal jaw contained 2-3 times in length of ventral keel [Trewavas 1983; Stiassny et al. 2008]. Total dorsal rays (including spines) 26-28 [Stiassny et al. 2008]. General color dull grey; breeding (or spent?) males with black or grey smudges; no tilapia-mark, at least 6.2 cm SL or over [Trewavas 1983].”

Biology

From Froese and Pauly (2018):

“The young of the species are more carnivorous than the adults; the latter feed predominantly on phytoplankton [Trewavas 1983]. Lacks marked sexual dichromatism when sexually active; forms temporary pair bonds [Stiassny et al. 2008].”

“It is not known which parent mouth-broods the large eggs.”

Human Uses

No information on the human uses of *Sarotherodon caroli*.

Diseases

No information on diseases of *Sarotherodon caroli* was found. **No records of OIE-reportable diseases (OIE 2021) were found for *S. caroli*.**

Threat to Humans

From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions

No records of introductions of *Sarotherodon caroli* were found.

4 History of Invasiveness

There are no known nonnative populations of *Sarotherodon caroli*.

5 Global Distribution

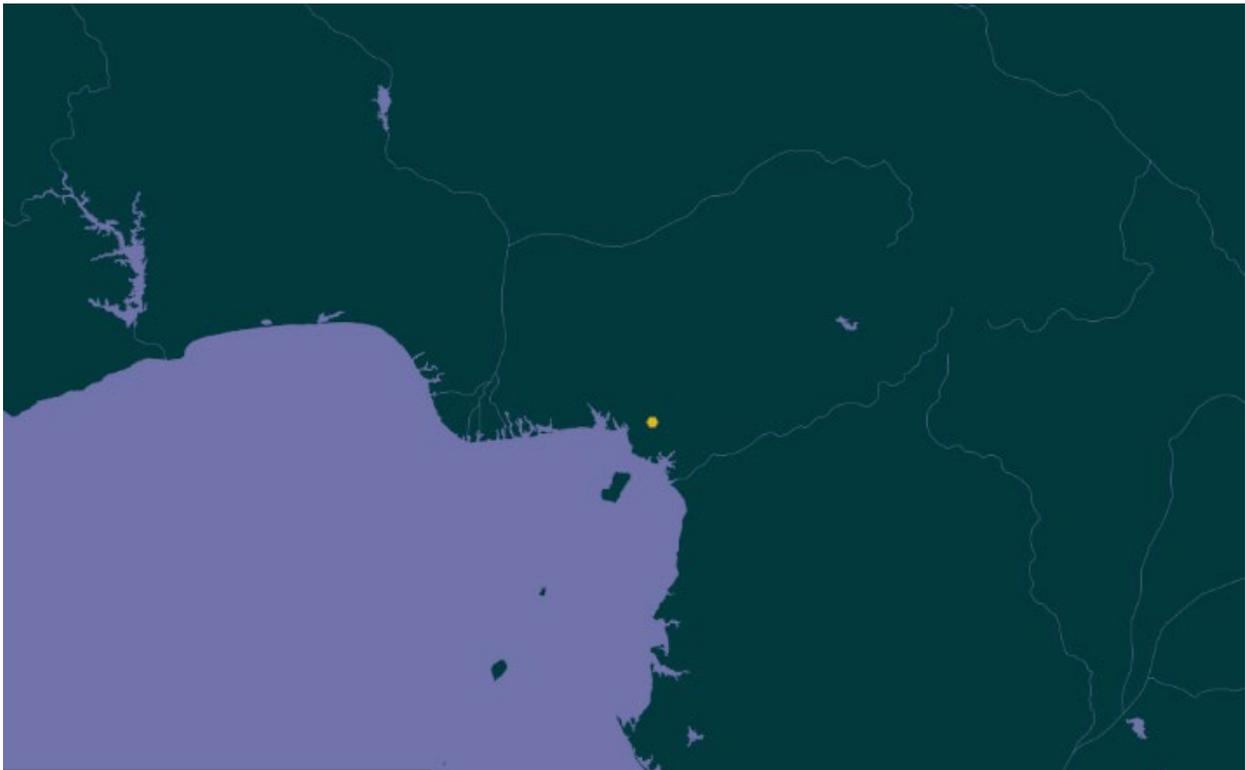


Figure 1. Known global distribution of *Sarotherodon caroli*. Location is in Cameroon. Map from GBIF Secretariat (2018).

6 Distribution Within the United States

No records of *Sarotherodon caroli* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Sarotherodon caroli* was low across the entire contiguous United States. There were no areas of medium or high match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for contiguous United States was 0.000, low (scores from 0.000 and 0.005, inclusive, are classified as low). All States had low individual climate scores.

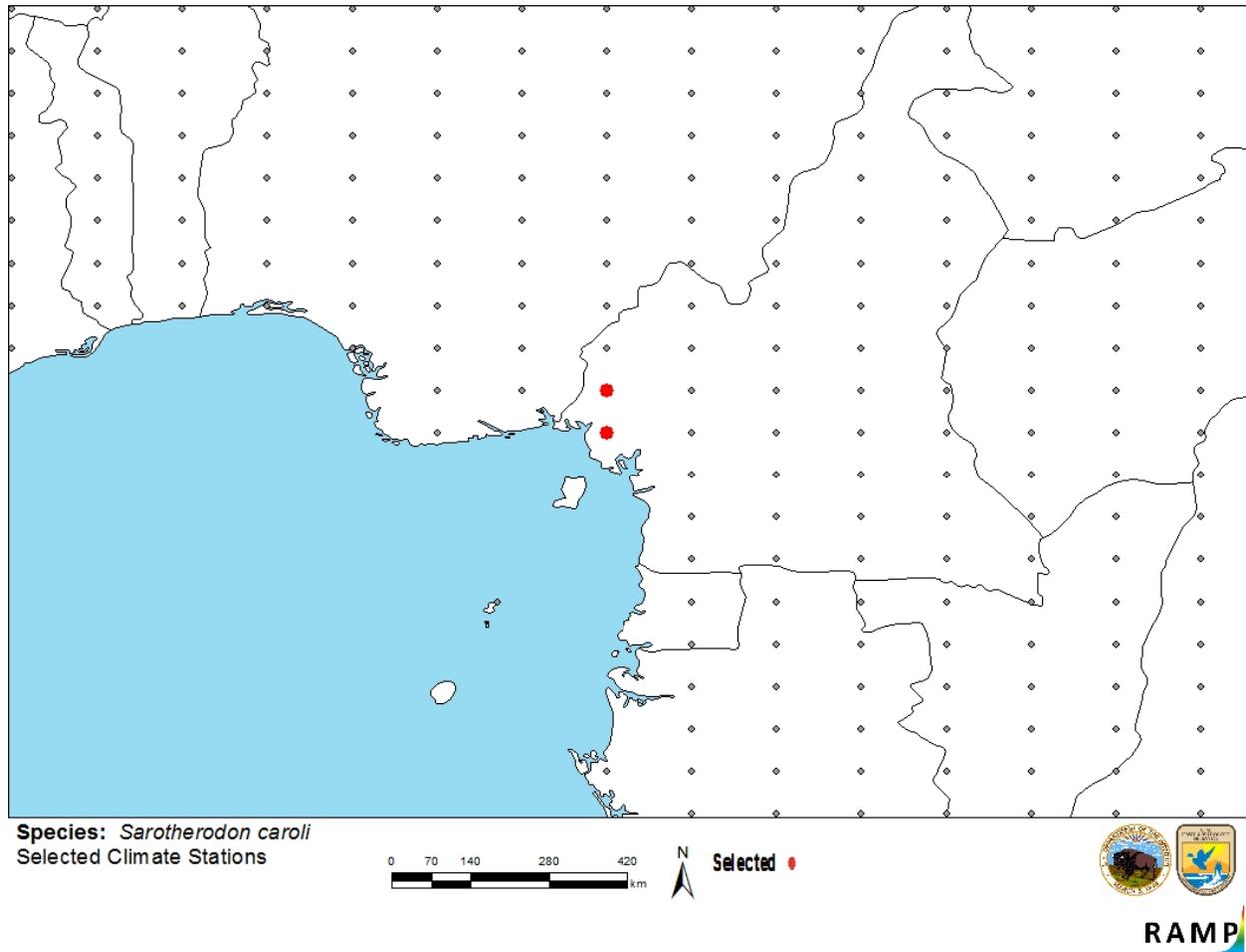


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Africa selected as source locations (red; Cameroon) and non-source locations (gray) for *Sarotherodon caroli* climate matching. Source locations from GBIF Secretariat (2018). Selected source locations are within 100 km of one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

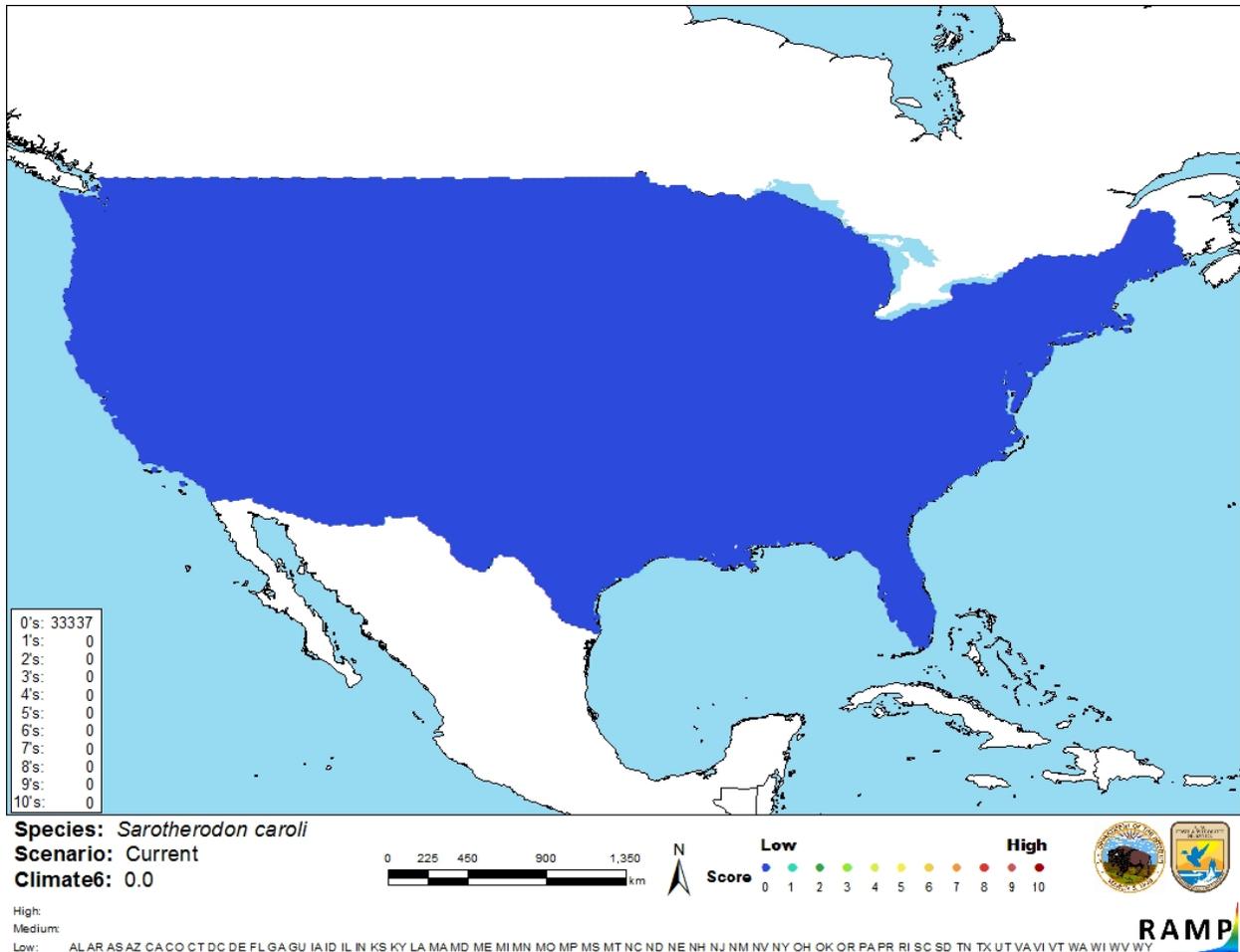


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Sarotherodon caroli* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

8 Certainty of Assessment

The certainty of assessment for *Sarotherodon caroli* is low. There is minimal information available for this species. No records of introduction were found, so there is no information on impacts of introductions to evaluate.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Sarotherodon caroli is a species of cichlid fish endemic to Lake Barombi Mbo in Cameroon, Africa. The history of invasiveness for *S. caroli* is no known nonnative population. No records of introduction were found and, therefore, there is no information on impacts of introductions to evaluate. Multiple States regulate or prohibit *S. caroli*. *S. caroli* had a low climate match. There were no areas of medium or high match in the contiguous United States. The certainty of assessment is low. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population**
- **Overall Climate Match Category (Sec. 7): Low**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information:** *Sarotherodon caroli* is regulated in multiple States.
- **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.

Eschmeyer WN, Fricke R, van der Laan R, editors. 2018. Catalog of fishes: genera, species, references. California Academy of Science. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (August 2018).

[FFWCC] Florida Fish and Wildlife Conservation Commission. 2020. Prohibited species list. Tallahassee, Florida: Florida Fish and Wildlife Conservation Commission. Available: <http://myfwc.com/wildlifehabitats/nonnatives/regulations/prohibited/> (October 2020).

Froese R, Pauly D, editors. 2018. *Sarotherodon caroli* Holly, 1930. FishBase. Available: <http://www.fishbase.se/summary/Sarotherodon-caroli.html> (August 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Sarotherodon caroli* (Holly, 1930). Copenhagen: Global Biodiversity Information Facility. Available: <https://www.gbif.org/species/2372897> (August 2018).

[ITIS] Integrated Taxonomic Information System. 2018. *Sarotherodon caroli* Holly, 1930. Reston, Virginia: Integrated Taxonomic Information System. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=648895#null (August 2018).

- Louisiana State Legislature. 2019. Exotic fish; importation, sale, and possession of certain exotic species prohibited; permit required; penalty. Louisiana Revised Statutes, Title 56, Section 319.
- New Mexico Department of Game and Fish. 2010. Director's species importation list. Santa Fe, New Mexico: New Mexico Department of Game and Fish. Available: http://www.wildlife.state.nm.us/download/enforcement/importation/information/Directors-Species-Importation-List-08_03_2010.pdf (November 2020).
- [OIE] World Organisation for Animal Health. 2021. OIE-listed diseases, infections and infestations in force in 2021. Available: <http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2021/> (February 2021).
- Oklahoma Secretary of State. 2019. List of restricted exotic species. Oklahoma Administrative Code, Title 800, Chapter 20-1-2.
- Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.
- State of Nevada. 2018. Restrictions on importation, transportation and possession of certain species. Nevada Administrative Code, Chapter 503, Section 110.
- Texas Parks and Wildlife. 2020. Invasive, prohibited and exotic species. Austin, Texas: Texas Parks and Wildlife. Available: https://tpwd.texas.gov/huntwild/wild/species/exotic/prohibited_aquatic.phtml (November 2020).
- Utah Office of Administrative Rules. 2019. Classification and specific rules for fish. Utah Administrative Code, Rule R657-3-23.
- Virginia Department of Game and Inland Fisheries. 2020. Nongame fish, reptile, amphibian and aquatic invertebrate regulations. Henrico, Virginia: Virginia Department of Game and Inland Fisheries. Available: <https://www.dgif.virginia.gov/fishing/regulations/nongame/> (November 2020).
- Washington State Senate. 2019. Invasive/nonnative species. Washington Administrative Code, Chapter 220-640.

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.

- Holly M. 1930. Synopsis der Süßwasserfische Kameruns. Sitzungsberichte, Akademie der Wissenschaften in Wien, Mathematisch-Naturwissenschaftliche Klasse 139:195–281.

Lamboj A. 2004. The cichlid fishes of Western Africa. Bornheim, Germany: Birgit Schmettkamp Verlag.

Stiassny MLJ, Lamboj A, De Weirtd D, Teugels GG. 2008. Cichlidae. In Stiassny MLJ, Teugels GG, Hopkins CD, editors. The fresh and brackish water fishes of Lower Guinea, West-Central Africa volume 2. Coll. faune et flore tropicales 42. Paris: Institut de recherche de développement, and Muséum national d'histoire naturelle; Tervuren, Belgium: Musée royal de l'Afrique Central.

Trewavas E. 1983. Tilapiine fishes of the genera *Sarotherodon*, *Oreochromis* and *Danakilia*. London: British Museum of Natural History.