Blackfin Tilapia (*Sarotherodon linnellii*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, May 2012
Revised, September 2018
Web Version, 2/18/2021

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

Photo: Unnormalized. Licensed under Creative Commons Attribution-Share Alike 2.0 Generic. Available: https://commons.wikimedia.org/wiki/File:Sarotherodon_linnellii_(London_Zoo)2.jpg. (September 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"Africa: endemic to Lake Barombi Mbo, West Cameroon [Trewavas and Teugals 1991; Lamboj 2004; Stiassny et al. 2008]."

Status in the United States

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

The Florida Fish and Wildlife Conservation Commission has listed the tilapia *S. linnellii* as a prohibited species. Prohibited nonnative species (FFWCC 2018), "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 linnellii* is a species of tilapia], […]"

Sarotherodon linnellii 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 linnellii* in the wild in the United States were found.

Remarks

From Moelants (2010):

"Critically Endangered"

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Fricke et al. (2018), *Sarotherodon linnellii* (Lönnberg 1903) is the current valid name of this species. *Sarotherodon linnellii* was originally described as *Tilapia linnellii* Lönnberg 1903.

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 linnellii* (Lönnberg, 1903)

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Max length : 18.5 cm SL male/unsexed; [Stiassny et al. 2008]"

Environment

From Froese and Pauly (2018):

"Freshwater; demersal. […]; 24°C - 26°C [assumed to be recommended aquarium temperature range] [Baensch and Riehl 1997]; […]"

Climate/Range
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, West Cameroon [Trewavas and Teugals 1991; Lamboj 2004; Stiassny et al. 2008]."

Introduced
No records of introductions of *Sarotherodon linnellii* were found.

Means of Introduction Outside the United States
No records of introductions of *Sarotherodon linnellii* were found.

Short Description
From Froese and Pauly (2018):

"Dorsal spines (total): 14 - 16; Dorsal soft rays (total): 10-12; Anal spines: 3; Anal soft rays: 8 - 11; Vertebrae: 29. Diagnosis: 15-20 rakers on lower limb of first arch; 30-32 scales in lateral line [Stiassny et al. 2008]. Body dark grey or green [Trewavas 1983; Stiassny et al. 2008]. Head large, especially in adults [Trewavas 1983], its length 37-45% of standard length [Stiassny et al. 2008]. Jaw teeth very small [Stiassny et al. 2008]. Breeding males green; intense tilapia-mark present in young until about 10 cm SL, absent above 15 cm SL; as the gonads mature the lower parts of the head and the flanks become more metallic and green; most brooding females silver grey in general color; fins mainly of a neutral color; pelvic fins may be yellow [Trewavas 1983]."

From Manci (2002):

"Several physical traits make the unga [*Saraotherodon linnellii*] stand out from many other cichlids. It has large eyes and an unusally [*sic*] large, long head to effectively find and consume food. Adults lack the large spot on the tail end of the dorsal fin called a tilapia mark, but it is present in younger fish. The unga is well armed against predators, with 15 or 16 spines on the dorsal fin to ward off attacks."

"The overall coloration of this lake dweller is a silvery green; breeding females and young fish are silvery gray. Both sexes may have a dark pigment patch on the throat, but there is individual variability. Likewise, the pelvic fins may be yellow."

Biology

From Froese and Pauly (2018):

"Occasionally forms schools; is mainly diurnal; juveniles feed on mayfly larvae and various terrestrial insects among a diet in which animal items formed a high proportion [Trewavas 1983]. Adults feed predominantly on phytoplankton [Trewavas 1983; Lamboj 2004]. Congregates in small groups (under 10 individuals) in open water regions and at a maximum depth of about 5 m [Lamboj 2004]. Lacks marked sexual dichromatism when sexually active [Stiassny et al. 2008]. Ovophilic, maternal mouth brooder [Lamboj 2004] that forms temporary pair bonds [Stiassny et al. 2008] prior to spawning, but none after [Lamboj 2004]. Ventures to regions near the edges of the lake for spawning, where the male constructs craters in the sand; males infrequently incubate the eggs [Lamboj 2004]."

"Brooding by both sexes, predominantly by the female."

From Dominey and Snyder (1988):

"Although adult *Sarotherodon linnellii* feed exclusively on phytoplankton, juveniles feed by picking small invertebrates from the water column or substrate."

From Manci (2002):

"Adult ungas, like many cichlids, eat microscopic plant material. Cichlids can extract adequate nourishment from a strictly vegetarian diet, but insects will be consumed when they are available. When young, the unga is omnivorous and will eat whatever is available, it is a suitable food."

Human Uses

From Froese and Pauly (2018):

"Fisheries: ; aquaculture: likely future use"

Diseases

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

Threat to Humans

From Froese and Pauly (2018):

"Harmless"

3 Impacts of Introductions

No records of introductions of *Sarotherodon linnellii* were found; therefore, there is no information on impacts of introductions.

4 History of Invasiveness

No records of introductions of *Sarotherodon linnellii* were found; therefore, the history of invasiveness is no known nonnative population.

5 Global Distribution

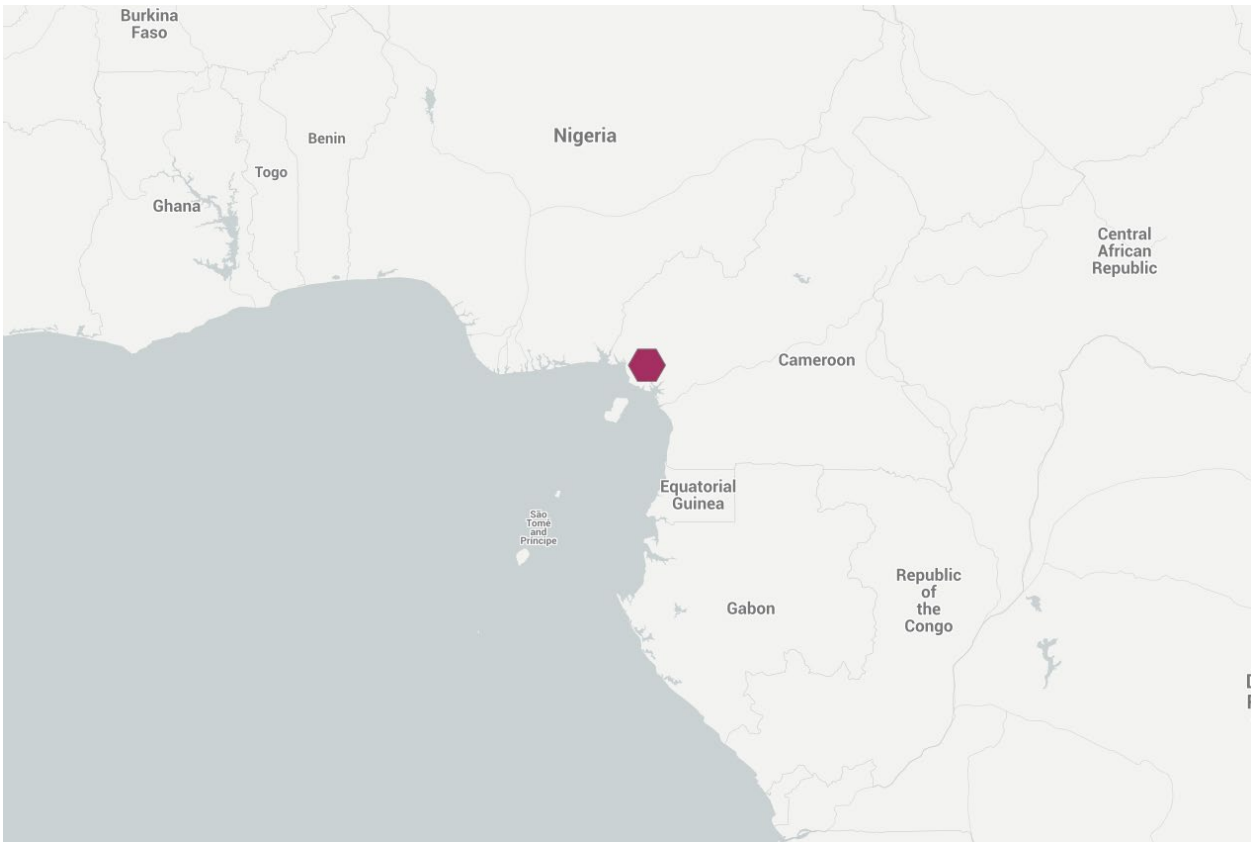

Figure 1. Map of western Africa showing locations where *Sarotherodon linnellii* has been reported. Location is in Cameroon. Map from GBIF Secretariat (2018).

6 Distribution Within the United States

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

7 Climate Matching

Summary of Climate Matching Analysis

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

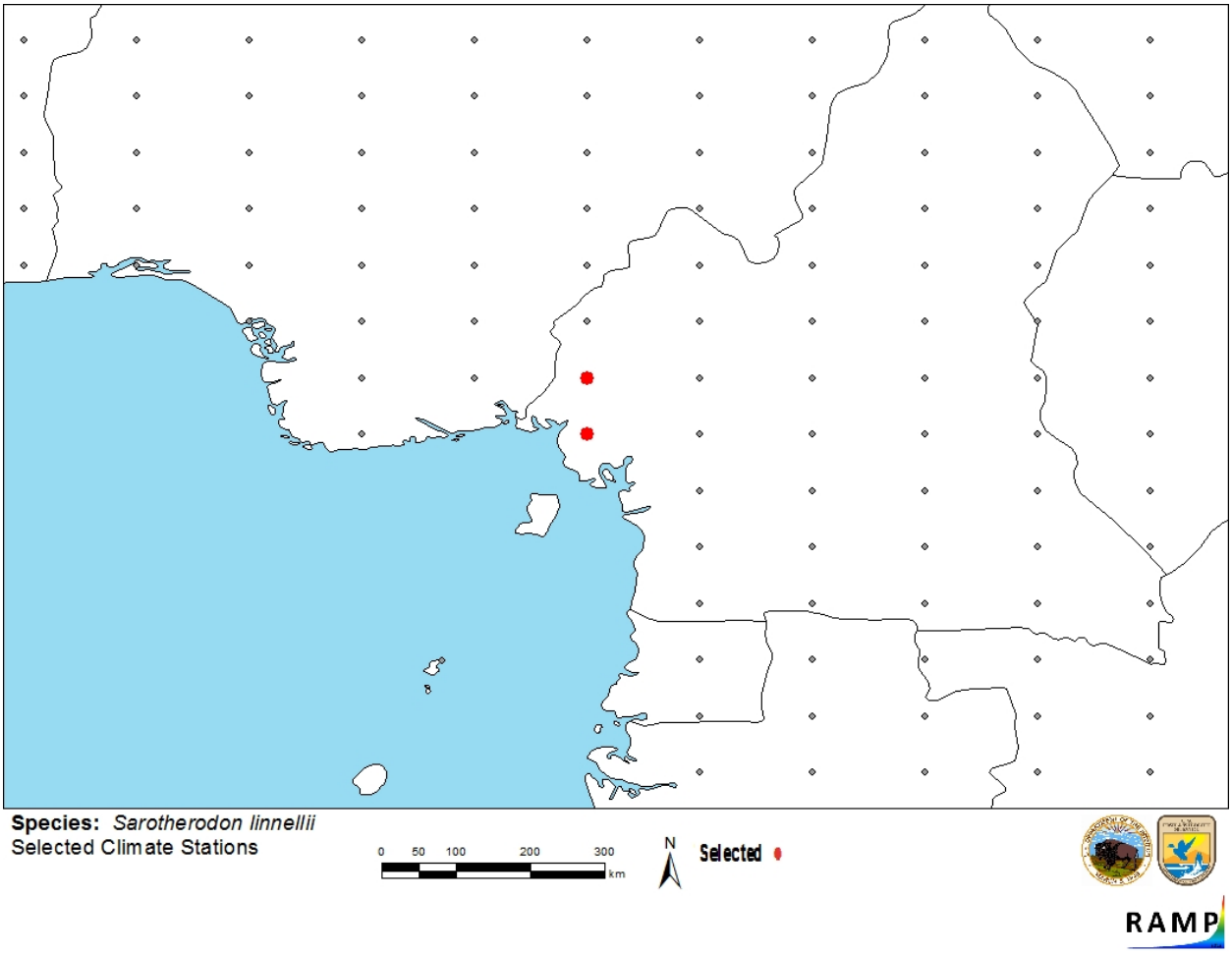

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in western Africa selected as source locations (red; Cameroon) and non-source locations (gray) for *Sarotherodon linnellii* climate matching. Source locations from GBIF Secretariat (2018). Selected source locations are within 100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

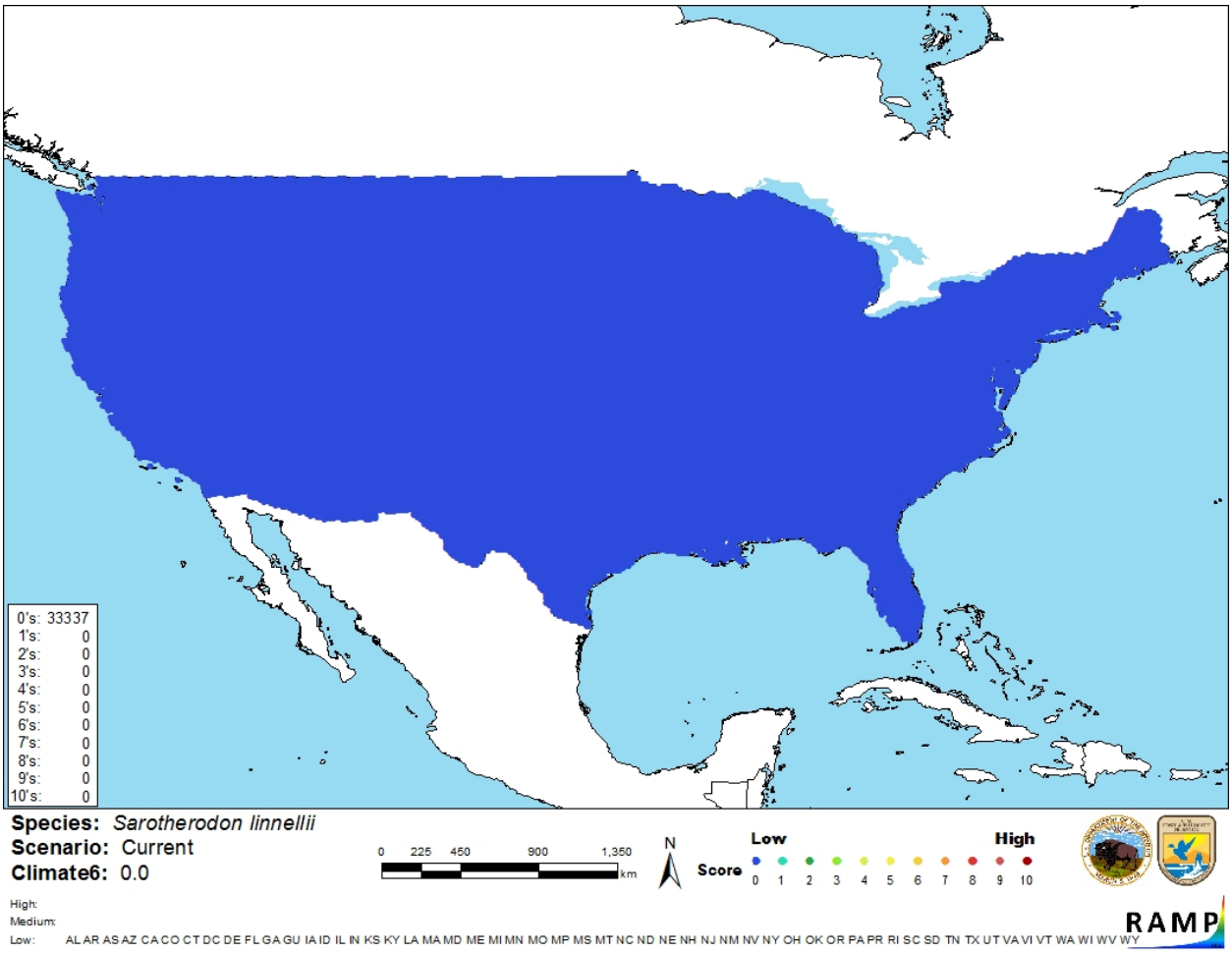

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Sarotherodon linnellii* in the contiguous United States based on source locations reported from GBIF Secretariat (2018). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

The certainty of assessment is low. There was general information about the species available from peer-reviewed sources. *Sarotherodon linnellii* is endemic to Lake Barombi Mbo, and all literature reviewed supports that there have not been any records of introductions. Due to a lack of introductions found, there is no information on impacts available to evaluate.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Blackfin Tilapia (*Sarotherodon linnellii*) is a fish endemic to Lake Barombi Mbo in Cameroon. The history of invasiveness is no known nonnative population. There were no records of introductions to the wild found, and therefore no information on impacts of introduction. The climate match was low for the entire contiguous United States. The certainty of assessment is low. The overall risk assessment 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:** This species 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.

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[FFWCC] Florida Fish and Wildlife Conservation Commission. 2018. Prohibited species list. Tallahassee, Florida: Florida Fish and Wildlife Conservation Commission. Available: http://myfwc.com/wildlifehabitats/nonnatives/regulations/prohibited/ (September 2018).

Fricke R, Eschmeyer WN, 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 (September 2018).

Froese R, Pauly D, editors. 2018. *Sarotherodon linnellii* (Lönnberg, 1903). FishBase. Available https://www.fishbase.de/summary/Sarotherodon-linnellii.html (September 2018).

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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.

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Moelants T. 2010. *Sarotherodon linnelli*. The IUCN Red List of Threatened Species 2010: e.T19909A9110008. Available: http://www.iucnredlist.org/details/19909/0 (September 2018).

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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.

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

Trewavas E, Teugels GG. 1991. Sarotherodon. Pages 425–437 in Daget J, Gosse J-P, Teugels GG, Thys van den Audenaerde DFE, editors. Check-list of the freshwater fishes of Africa. Brussels: ISNB; Tervuren: MRAC; Paris: ORSTOM.