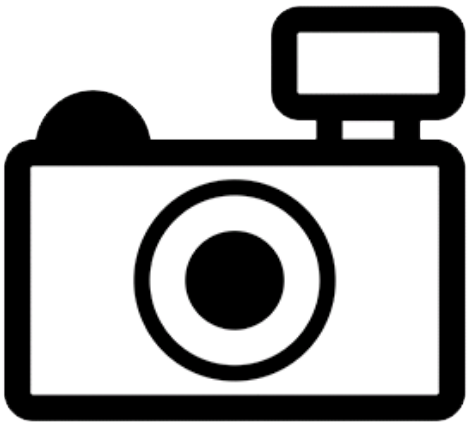
Oreochromis shiranus (a tilapia, no common name)
Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2012
Revised, June 2018
Web Version, 5/1/2020

Organism Type: Fish,
Overall Risk Assessment Category: Uncertain



1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"Africa: Shiré River above the Murchison rapids and its tributaries; upper Shire; Lake Malawi and its tributary rivers, streams and lagoons; Lake Chilwa and its basin in Malawi and Mozambique."

Status in the United States

No records of *Oreochromis shiranus* occurrences in the United States were found.
No information on trade of *O. shiranus* in the United States was found.

The Florida Fish and Wildlife Conservation Commission has listed the tilapia *O. shiranus* 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."

Means of Introductions in the United States

No records of *Oreochromis shiranus* occurrences 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), *Oreochromis shiranus* Boulenger 1897 is the current valid name of this species.

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 *Oreochromis* Günther, 1889
Species *Oreochromis shiranus* Boulenger, 1897

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Maturity: Lm 13.5, range 17 - ? cm
Max length : 39.0 cm SL male/unsexed; [Wohlfarth and Hulata 1983]"

Environment

From Froese and Pauly (2018):

"Freshwater; brackish; benthopelagic. […]; 23°C - 42°C [assumed to be recommended temperature or culture of *O. shiranus*] [Msiska 1991]"

Climate
From Froese and Pauly (2018):

"Tropical; […]; 13°S - 17°S"

Distribution Outside the United States
Native
From Froese and Pauly (2018):

"Africa: Shiré River above the Murchison rapids and its tributaries; upper Shire; Lake Malawi and its tributary rivers, streams and lagoons; Lake Chilwa and its basin in Malawi and Mozambique."

Introduced
Froese and Pauly (2018) lists an introduction from Malawi to Madagascar in 1969, the introduction did not result in an established population.

Means of Introduction Outside the United States
No records of means of introductions for *Oreochromis shiranus* were found.

Short Description
From Froese and Pauly (2018):

"Dorsal spines (total): 15 - 18; Dorsal soft rays (total): 10-13; Anal spines: 4; Anal soft rays: 9 - 11; Vertebrae: 30. The pharyngeal teeth are very slender and overlapping. There are 4-7 scales between bases of pectoral and pelvic fins and 2-3 rows on the cheek. The rays are scaly. Other source of morphological information: [Turner and Mwanyama 1992]."

Biology
From Froese and Pauly (2018):

"Occurs at temperatures ranging from 23.0-42.0 °C [Msiska 1991]. Found mainly in densely vegetated shallow waters around the lake. Mainly diurnal; feeds on detritus and phytoplankton [Konings 1990]."

"Builds basin-shaped nests in shallow water from 0.15 m to 1.5 m deep , in sand overlaid with mud, in the vicinity of rooted aquatic vegetation. Females brood eggs and young in the mouth until the young reach a length of about 10 mm."

From Mattson and Kaunda (1997):

"In Lake Malawi, *O. shiranus* has an extended breeding season with a peak during December–January (Lowe-McConnell, 1982). *O. shiranus* cultured in ponds breeds through most of the

year, with a drop in activity during the coldest months, June and July. The assumption of five broods per female and year therefore appears reasonable, and possibly even conservative."

From Ridha et al. (1998):

"In *O. shiranus* (Boulenger), Maluwa & Costa-Pierce (1993) found that temperatures below 19.0°C delayed reproduction, which ceased completely below 17°C."

Human Uses

From Froese and Pauly (2018):

"Fisheries: commercial; aquaculture: commercial; aquarium: commercial"

"[…] this species has long been an important component of commercial fish catches. First cultivated in Northern Malawi in the 1950's, this species has become the backbone of the Malawian aquaculture industry. Currently grown either in monoculture or polyculture (with *Tilapia rendalli*) by some 3,000 smallholders and two larger-scale commercial integrated aquaculture enterprises in Malawi."

"**Production Statistics**: 10-20 tons per annum."

"In Southern Africa, normally sold whole and fresh on smallholder pond banks. When preserved, splitting and smoking is the preferred method. Marketed at any size over 50 g."

From M'balaka et al. (2013):

"The most cultured fish species in Malawi are Tilapias, namely *Tilapia rendalli, Oreochromis shiranus* and *Oreochromis karongae,* which together account for about 93% of production (Chirwa, 2009; Russell et al., 2008). These herbivorouscum-omnivorous fish have a good aquaculture potential because they are exceptionally hardy and prolific, easy to farm and thus ideal for both small farmers and industrial sized aquaculture (Chirwa, 2009; Maluwa and Gjerde, 2006)."

Diseases

No records of OIE-reportable diseases (OIE 2020) were found for *Oreochromis shiranus.*

Poelen et al. (2014) lists *Ophiovalipora minuta, Anacanthorus colombianus, Cichlidogyrus sclerosus, Ciclidogyrus tilapiae, Gryodactylus cichlidarum, Gyrodactylus niloticus,* and *Gyrodactylus shariffi* as parasites of *O. shiranus.*

Threat to Humans

From Froese and Pauly (2018):

"Harmless"

3 Impacts of Introductions

No records of impacts from *Oreochromis shiranus* introductions were found.

O. shiranus is listed as a prohibited species in Florida (FFWCC 2018).

4 History of Invasiveness

While *O. shiranus* was introduced in Madagascar in 1969, it did not result in an established population and no records of impacts from its introduction were found. Therefore, the history of invasiveness is "no known nonnative population".

5 Global Distribution

Figure 1. Known global distribution of *Oreochromis shiranus* reported from Kenya, Tanzania, Malawi, and Mozambique. Map from GBIF Secretariat (2018). The observations reported from Kenya and Tanzania were not used to select source points for the climate match. They are outside the described range of the species and no records of populations were found for those locations.

6 Distribution Within the United States

No records of *Oreochromis shiranus* occurrences in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Oreochromis shiranus* was low for most of the contiguous United States, with small patches of medium match in southern Florida, southeastern Texas, southern New Mexico, and southern California. 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 scores.

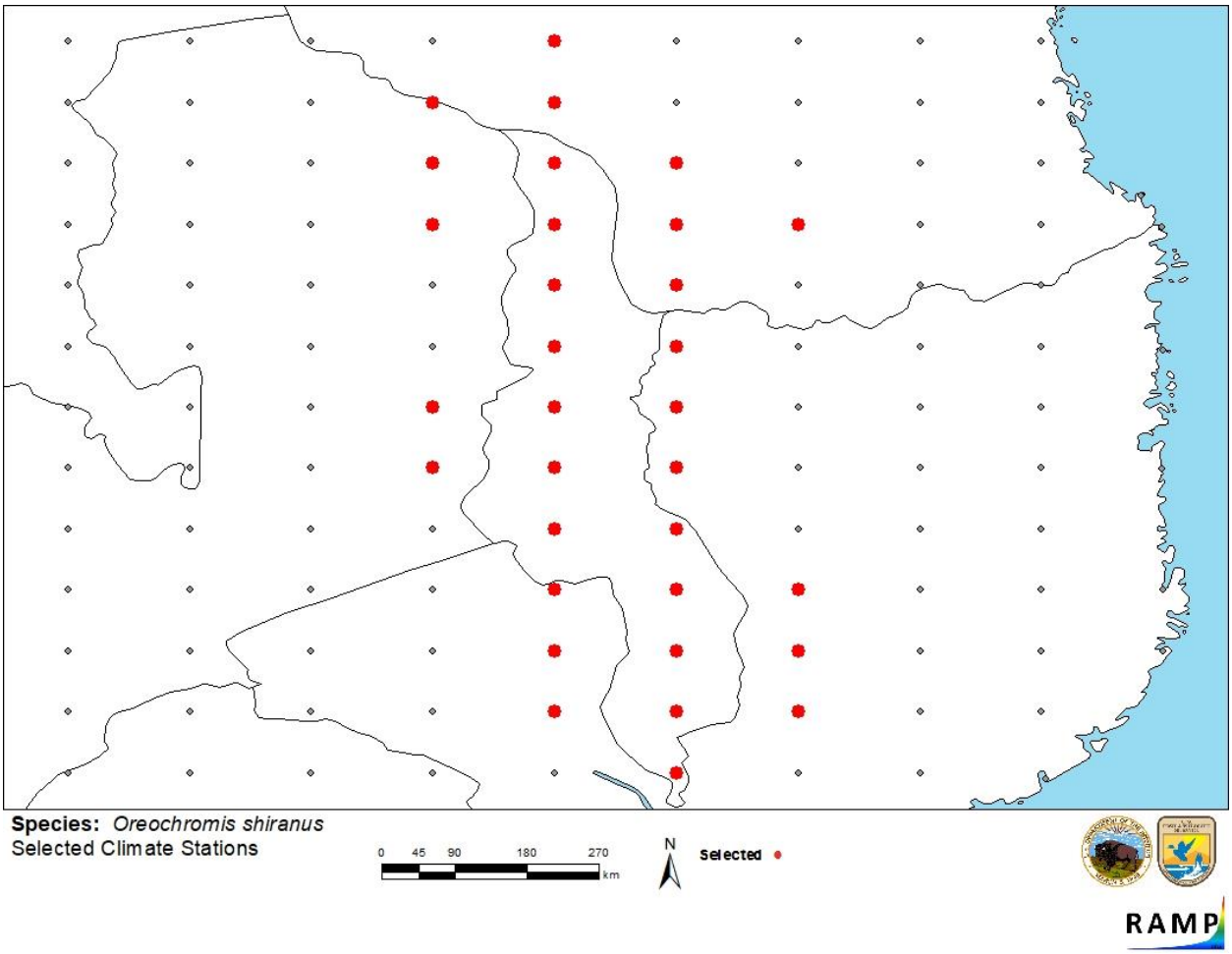


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in eastern Africa selected as source locations (red; Tanzania, Zambia, Malawi, Mozambique) and non-source locations (gray) for *Oreochromis shiranus* climate matching. Source locations from GBIF Secretariat (2018). Selected source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

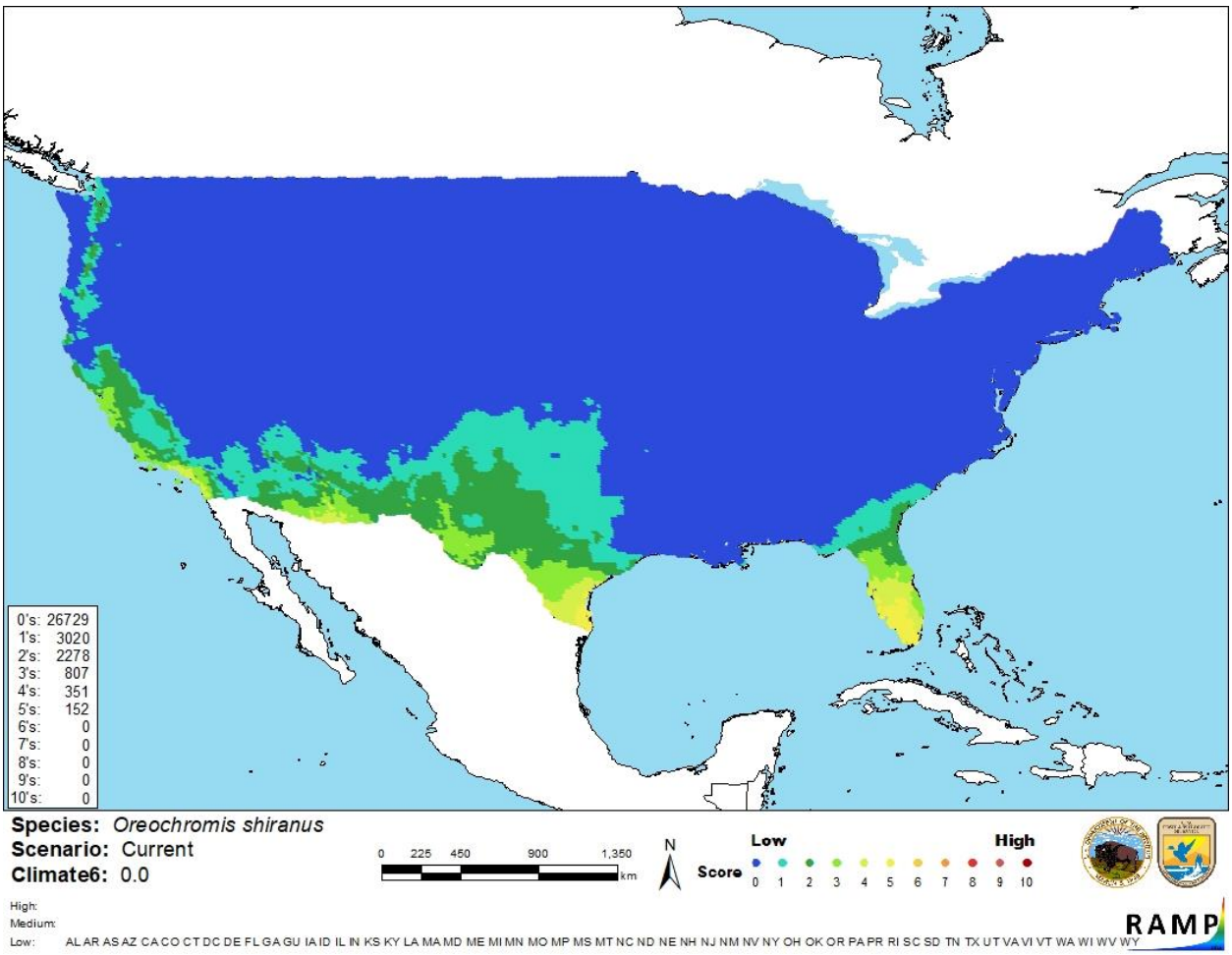


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Oreochromis shiranus* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

8 Certainty of Assessment

The certainty of this assessment is low. There is some biological and ecological information available for this species. The distribution and history of human use is well documented. A single record of introduction was found that did not result in an established population. No records of impacts from that introduction were found.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Oreochromis shiranus is a tilapia native to the Lake Malawi basin in Africa. *O. shiranus* is a staple species in the aquaculture industry in southern Africa. The history of invasiveness is no known nonnative population. *O. shiranus* was introduced in Madagascar, however no records indicate that a population was established. The climate match analysis resulted in a low match for the contiguous United States, with small areas of medium match in southern Florida, Texas, New Mexico, and California. The certainty of this assessment is low due to a lack of information. The overall risk assessment category in 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:** No additional remarks.
- **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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Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.

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.

Boulenger GA. 1897. Descriptions of new fishes from the Upper Shiré River, British Central Africa, collected by Dr. Percy Rendall, and presented to the British Museum by Sir Harry H. Johnston, K. C. B. Proceedings of the Zoological Society of London 1896:915–920.

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Lowe-McConnell RH. 1982. Tilapias in fish communities. Pages 83–113 in Pullin RSV, Lowe-McConnell RH, editors. The biology and culture of Tilapias. Manila, Philippines: ICLARM Conference Proceedings 7.

Maluwa AO, Costa-Pierce BA. 1993. Effect of broodstock density on *Oreochromis shiranus* fry production in hapas. Journal of Applied Aquaculture 2:63–76.

Maluwa AO, Gjerde B. 2006. Genetic evaluation of four strains of *Oreochromis shiranus* for harvest body weight in a diallel cross. Aquaculture 259:28–37.

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