Yellow-belly Bream (*Serranochromis robustus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2015
Revised, December 2017
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Photo: Frederick Hermanus Van der Bank, University of Johannesburg. Released to Public Domain by author. Available: https://commons.wikimedia.org/wiki/File:Serranochromis_robustus.jpg. (March 26, 2015).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2017):

"Africa: Lake Malawi, rivers flowing into it and the upper Shire River [Tweddle and Willoughby 1979; Snoeks and Hanssens 2004; Scott et al. 2006; Konings 2007]."

"Found in Lake Nyasa (Malawi) basin; not common in lake but abundant in larger rivers [Eccles 1992]. Also [Ngatunga 2003]."

"Known from Nkhotakota [in Malawi] [Snoeks and Hanssens 2004]. Present in the Shire River [in Malawi] [Tweddle et al. 1979; Tweddle and Willoughby 1979]."

From Snoeks et al. (2009):

"*S. robustus robustus* is found in Lake Malawi and the upper Shire River. It is also reported from Luongo River in the Congo system, Zambia."

"*S. robustus jallae* is found in the Cunene [Angola, Namibia], Okavango [Angola, Botswana, Namibia], Kafue [Zambia], upper and middle Zambezi [Angola, Zambia, Zimbabwe, Mozambique], Luangwa [Zambia, Malawi, Zimbabwe, Mozambique], Luapula-Moero [Zambia, Democratic Republic of the Congo], Lualaba [Democratic Republic of the Congo] and Kasai rivers [Democratic Republic of the Congo, Angola]."

Status in the United States

No records of *Serranochromis robustus* in the United States were found. No information on trade of this species in the United States was found.

Means of Introductions in the United States

No records of *Serranochromis robustus* in the United States were found.

Remarks

From Snoeks et al. (2009):

"There are two subspecies: *Serranochromis robustus robustus* and *Serranochromis robustus jallae*."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Eschmeyer et al. (2017):

"**Current status:** Valid as *Serranochromis robustus* (Günther 1864)."

From ITIS (2015):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii

Subclass Neopterygii
Infraclass Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Labroidei
Family Cichlidae
Genus *Serranochromis*
Species *Serranochromis robustus* (Günther, 1864)"

Size, Weight, and Age Range

From Froese and Pauly (2017):

"Maturity: L_m 26.5, range 25 - 27.5 cm
Max length : 56.0 cm TL male/unsexed; [IGFA 2001]; max. published weight: 6.1 kg [Skelton 1993]"

Environment

From Froese and Pauly (2017):

"Freshwater; demersal; depth range 2 - ?m."

"24°C - 26°C [Baensch and Riehl 1991] [assumed to be recommended aquarium temperature range]"

From Snoeks et al. (2009):

"Larger specimens prefer deep main channels and permanent lagoons, whereas smaller fishes occur mainly in lagoons and secondary channels."

Climate/Range

From Froese and Pauly (2017):

"Tropical; […]; 11°S - 21°S"

Distribution Outside the United States

Native

From Froese and Pauly (2017):

"Africa: Lake Malawi, rivers flowing into it and the upper Shire River [Tweddle and Willoughby 1979; Snoeks and Hanssens 2004; Scott et al. 2006; Konings 2007]."

"Found in Lake Nyasa (Malawi) basin; not common in lake but abundant in larger rivers [Eccles 1992]. Also [Ngatunga 2003]."

"Known from Nkhotakota [in Malawi] [Snoeks and Hanssens 2004]. Present in the Shire River [in Malawi] [Tweddle et al. 1979; Tweddle and Willoughby 1979]."

From Snoeks et al. (2009):

"*S. robustus robustus* is found in Lake Malawi and the upper Shire River. It is also reported from Luongo River in the Congo system, Zambia."

"*S. robustus jallae* is found in the Cunene [Angola, Namibia], Okavango [Angola, Botswana, Namibia], Kafue [Zambia], upper and middle Zambezi [Angola, Zambia, Zimbabwe, Mozambique], Luangwa [Zambia, Malawi, Zimbabwe, Mozambique], Luapula-Moero [Zambia, Democratic Republic of the Congo], Lualaba [Democratic Republic of the Congo] and Kasai rivers [Democratic Republic of the Congo, Angola]."

Introduced

From Froese and Pauly (2017):

"Translocated to the upper Ruo River in Malawi and also to Swaziland [Skelton 1993]."

"Present investigations indicate that this species may have spread to the Siphiso River in the Mlawula reserve [in Swaziland]."

"Introduced [to Lake Chila, Zambia] in the 1980s. According to fishermen, still present in 1992. [Thys van den Audenaerde 1994]"

"A population survives in the Sand River Dam [Swaziland]."

FAO (2017) lists *Serranochromis robustus robustus* as introduced to Swaziland from Malawi in 1975; this introduction resulted in an established population. *S. r. robustus* introduced to Zambia (Lake Chila) from Democratic Republic of Congo in the 1980s; it is unknown if this introduction resulted in an established population.

FAO (2017) lists *Serranochromis robustus jallae* as introduced to South Africa from Zimbabwe in the 1970s; this introduction resulted in an established population. *S. r. jallae* introduced to Swaziland from Malawi, Tanzania, Mozambique (Lake Malawi) in 1975; this introduction resulted in an established population.

Ellender and Weyl (2014) list the introduction of *Serranochromis robustus* to South Africa as failed.

From Gratwicke and Marshall (2001):

"The other introduced predator [in Zimbabwe] is the cichlid *Serranochromis robustus* (Boulenger), referred to as nembwe, which was introduced from the Upper Zambezi in the early 1960s (Toots, 1970)."

From Gratwicke et al. (2003):

"Marshall (1982) listed 26 species from Lake Chivero [Zimbabwe] and since then two exotic cichlids, *Serranochromis robustus* and *O. niloticus*, have become well established here, bringing the total to 28 species.

From Kadye and Marshall (2006):

"Four introduced species were collected [from Nyagui River, Zimbabwe], namely *Mesobola brevianalis*, *M*[*icropterus*]. *salmoides*, *Oreochromis niloticus* and *Serranochromis robustus*."

From Tweddle et al. (2011):

"[…] but the invaders [in Lake Liambezi, Namibia] also included inoculants of the tilapiine cichlids *Oreochromis andersonii*, *O. macrochir* and *Tilapia rendalli* and the predatory largemouth cichlids *Serranochromis robustus jallae* and *S. macrocephalus*."

From Kolding and Songore (2003):

"Two of the introduced species [in Lake Kariba, a man-made lake, Zimbabwe], *Tilapia rendalli* and *Serranochromis robustus*, may as well have invaded the lake naturally (e.g. Kenmuir 1984)."

Means of Introduction Outside the United States

FAO (2017) lists aquaculture and angling/sport as reasons for introduction.

From Kolding and Songore (2003):

"[…] may as well have invaded the lake naturally (e.g. Kenmuir 1984)"

Short Description

Froese and Pauly (2017) list the following characteristics for *Serranochromis robustus*: fusiform body, oval body cross section, superior mouth, complete lateral line, no barbels, single dorsal fin, pelvic fins positioned beneath origin of D1.

Biology

From Froese and Pauly (2017):

"Present in calm coves or slow flowing sections of rivers with vegetation; not common in Lake Malawi, but abundant in larger rivers [Eccles 1992]. Mostly found near river outlets and in the southern part of Lake Malawi; most frequently observed in the shallows of Lake Malawi; found over sandy and vegetated areas as well as over rocky substrates; piscivore, hunting mbuna and sand-dwelling haplochromines; mouthbrooder [Konings 1990]. Oviparous [Breder and Rosen 1966]. Breeds in summer [Skelton 1993]."

"Females incubate the eggs in the mouth [Goodwin et al. 1998]."

From Snoeks et al. (2009):

"Larger specimens prefer deep main channels and permanent lagoons, whereas smaller fishes occur mainly in lagoons and secondary channels.

It is an oviparous fish that breeds in the summer, nesting along vegetated fringes of mainstreams."

Human Uses

From Froese and Pauly (2017):

"Fisheries: commercial; gamefish: yes"

From Snoeks et al. (2009):

"*S. robustus* has commercial importance as a food fish. It is one of the main commercial fish species in Lake Mutirikwi, Zimbabwe (FAO 2003). This fish is also an important species in the recreational fishery industry (M[m]opelwa et al. 2002)."

Diseases

Epizootic ulcerative syndrome is on the 2017 list of OIE reportable diseases (OIE 2017). Infection with *Trypanosoma evansi* is a reportable disease; *Serranochromis robustus* can be infected with the related *Trypanosoma mukasai*.

Procamallaus (*Spriocamallanus*) *spiralis* Baylis, 1923 is a parasite of *Serranochromis robustus* according to Moravec and Van As (2015).

Smit et al. (2004) list *Serranochromis robustus* as a host for *Trypanosoma mukasai*.

Moyo et al. (2009) list *Acanthogyrus* sp., *Controcaecum* sp. as parasites of *Serranochromis robustus*.

Vanhove et al. (2013) list *Cichlidogyrus zambezensis* as a parasite of *Serranochromis robustus*.

Nsonga et al. (2012) list *Serranochromis robustus* as having epizootic ulcerative syndrome.

Threat to Humans

From Froese and Pauly (2017):

"Harmless"

3 Impacts of Introductions

From Gratwicke and Marshall (2001):

"Twenty-one fish species were collected during the survey. Also, some cichlids were collected that were difficult to identify and may have been hybrinds between *Oreochromis mossambicus* (Peters) and *O. niloticus* (L.) […]. The most widespread species (present at ≥ 20 stations) were *Marcusenius macrolepidotus* (Peters), *Barbus paludinosus* Peters, *Labeo cylindricus* Peters, *Clarias gariepinus* (Burchell) and *Tilapia sparrmanii* A. Smith. The most numerous species, each constituting >10% of the total, were *Barbus lineomaculatus* Peters, *B. trimaculatus* Peters, and *T. sparrmanii*. The two introduced predators, *S. robustus* and *M. salmoides*, were found in relatively small numbers but the former was always more numerous (2·76 and 0·57% of the total, respectively). *Micropterus salmoides* were significantly larger (mean weight=80·6 g) than *S. robustus* (mean weight=13·5 g) […]. There were 16 stations where neither predator occurred, 12 stations with only *S. robustus*, seven stations with both predators, and six stations with *M. salmoides* only […]. The introduced predators were restricted to streams influenced by small dams into which they had been introduced."

"The composition of fish communities was associated significantly with presence of exotic predators […]. Overall fish abundance was significantly lower (Kruskal–Wallis test, $P<0{\cdot}001$) when the predators were present, but this was largely accounted for by a low abundance and diversity of barbs (*Barbus* spp.) […]. Barb abundance was not as low when *S. robustus* was present alone compared with when *M. salmoides* was the only exotic. Barb diversity was slightly higher when *S. robustus* was the only predator, but these differences were not significant. Barbs were completely absent from eight of the 13 stations where the bass occurred (either alone or with *S. robustus*) while they were absent from only two of the 12 stations where *S. robustus* was the only introduced predator. Barbs were present at all of the 13 stations where introduced predators were absent."

"Small catlets were the only other species to be significantly lower in numbers when *S. robustus* was present (Kruskal–Wallis test, adjusted for ties, $P<0{\cdot}02$). Only one specimen of the sand catlet *Leptoglanis rotundiceps* (Hilgendorf), and no rock catlets *Chiloglanis neumanni* Boulenger were collected at the 19 stations where this predator occurred."

"This is probably because *S. robustus* tended to live in riffles where the catlets tend to be most numerous. Catlets are very small benthic fishes (maximum length=4–6·5 cm) and therefore vulnerable even to small *S. robustus*, which are predominantly benthic feeders in Zimbabwean waters (Toots & Bowmaker, 1976). The catlets have sharp dorsal and pectoral spines but these would give little protection against *S. robustus* that are adapted to feeding on fish with protective spines, such as *Synodontis* spp. which make up about 50% of their diet in their natural habitat (Winemiller, 1991)."

"The addition of exotic predators is another threat to fish abundance and biodiversity, and further introductions of *S. robustus* and *M. salmoides* in Zimbabwe should be discouraged to protect these species."

From Gratwicke et al. (2003):

"Two of the most abundant species, *Barbus paludinosus* and *B. lineomaculatus*, were widely distributed and abundant throughout the catchment (Figures 4a and 4b), except at the polluted sites and those where *M. salmoides* and *S. robustus* were present."

4 Global Distribution

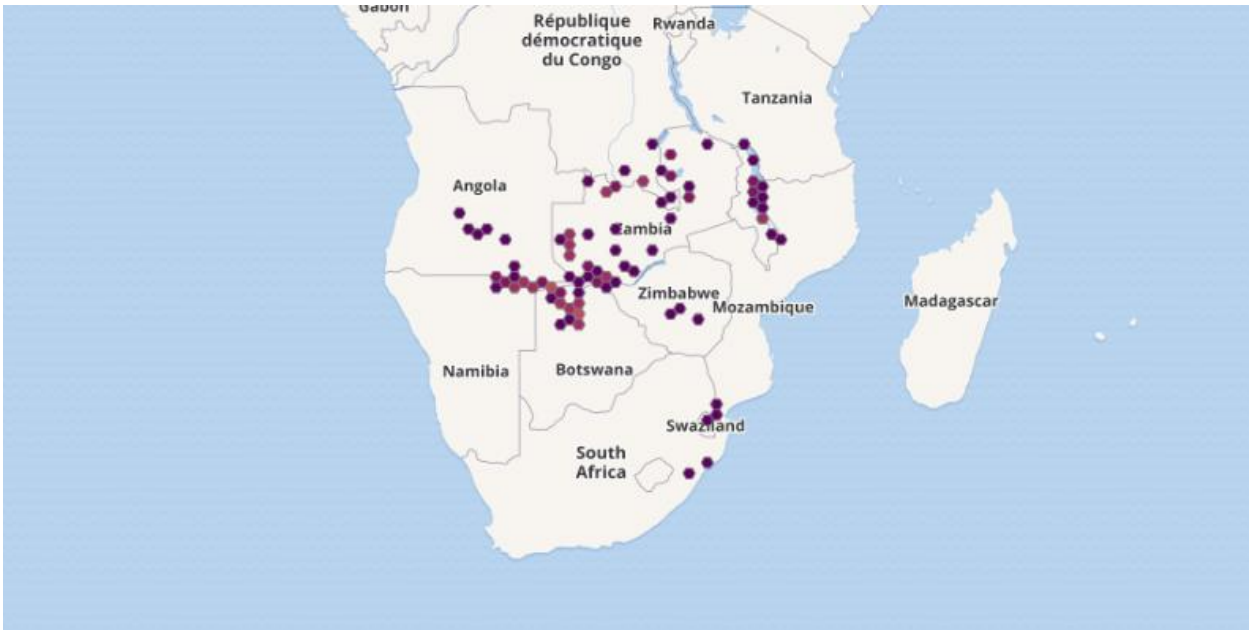

Figure 1. Known global distribution of *Serranochromis robustus* reported from Africa. Observations reported from Angola, Democratic Republic of the Congo, Zambia, Tanzania, Malawi, Namibia, Botswana, Zimbabwe, Mozambique, South Africa, and Swaziland. Map from GBIF Secretariat (2017). The locations in South Africa were not used as source points as those introductions did not result in an established population (Ellender and Weyl 2014).

5 Distribution Within the United States

No records of *Serranochromis robustus* in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Serranochromis robustus* was medium in the southwest and southern Florida and high in the southern tip of Texas. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.013, medium. (Scores between 0.005 and 0.103 are classified as medium.) Texas had individually high state wide climate score, Arizona had a medium climate score, and all other states had a low score.

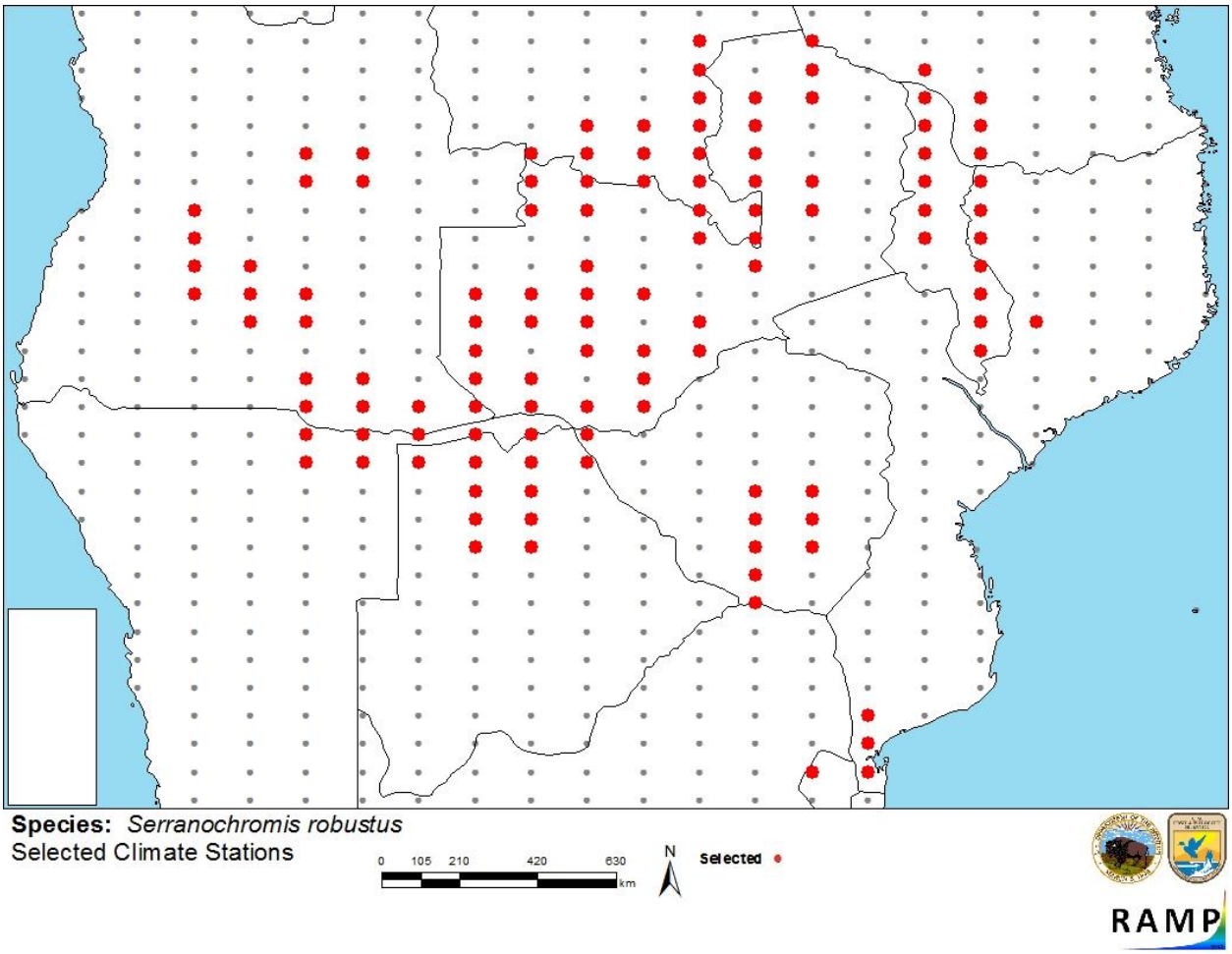

Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations in South-Central Africa selected as source locations (red; Angola, Democratic Republic of the Congo, Tanzania, Zambia, Malawi, Mozambique, Namibia, Botswana, Zimbabwe, Swaziland) and non-source locations (gray) for *Serranochromis robustus* climate matching. Source locations from Ellender and Weyl (2014) and GBIF Secretariat (2017). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

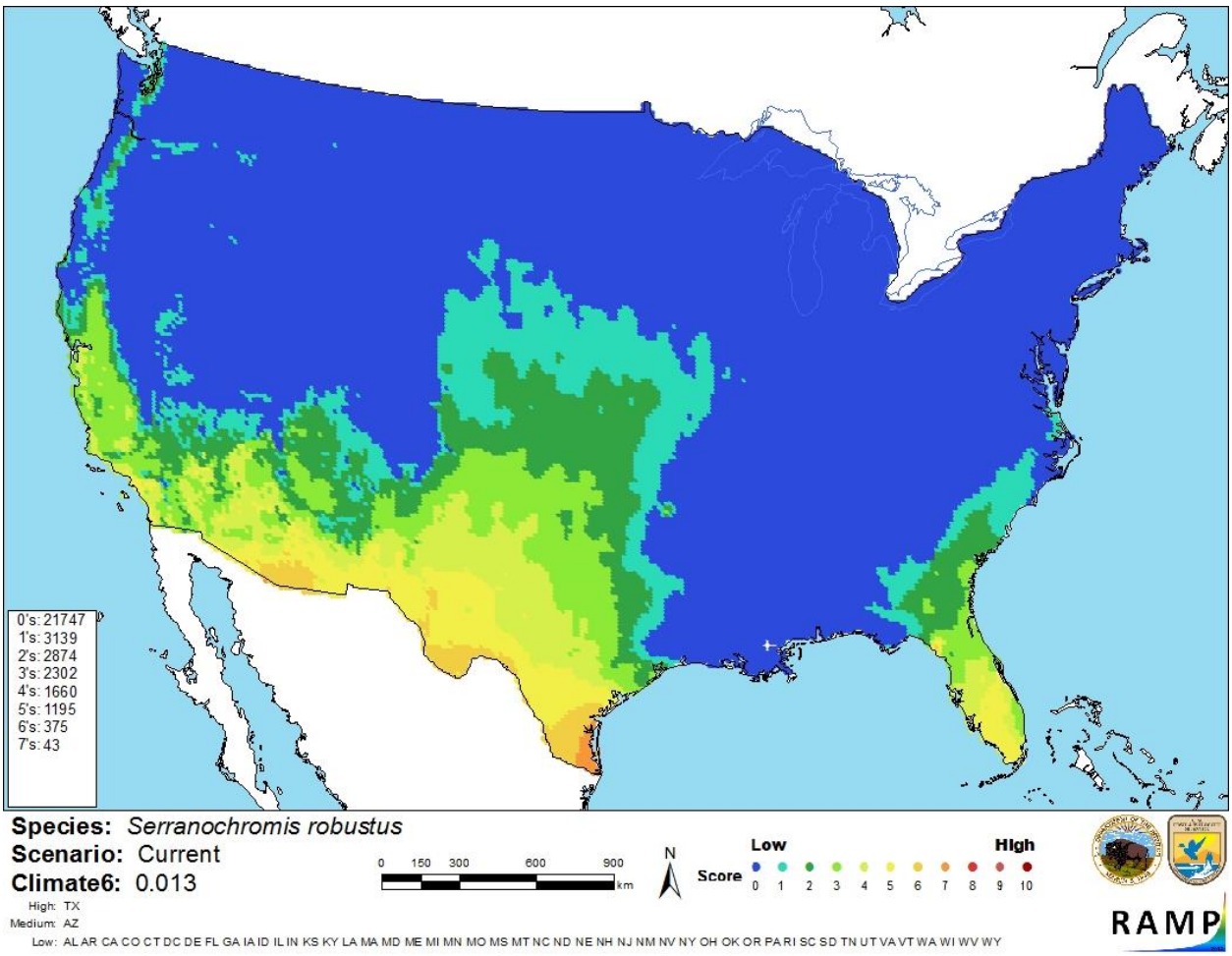

Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Serranochromis robustus* in the contiguous United States based on source locations reported by Ellender and Weyl (2014) and GBIF Secretariat (2017). 0 = Lowest match, 10 = Highest match.

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

The certainty of assessment is high. There was adequate ecological information available for *Serranochromis robustus*. Many records of introductions were found that resulted in established populations. Reliable information on negative ecological impacts of those introductions were found.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Yellow-belly Bream, *Serranochromis robustus*, is a cichlid fish from south-central Africa. It is found in most of the major rivers from Angola to Mozambique. It is used as a food source, supporting a commercial fishery, and it is also sought as a game fish. The history of invasiveness is high. Many records of introductions for aquaculture and sport fishing that resulted in established populations were found. Introductions of *Serranochromis robustus* have resulted in significantly lowered abundances of native fish species, both in conjunction with another invasive fish species and when *S. robustus* was the only introduced species. The climate match with the contiguous United States is medium. However, there was an area of high match in southern Texas. The certainty of assessment is high due to the quality of the information available. The overall risk assessment category is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks/Important additional information** Some resources recognize two subspecies. *S. robutus* can be infected with Epizootic ulcerative syndrome, an OIE-reportable disease, and can carry a parasite is in the same genus as an OIE-listed parasitic infection.
- **Overall Risk Assessment Category: High**

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.

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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.

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