

Redstriped Eartheater (*Geophagus surinamensis*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2011

Revised, September 2018

Web Version, 6/6/2019



Photo: Citron. Licensed under CC BY-SA 3.0. Available:
https://commons.wikimedia.org/wiki/File:Geophagus_surinamensis1.jpg. (September 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

“South America: Saramacca and Suriname Rivers in Suriname; Marowijne River in Suriname and French Guiana.”

Status in the United States

From Nico and Neilson (2018):

“Two fish (originally identified as *G. surinamensis*) were taken from Snapper Creek canal north of its junction with Tamiami Canal in the Miami area of Miami-Dade County, in April 1981. Loftus and Kushlan (1987) did not collect this species at those locations during electrofishing in 1980. A small reproducing population was observed and fry and adults were collected in the same 1-km reach of Snapper Creek during visits in May, and from June to July 1982 (Metzger and Shafland 1984). Additional specimens have been taken from Snapper Creek and one of its tributaries in the late 1980s and early 1990s and from Tamiami Canal in the 2000s (Shafland 1996; Shafland et al. 2008).”

“Originally considered established in Miami-Dade County canals (Shafland 1996); Shafland et al. (2008) reported that no specimens have been collected or reported since 2004 (although a single *Geophagus* sp. was collected in 2009; museum specimen), indicating either severe population decline or extirpation.”

“According to Kullander and Nijssen (1989), most past literature on "*Geophagus surinamensis*" actually pertains to other species. Given the past taxonomic confusion associated with the genus *Geophagus*, the Florida form may very well represent another member of the genus and not *G. surinamensis* (Smith-Vaniz, personal communication).”

This species is in trade in the United States. For example, from Doctors Foster and Smith (2018):

“Redstriped Earth eater Cichlid (*Geophagus surinamensis*) [...] \$ 12.99”

Means of Introductions in the United States

From Nico and Neilson (2018):

“Probable escape or release from fish farm, or aquarium release (Metzger and Shafland 1984).”

Remarks

From López-Fernández and Taphorn (2004):

“Since Kullander (1986) and Kullander and Nijssen (1989), most populations of *Geophagus* referred to as *G. surinamensis* (Bloch) (Gosse 1975) have been recognized as different taxa. The *Geophagus surinamensis* “complex” includes 7 described species (*G. surinamensis*, *G. brokopondo* Kullander and Nijssen, *G. brachybranchus* Kullander and Nijssen, *G. camopiensis* Pellegrin, *G. proximus* (Castelnau), *G. megasema* Heckel and *G. altifrons* Heckel) and an undetermined number of undescribed species with deep bodies and heads, a mid-flank spot of variable size, and either with infraorbital stripe absent (e.g. *G. surinamensis*,) or limited to a preopercular black mark (e.g. *G. brachybranchus*).”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

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 *Geophagus*
Species *Geophagus surinamensis* (Bloch, 1791)”

From Fricke et al. (2018):

“Current status: Valid as *Geophagus surinamensis* (Bloch 1791). Cichlidae: Cichlinae.”

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 14.8 cm SL male/unsexed; [Kullander 2003]”

“Maximum length 30 cm TL [Page and Burr 1991].”

Environment

From Froese and Pauly (2018):

“Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 19. [...] 22°C - 25°C [Riehl and Baensch 1991; assumed to be recommended aquarium temperature range]”

Climate/Range

From Froese and Pauly (2018):

“Tropical [...]”

Distribution Outside the United States

Native

From Froese and Pauly (2018):

“South America: Saramacca and Suriname Rivers in Suriname; Marowijne River in Suriname and French Guiana.”

Introduced

Hui et al. (2010) report *Geophagus surinamensis* as present in the Singapore River, Rochor Canal, Kallang River, Geylang River, and Marina Channel in the Marina Basin, Singapore.

From FAO (2018):

“*Geophagus surinamensis* introduced to Singapore [...]”

“Status of the introduced species in the wild : Established”

Means of Introduction Outside the United States

From FAO (2018):

“*Geophagus surinamensis* introduced to Singapore [...]”

“Reasons of Introduction : 1) ornamental”

Short Description

From Eigenmann (1912):

“Head 3-3.4; depth 2.25-2.5; D. XVII (rarely XVIII), 11 or 12; A. III, 7 or 8; lateral line 22 or 23 + 17 or 18 + $\frac{22-31}{15-31}$; about thirty-five scales in a median line; eye 2.25 in the snout, 4 in the head, 1.3 in the interorbital in the old, 1.75, 3, 1 + , respectively, in a specimen 112 mm. long.”

“Rather elevated forward, the profile steep, the depth of the caudal peduncle 1.5 in its length; maxillary not reaching to the eye; maxillary-premaxillary border 3.3 in the head; distance of eye from the gill-opening 3 in its distance from the snout. Gill-rakers about 10.”

“Scales of the breast very small; base of the dorsal and anal scaled in the old, the anal naked in a specimen 180 mm. long, both dorsal and anal naked in the smaller young; caudal scaled to near its tip; one or two scales between the lateral line and the dorsal; caudal leathery in the old. Dorsal spines subequal from the fifth or sixth, or graduated to the last, which may be more than half the head in height. Caudal emarginate; ventral filament sometimes reaching to the end of the base of anal.”

“A large spot below the lateral line near the middle of the length; throat bluish black. Living specimens from Rockstone had the breast pink, lower fins dark red with light blue stripes; sides with blue lines and deep orange spots, becoming yellow below; caudal and dorsal dark red.”

Biology

From Froese and Pauly (2018):

“Though not so abundant, it is often caught in the quiet zones of cascades with *G. harreri* [Keith et al. 2000]. Lives in mud and sand-bottomed canals. [...] Omnivorous, with a tendency towards herbivory, searches for food by digging into the substrate with its protractile mouth. Can emit sounds through its pharyngeal teeth though it is not known whether it is a form of communication or not. Spawning takes place on a flat stone or in a hole dug in the sand. Parents generally take the eggs into their mouths until hatching occurs three days later. At night or when faced with danger, the alevins seeks shelter in the mother's mouth.”

“Parents form pairs. Larvophile mouthbrooder.”

Human Uses

From Froese and Pauly (2018):

“Aquarium: commercial”

This species is in trade in the United States. For example, from Doctors Foster and Smith (2018):

“Redstriped Eartheater Cichlid (*Geophagus surinamensis*) [...] \$ 12.99”

Diseases

No OIE-reportable diseases have been documented for this species.

Poelen et al. (2014) list *Sciadicleithrum geophagi* and *Sciadicleithrum variabilum* as parasites of *Geophagus surinamensis* (Strona et al. 2013).

Threat to Humans

From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions

No information available.

4 Global Distribution

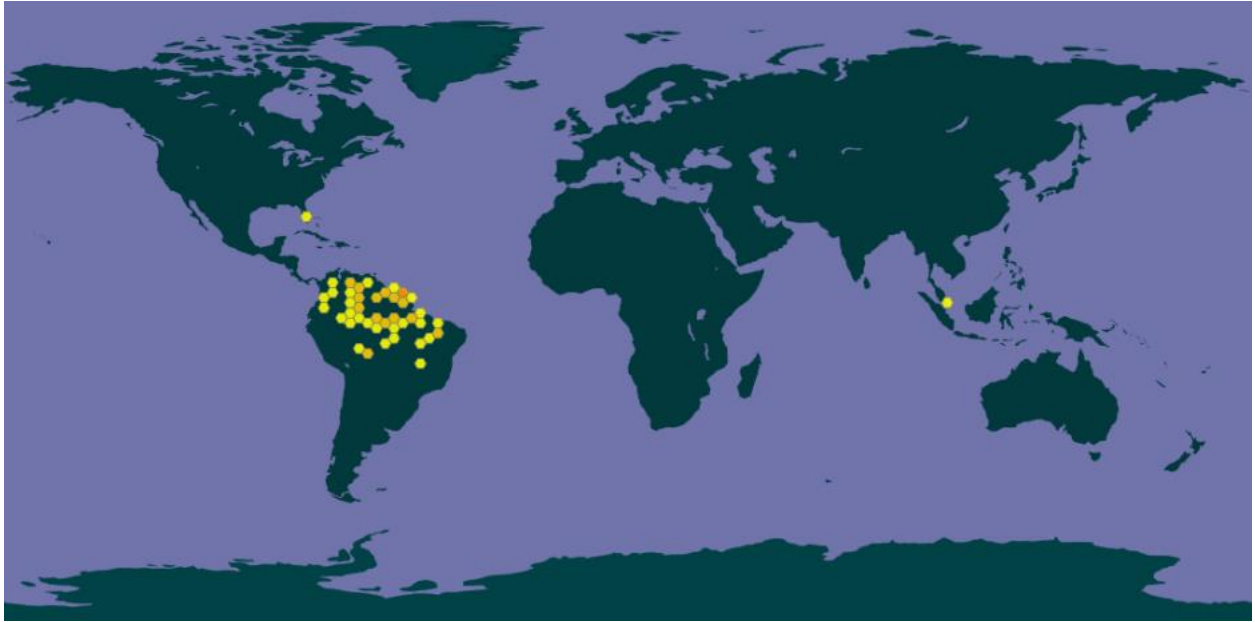


Figure 1. Known global distribution of *Geophagus surinamensis*, reported from South America, Florida (United States), and Singapore. Map from GBIF Secretariat (2018). Points in South America outside of Suriname and French Guiana were excluded from climate matching because they occur outside the established range of this species as currently understood. Reported occurrences outside of Suriname and French Guiana likely represent other members of the *G. surinamensis* species complex (see Remarks).

5 Distribution Within the United States



Figure 2. Known distribution of *Geophagus* sp. in the United States, reported from Florida. These occurrences are believed to be *Geophagus surinamensis* according to Nico and Neilson (2018). Map from Nico and Neilson (2018). Population with a reported “established” status is highlighted in yellow.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous U.S. was 0.014, which is a medium climate match. A Climate 6 score of between 0.005 and 0.103 indicates a medium climate match. The climate match was high in Florida and low in every other state in the contiguous U.S. While most of the contiguous U.S. had a very low climate match, there was an area of medium to medium-low climate match in the Southeast.

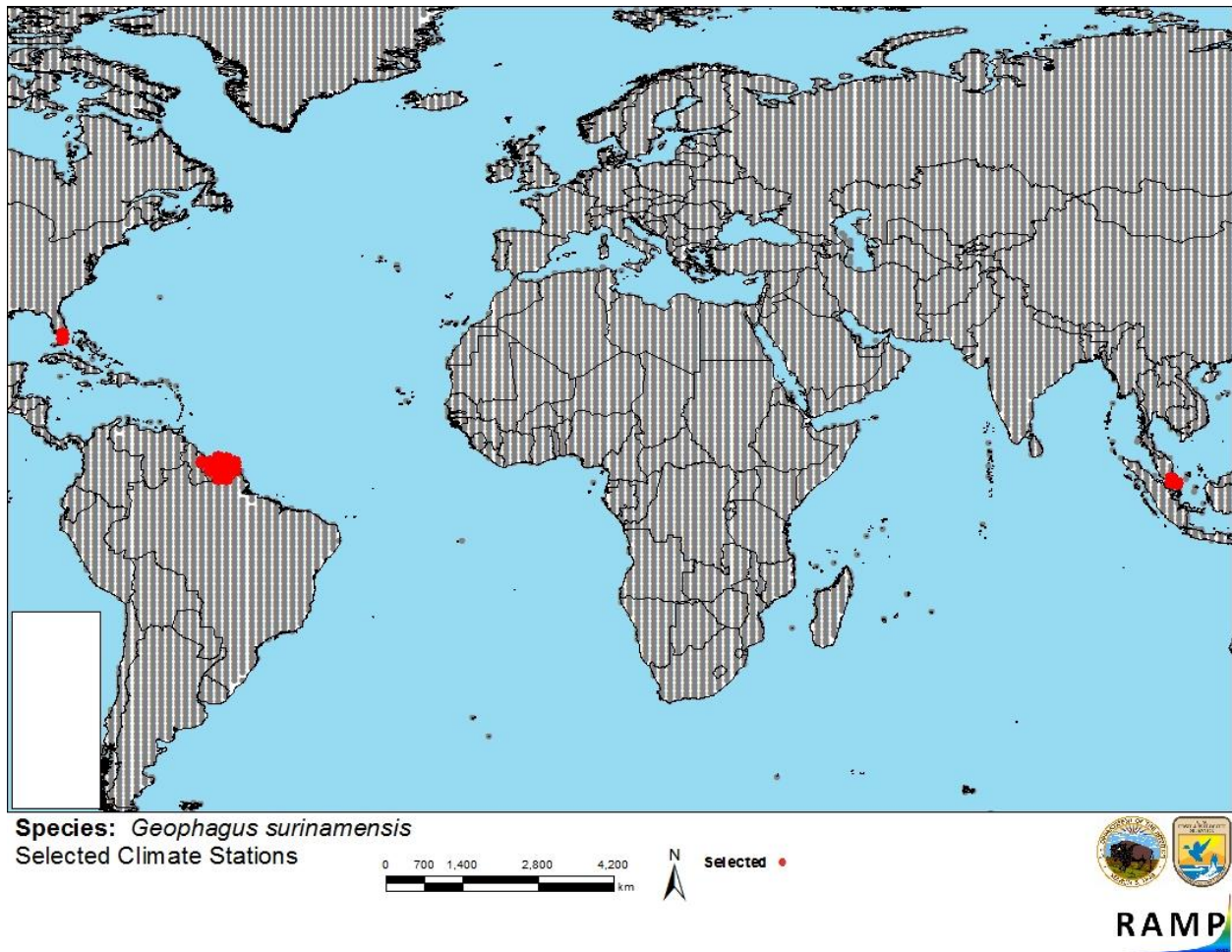


Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; Suriname, French Guiana, United States, Singapore) and non-source locations (gray) for *Geophagus surinamensis* climate matching. Source locations from GBIF Secretariat (2018).

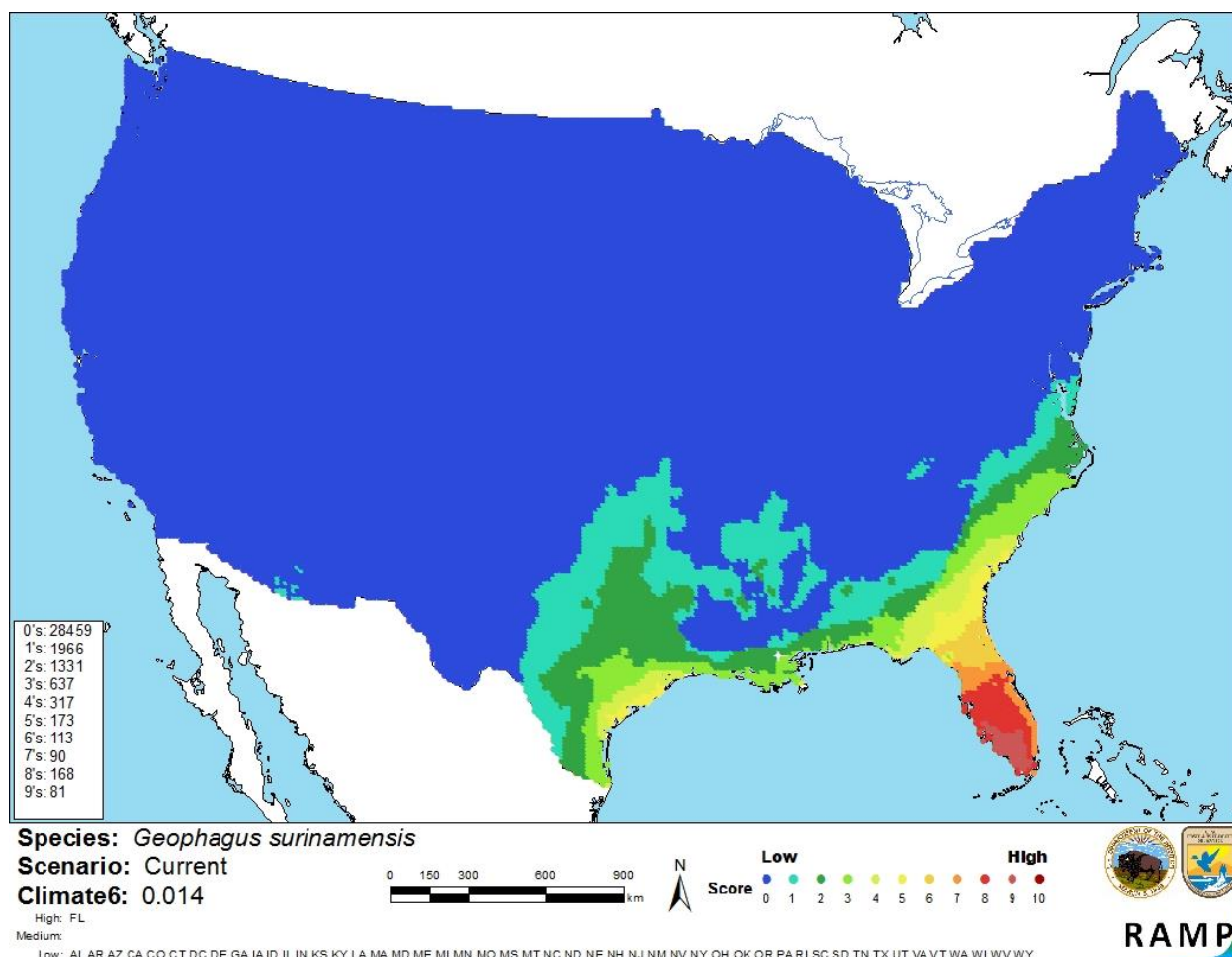


Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Geophagus surinamensis* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). Counts of climate match scores are tabulated on the left. 0= Lowest match, 10= Highest match.

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

7 Certainty of Assessment

There is adequate information available about the biology and distribution of *Geophagus surinamensis*. This species has been reported as introduced outside of its native range, but no negative impacts of these introductions have been documented. The identity of *Geophagus* specimens collected from Florida is unclear, so it is uncertain if this species has been introduced to the United States. Specimens identified as *Geophagus surinamensis* in its native range may

instead refer to a number of species in a species complex, so the exact extent of this species' occurrence is also uncertain. Overall, the certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Geophagus surinamensis, the Redstiped Eartheater, is a cichlid species native to Suriname and French Guiana. This species is used in the aquarium trade and is in trade in the United States. *G. surinamensis* has been introduced to Singapore. *G. surinamensis*, or a similar species, has been reported from Florida, but the current status of its population there is not known. No negative impacts of introductions if this species have been documented. *G. surinamensis* has a medium climate match with the contiguous United States overall and a high climate match in Florida. Because further information is needed to adequately assess the risk this species poses to the contiguous United States, the certainty of this assessment is low. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

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.

Doctors Foster and Smith. 2018. Tropical fish for freshwater aquariums: Redstriped Eartheater Cichlid. LiveAquaria. Available: <https://www.liveaquaria.com/product/894/redstriped-eartheater-cichlid?pcatid=894&c=747+870+894>. (September 2018).

Eigenmann, C. H. 1912. The freshwater fishes of British Guiana, including a study of the ecological grouping of species and the relation of the fauna of the plateau to that of the lowlands. Memoirs of the Carnegie Museum Volume V, Carnegie Institute, Pittsburgh.

FAO (Fisheries and Agriculture Organization of the United Nations). 2018. Database on introductions of aquatic species. FAO, Rome. Available: <http://www.fao.org/fishery/introsp/search/en>. (September 2018).

Fricke, R., W. N. Eschmeyer, and R. van der Laan, editors. 2018. Catalog of fishes: genera, species, references. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (September 2018).

- Froese, R., and D. Pauly, editors. 2018. *Geophagus surinamensis* (Bloch, 1791). FishBase. Available: <https://www.fishbase.de/summary/Geophagus-surinamensis.html>. (September 2018).
- GBIF Secretariat. 2018. GBIF backbone taxonomy: *Geophagus surinamensis*, Bloch, 1791. Global Biodiversity Information Facility, Copenhagen. Available: <https://www.gbif.org/species/5208434>. (September 2018).
- Hui, T. H., M. E. Y. Low, and K. L. K. Peng. 2010. Fishes of the Marina Basin, Singapore, before the erection of the Marina Barrage. *The Raffles Bulletin of Zoology* 58(1):137-144.
- ITIS (Integrated Taxonomic Information System). 2018. *Geophagus surinamensis* (Bloch, 1791). Integrated Taxonomic Information System, Reston, Virginia. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=169919#null. (September 2018).
- López-Fernández, H., and D. C. Taphorn. 2004. *Geophagus abalios*, *G. dicrozoster* and *G. winemilleri* (Perciformes: Cichlidae), three new species from Venezuela. *Zootaxa* 439:1-27.
- Nico, L., and M. Neilson. 2018. *Geophagus* sp. Heckel, 1840: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: <https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=455>. (September 2018).
- Poelen, J. H., J. D. Simons, and C. J. Mungall. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. *Ecological Informatics* 24:148-159.
- Sanders, S., C. Castiglione, and M. H. Hoff. 2014. Risk Assessment Mapping Program: RAMP. US Fish and Wildlife Service.

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.

- Gosse, J. P. 1975. Révision du genre *Geophagus* (Pisces, Cichlidae). *Memoires de l'Académie Royale des Sciences d'Outre-Mer, Classe des Sciences Naturelles et Médicales*, XIX–3:1–172 + 18.
- Keith, P., P.-Y. Le Bail and P. Planquette. 2000. Atlas des poissons d'eau douce de Guyane. Tome 2, Fascicule I: Batrachoidiformes, Mugiliformes, Beloniformes, Cyprinodontiformes, Synbranchiformes, Perciformes, Pleuronectiformes, Tetraodontiformes. *Collection Patrimoines Naturels* 43(I). Publications scientifiques du Muséum national d'Histoire naturelle, Paris.

- Kullander, S. O. 1986. Cichlid fishes of the Amazon River drainage of Peru. Swedish Museum of Natural History, Stockholm.
- Kullander, S. O. 2003. Cichlidae (Cichlids). Pages 605-654 in R. E. Reis, S. O. Kullander and C. J. Ferraris, Jr., editor. Checklist of the freshwater fishes of South and Central America. EDIPUCRS, Porto Alegre, Brazil.
- Kullander, S. O., and H. Nijssen. 1989. The cichlids of Surinam, Teleostei: Labroidei. E.J. Brill, New York.
- Loftus, W. F., and J. A. Kushlan. 1987. Freshwater fishes of southern Florida. Bulletin of the Florida State Museum of Biological Science 31(4):147-344.
- Metzger, R. J., and P. L. Shafland. 1984. Possible establishment of *Geophagus surinamensis* (Cichlidae) in Florida. Florida Scientist 47(3):201-203.
- Page, L. M., and B. M. Burr. 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston.
- Riehl, R., and H. A. Baensch, 1991. Aquarien atlas. Volume 1. Mergus, Verlag für Natur-und Heimtierkunde, Melle, Germany.
- Shafland, P. L. 1996. Exotic fishes of Florida – 1994. Reviews in Fisheries Science 4(2):101-122.
- Shafland, P. L., K. B. Gestring, and M. S. Stanford. 2008. Florida's exotic freshwater fishes - 2007. Florida Scientist 71(3):220-245.
- Strona, G., M. Lourdes, D. Palomares, N. Bailly, P. Galli, and K. D. Lafferty. 2013. Host range, host ecology, and distribution of more than 11800 fish parasite species. Ecology 94:544.