

Guinean Tilapia (*Coptodon guineensis*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, August 2016

Revised, July 2019

Web Version, 11/15/2019

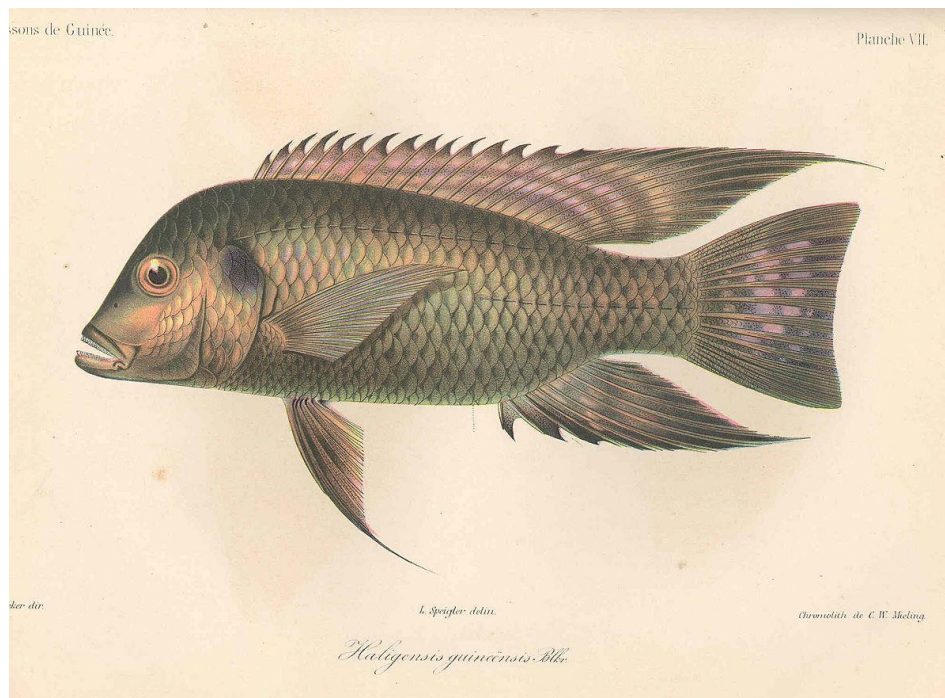


Image: Pieter Bleeker. Freshwater and Marine Image Bank, Public Domain. Available: https://commons.wikimedia.org/wiki/File:FMIB_45820_Haligenes_guineensis.jpeg. (July 2019).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

“Africa: coastal basins, fresh waters, brackish and marine waters from mouth of Senegal River (Senegal) to mouth of the Cuanza River (Angola) [Stiassny et al. 2008] [Angola, Benin, Cameroon, Congo, Congo Dem Rp [Democratic Republic of the Congo], Cote d’Ivoire, Eq [Equatorial] Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Nigeria, Senegal, Sierra Leone, Togo, and West Sahara], sometimes ascending far up rivers.”

From Agnese et al. (2018):

“*Coptodon guineensis* is a euryhaline fish, usually living in brackish waters in the river mouths and lagoons along the West African coast, from Angola to Morocco. In Morocco, the species has recently been found in the wadi Aabar [Qninba et al. 2012], thus extending its range 1400km northward from the River Senegal. The species is also present in the sea, near Dakar in Senegal, and has recently been identified in the Banc d’Arguin, in Mauritania [Kide et al. 2016].”

Status in the United States

GBIF Secretariat (2019) reports that *Coptodon guineensis* was collected from the north end of the Salton Sea in California in 1975; however, no additional information was found to determine if this location indicates an established population.

The Florida Fish and Wildlife Conservation Commission has listed the fish *Coptodon guineensis* (under the synonym *Tilapia guineensis*) as a prohibited species. Prohibited nonnative species (FFWCC 2019), "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."

No records of *C. guineensis* in trade in the United States were found.

Means of Introductions in the United States

No records were found on the means of an introduction of *Coptodon guineensis* to the United States.

Remarks

Tilapia guineensis is a commonly used synonym for this species (Fricke et al. 2019). It was used in addition to the valid name to search for information.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

“**Current status:** Valid as *Coptodon guineensis* (Günther 1862).”

From Bailly (2017):

“Biota > Animalia (Kingdom) > Chordata (Phylum) > Vertebrata (Subphylum) > Gnathostomata (Superclass) > [...] Actinopterygii (Class) > Perciformes (Order) > Labroidei (Suborder) > Cichlidae (Family) > Pseudocrenilabrinae (Subfamily) > *Coptodon* (Genus) > *Coptodon guineensis* (Species)”

Size, Weight, and Age Range

From Froese and Pauly (2019):

“Maturity: L_m 13.5, range 10 - ? cm

Max length : 30.0 cm SL male/unsexed; [Olaosebikan and Raji 1998]”

Environment

From Froese and Pauly (2019):

“Marine; freshwater; brackish; benthopelagic. [...]; 22°C - 26°C [Baensch and Riehl 1991] [assumed to be recommended aquarium temperature]; [...]”

Climate/Range

From Froese and Pauly (2019):

“Tropical; [...]; 16°N - 12°S, 17°W - 16°E”

Distribution Outside the United States

Native

From Froese and Pauly (2019):

“Africa: coastal basins, fresh waters, brackish and marine waters from mouth of Senegal River (Senegal) to mouth of the Cuanza River (Angola) [Stiassny et al. 2008] [Angola, Benin, Cameroon, Congo, Congo Dem Rp [Democratic Republic of the Congo], Cote d’Ivoire, Eq [Equatorial] Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mauritania, Nigeria, Senegal, Sierra Leone, Togo, and West Sahara], sometimes ascending far up rivers.”

From Agnese et al. (2018):

“*Coptodon guineensis* is a euryhaline fish, usually living in brackish waters in the river mouths and lagoons along the West African coast, from Angola to Morocco. In Morocco, the species has recently been found in the wadi Aabar [Qninba et al. 2012], thus extending its range 1400km northward from the River Senegal. The species is also present in the sea, near Dakar in Senegal, and has recently been identified in the Banc d’Arguin, in Mauritania [Kide et al. 2016].”

Introduced

From Azeroual et al. (2018):

“This species was introduced from the Ivory Coast to the former USSR in 1978 (Welcomme 1988). It is probably not established in the wild.”

Means of Introduction Outside the United States

No records were found on the means of an introduction of *Coptodon guineensis*.

Short Description

From Froese and Pauly (2019):

“Dorsal spines (total): 14 - 16; Dorsal soft rays (total): 12-13; Anal spines: 3; Anal soft rays: 8 - 10. Diagnosis: upper profile of head strongly convex; lower pharyngeal bone about as long as broad, and with anterior lamella shorter than toothed area [Teugels and Thys van den Audenaerde 2003]. 10 or fewer rakers on lower limb of first arch; unpaired fins not predominantly red-brown; mouth terminal; 29-30 scales on lateral line; outer row teeth robust [Stiassny et al. 2008]. Dorsal fin with 14-16 spines and 12-13 soft rays (total rays 27-29) [Teugels and Thys van den Audenaerde 2003; Stiassny et al. 2008]. Anal fin with 3 spines and 8-10 soft rays; caudal fin weakly covered with scales at base or entirely membranous [Stiassny et al. 2008]. Caudal without spots, grey on upper lobe, yellow on lower; large vertical stripes weakly pronounced on flanks; flank scales with a blackish mark at base [Teugels and Thys van den Audenaerde 2003; Stiassny et al. 2008]. No bifurcated dark vertical bars on flanks; dorsal and anal without orange-red upper margin [Teugels and Thys van den Audenaerde 2003]. Length of caudal peduncle 10.5-12.9% of standard length [Stiassny et al. 2008].”

Biology

From Froese and Pauly (2019):

“Very tolerant of elevated salinities, found in pure seawater, even reproduction in these highly saline environments is possible [Lamboj 2004]. Feeds on shrimps, bivalves, plankton [Diouf 1996], detritus [Diouf 1996; Lamboj 2004], higher plants, algae, aufwuchs and small crustaceans [Lamboj 2004]. Oviparous [Breder and Rosen 1996]. Very prolific, spawning up to every 3 weeks [Lamboj 2004]. Pair bonding, open [Lamboj 2004] substrate brooder/spawner [Lamboj 2004; Stiassny et al. 2008], with both parents guarding the brood [Lamboj 2004].”

“Oviparous [Breder and Rosen 1996]. Substrate guarding of eggs as a form of parental care is done by both male and female [Goodwin et al. 1998].”

From Azeroual et al. (2018):

“In Casamance, the reproductive activity of *C. guineensis* appears to be at a maximum in March and April (Albaret 1987).”

Human Uses

From Azeroual et al. (2018):

“*Coptodon guineensis* is commercially used for aquaculture in central Africa.”

“This species is harvested for human consumption, and for the aquarium trade.”

Diseases

No records of OIE-reportable diseases (OIE 2019) were found for *Coptodon guineensis*.

From Froese and Pauly (2019):

“Nosema Disease 2, Parasitic infestations (protozoa, worms, etc.)”

From Umana et al. (2017):

“The occurrence of bacterial isolates in fin-fishes (*Clarias gariepinus* and *Coptodon guineensis*) from the humic ecosystem of Eniong River, Akwa Ibom State was investigated. The results obtained from pour plate analysis showed that the fin-fishes contained bacterial contaminants. The bacterial loads varied with the type of fin-fish and were much higher in fish intestines, when compared with the skin and gills. The heterotrophic bacterial loads obtained exceeded the 1.2×10^5 cfu/g limit recommended for fresh fishes. High and unsafe fecal coliform ($1.1 \pm 0.57 \times 10^3$ cfu/g - $2. \pm 0.26 \times 10^3$ cfu/g) loads were also obtained. The culture-able bacteria species associated with the fin-fish samples include *Staphylococcus* sp, *Klebsiella* sp, *Bacillus* sp, *Enterobacter*, *Streptococcus* sp, *Micrococcus* sp, *Lactobacillus*, *Serratia* sp, *Proteus* sp, *Salmonella* sp, *Shigella* sp, and *Escherichia coli*.”

Threat to Humans

From Froese and Pauly (2019):

“Harmless”

3 Impacts of Introductions

No records of impacts of introductions were found for *Coptodon guineensis*.

4 Global Distribution



Figure 1. Known global distribution of *Coptodon guineensis*. Map from GBIF Secretariat (2019). Locations are in the United States and along the western coast of Africa. The location in California was not used to select source points for the climate match due to the fact that it is unknown if the observation is representative of an established population. Because the climate matching analysis (section 6) is not valid for marine waters, no marine occurrences were used in the climate matching analysis.

Agnese et al. (2018) lists a population of *Coptodon guineensis* present in Wadi Aabar, extending the range northward to Morocco; however, an exact location was unable to be found and thus this report could not be used to select source points for the climate match.

5 Distribution Within the United States



Figure 2. Map of the United States showing known locations where *Coptodon guineensis* has been reported. Map from GBIF Secretariat (2019). The reported observation is from the north end of the Salton Sea in California. No additional information was found to determine if this location indicates an established population; therefore it was not used to select source points for the climate match.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Coptodon guineensis* was low for the majority of the contiguous United States. There were areas of medium match along the coast of the Gulf of Mexico and southern Florida. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.002, low. (Scores between 0.000 and 0.005, inclusive, are classified as low.) All States had low individual Climate 6 scores except for Florida, which had a high individual Climate 6 score.

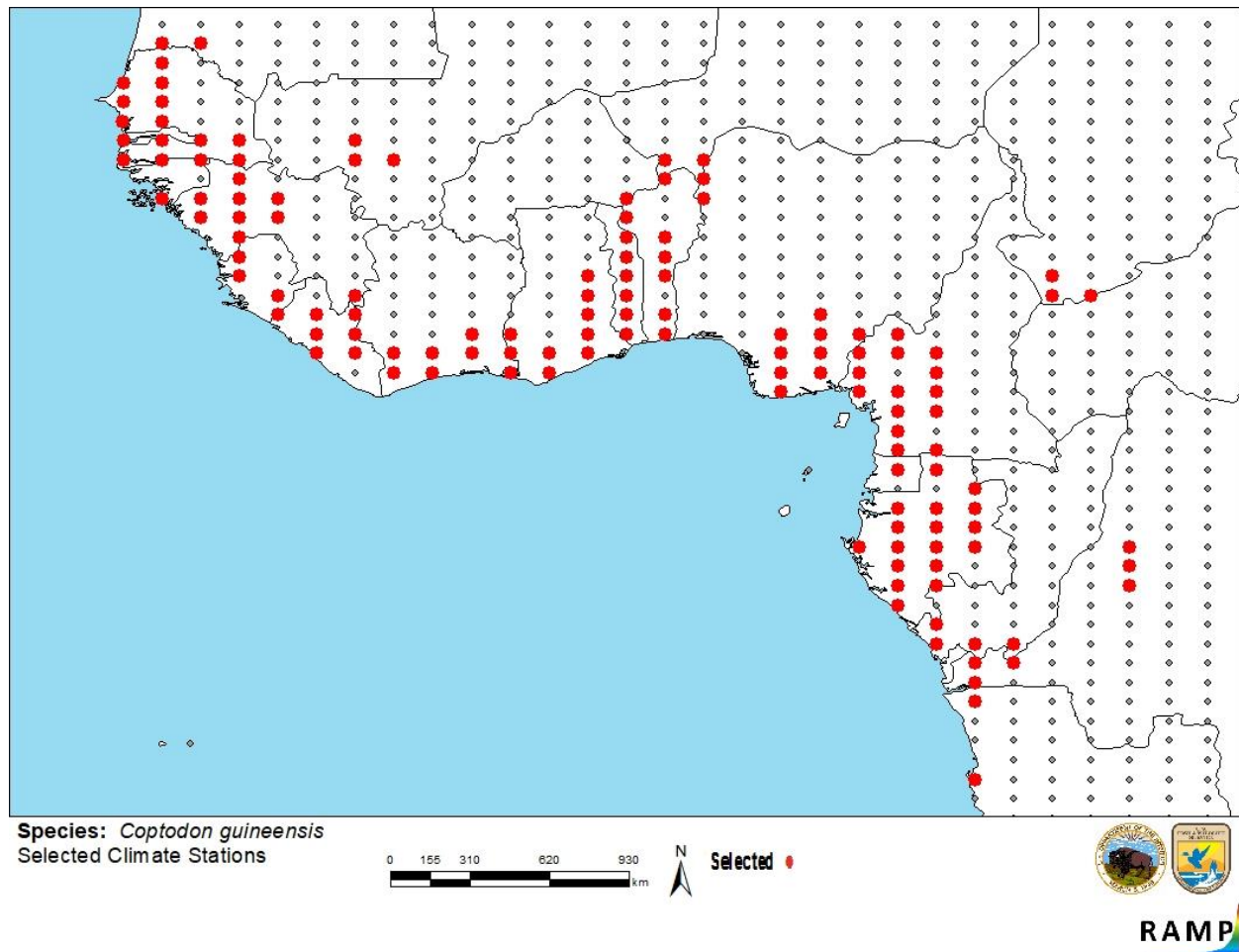


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations along the western coast of Africa selected as source locations (red; Mauritania, Senegal, Gambia, Guinea-Bissau, Mali, Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria, Cameroon, Chad, Equatorial Guinea, Gabon, Republic of the Congo, Democratic Republic of the Congo, Angola) and non-source locations (gray) for *Coptodon guineensis* climate matching. Source locations from GBIF Secretariat (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

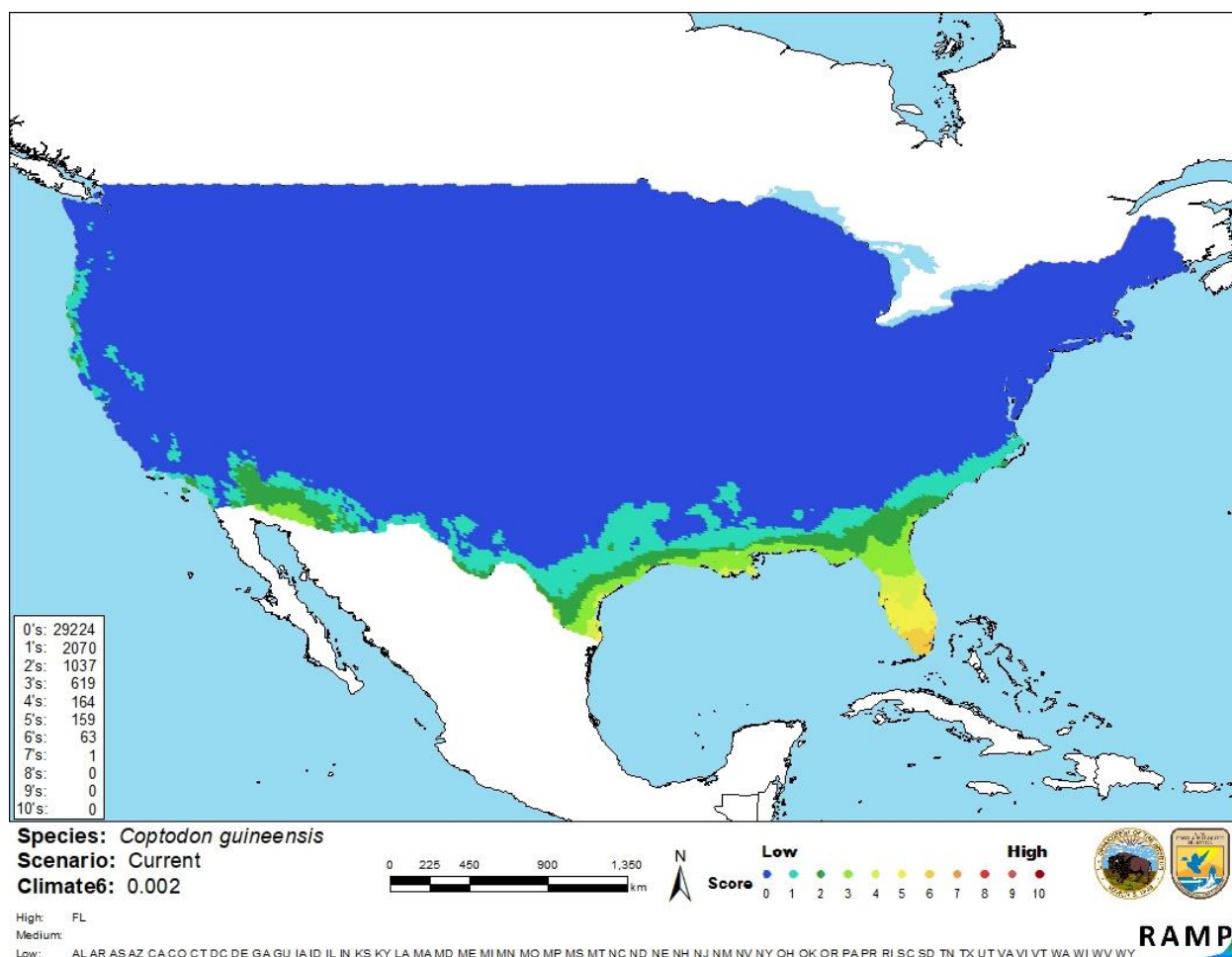


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Coptodon guineensis* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

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

The certainty of assessment for *Coptodon guineensis* is low. There is some general biological and ecological information available. Most of the species' distribution is well documented but there are no georeferenced observations from the newly discovered northern extent of the range (see information from Agnese et al. 2018, above). Records of two introductions were found but the species is probably not established in one location and the status is unknown in another. No records of any impacts from the introductions were found.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Guinean Tilapia, *Coptodon guineensis*, is a euryhaline fish that lives in the river mouths and lagoons along the West African coast, from Angola to Morocco. The species is used commercially as a food source for humans and is present in the international aquarium trade. The history of invasiveness is uncertain. *Coptodon guineensis* has been reported outside of its native range in the United States and the former USSR, but there is no information available to determine if either introduction resulted in an established population. No information has been found on impacts from the introduction. The climate match for the contiguous United States was low, with areas of medium match in south Florida, and the southern tips of Texas and Louisiana. The certainty of assessment is low due to lack of information. The overall risk assessment category for *Coptodon guineensis* is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): Low**
- **Certainty of Assessment (Sec. 7): Low**
- **Remarks/Important additional information:** No additional remarks.
- **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.

- Agnese, J. F., H. Louizi, A. Gilles, O. B. Rkhami, A. Benhoussa, A. Qninba, and A. Pariselle. 2018. A euryhaline fish, lost in the desert: the unexpected metapopulation structure of *Coptodon guineensis* (Günther, 1862) in the Sebkha of Imlili. *Comptes Rendus Biologies* 341:75–84.
- Azeroual, A., T. Bousso, L. da Costa, and P. Laleye. 2018. *Coptodon guineensis*. The IUCN Red List of Threatened Species 2018: e. T182223A134233421. Available: <https://www.iucnredlist.org/species/182223/134233421>. (July 2019).
- Bailly, N. 2017. *Coptodon guineensis*. World Register of Marine Species. Available: <http://www.marinespecies.org/aphia.php?p=taxdetails&id=1021112>. (July 2019).
- FFWCC (Florida Fish and Wildlife Conservation Commission). 2019. Prohibited species list. Tallahassee, Florida: Florida Fish and Wildlife Conservation Commission. Available: <https://myfwc.com/wildlifehabitats/nonnatives/prohibited-species-list/>. (November 2019).

- Fricke, R., W. N. Eschmeyer, and R. van der Laan, editors. 2019. Eschmeyer's catalog of fishes: genera, species, references. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (July 2019).
- Froese, R., and D. Pauly, editors. 2019. *Coptodon guineensis* (Günther, 1862). FishBase. Available: <https://www.fishbase.de/summary/Coptodon-guineensis.html>. (July 2019).
- GBIF Secretariat. 2019. GBIF backbone taxonomy: *Coptodon guineensis* Günther, 1862. Global Biodiversity Information Facility, Copenhagen. Available: <https://www.gbif.org/species/9542760>. (July 2019).
- OIE (World Organisation for Animal Health). 2019. OIE-listed diseases, infections and infestations in force in 2019. Available: <http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2019/>. (July 2019).
- Sanders, S., C. Castiglione, and M. Hoff. 2018. Risk assessment mapping program: RAMP, version 3.1. U.S. Fish and Wildlife Service.
- Umana, S. I., U. C. Okon. M. P. Uko, and M. P. Bassey. 2017. Occurrence of bacterial contaminants in fin-fishes (*Clarias gariepinus* and *Coptodon guineensis*) from Humic freshwater ecosystem of Eniong River, Itu, Akwa Ibom State, Nigeria. *Journal of Advances in Microbiology* 6(1):1–12.

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.

- Albaret. 1987. [Source material did not give full citation for this reference.]
- Baensch, H. A., and R. Riehl. 1991. *Aquarien atlas*, band 3. Melle: Mergus, Verlag für Natur- und Heimtierkunde, Germany.
- Breder, C. M., and D. E. Rosen. 1966. *Modes of reproduction in fishes*. T. F. H. Publications, Neptune City, New Jersey.
- Diouf, P. S. 1996. Les peuplements de poissons des milieux estuariens de l'Afrique de l'Ouest: L'exemple de l'estuaire hyperhalin du Sine-Saloum. Université de Montpellier II. Thèses et Documents Microfiches 156. ORSTOM, Paris.
- Goodwin, N. B., S. Balshine-Earn, and J. D. Reynolds. 1998. Evolutionary transitions in parental care in cichlid fish. *Proceedings of the Royal Society of London B* 265:2265–2272.

- Günther, A. 1862. Catalogue of the fishes in the British Museum. Catalogue of the Acanthopterygii, Pharyngognathi and Anacanthini in the collection of the British Museum. British Museum, London 4:1–534.
- Kide, N. G., A. Dunz, J. F. Agnese, J. Dilyte, A. Pariselle, and C. Carneiro. 2016. Cichlids of the Banc d'Arguin National Park, Mauritania: insight into the diversity of the genus *Coptodon*. *Journal of Fish Biology* 88(4):1369–1393.
- Lamboj, A. 2004. The cichlid fishes of Western Africa. Birgit Schmettkamp Verlag, Bornheim, Germany.
- Olaosebikan, B. D., and A. Raji. 1998. Field guide to Nigerian freshwater fishes. Federal College of Freshwater Fisheries Technology, New Bussa, Nigeria.
- Qninba, A. M., A. El Agbani, M. Radi, A. Pariselle. 2012. Sur la presence de *Tilapia guineensis* (Teleostei, Cichlidae) dans les gueltas d'un affluent de l'Oued Chbeyka, l'oued Aabar (Province de Tan Tan, Sud-Ouest du Maroc), *Bull. Inst. Sci.* 34(2):125–126.
- Stiassny, M. L. J., A. Lamboj, D. De Weirtdt, and G. G. Teugels, 2008. Cichlidae. Pages 269–403 in M. L. J. Stiassny, G. G. Teugels, and C. D. Hopkins, editors. The fresh and brackish water fishes of Lower Guinea, West-Central Africa, volume 2. Coll. faune et flore tropicales 42. Institut de recherche de développement, Paris, France, Muséum national d'histoire naturelle, Paris, France and Musée royal de l'Afrique Central, Tervuren, Belgium.
- Teugels, G. G., and D. F. E. Thys van den Audenaerde. 2003. Cichlidae. Pages 521–600 in D. Paugy, C. Lévêque, and G. G. Teugels, editors. The fresh and brackish water fishes of West Africa, volume 2. Coll. faune et flore tropicales 40. Institut de recherche de développement, Paris, France, Muséum national d'histoire naturelle, Paris, France and Musée royal de l'Afrique Central, Tervuren, Belgium.
- Welcomme. 1988. [Source material did not give full citation for this reference.]