

Karomo (*Oreochromis karomo*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2012

Revised, June 2018

Web Version, 12/15/2020

Organism Type: Fish

Overall Risk Assessment Category: Uncertain

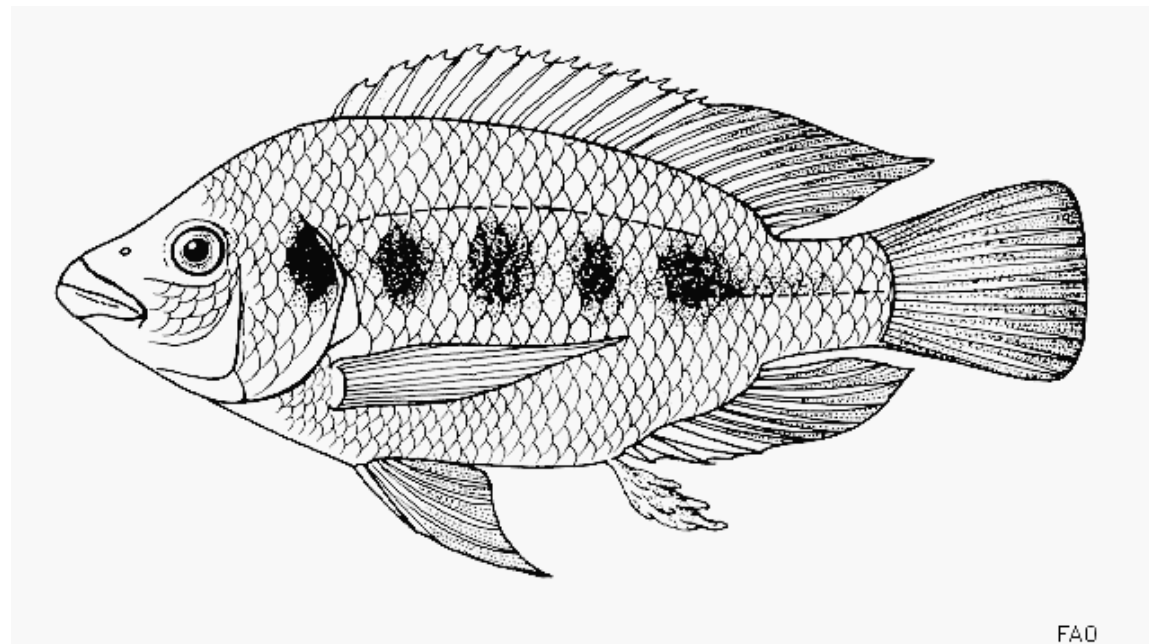


Image: D. H. Eccles. Licensed under Creative Commons BY-NC 3.0 Unported. Available: <http://www.fishbase.org/photos/PicturesSummary.php?ID=1446&what=species>. (June 19, 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

“Africa: endemic to the Malagarasi River basin [Poll 1956; Trewavas 1983; De Vos et al. 2001].”

“Present in the Malagarasi River [Tanzania] [Poll 1956; Thys van den Audenaerde 1963; Lowe-McConnell 1982; Trewavas 1983; Baensch and Riehl 1985; Brichard 1989; Trewavas and Teugels 1991; Eccles 1992; De Vos et al. 2001] from the delta into the swamps [Bailey 1968].”

“Reported from Liemba Jetty [Zambia], southern Lake Tanganyika [Coulter 1962]. Recorded from Zambian waters [Bell-Cross and Kaoma 1971], but this record needs confirmation [Trewavas 1983]. Moreover, this species is endemic to the Malagarasi basin [Tanzania] [De Vos et al. 2001].”

From Nkwengulila (2015):

“The study was conducted at Mindu Dam (Fig. 1 [in source material]) found in Morogoro region, 60 51' South, 310 41' East and 530 m ASL. The dam covers an area of about 10 km² and is surrounded by Uluguru Mountains from which several rivers including Ngerengere, Mzinga and Mgera feed the dam. The dam was constructed primarily to provide water for Morogoro municipality and currently supplies water to about 70% of its water requirements. The dam is also a source of fish, several species including *Oreochromis karomo*, [...]”

Status in the United States

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

The Florida Fish and Wildlife Conservation Commission has listed the tilapia *Oreochromis karomo* 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.

Possession of any species of tilapia is prohibited without permit in the State of Louisiana (Louisiana State Legislature 2019).

O. karomo falls within Group I of New Mexico's Department of Game and Fish Director's Species Importation List (New Mexico Department of Game and Fish 2010). Group I species "are designated semi-domesticated animals and do not require an importation permit."

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 *Oreochromis* are listed as prohibited in Texas (Texas Parks and Wildlife 2020).

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 *Oreochromis* 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 *Oreochromis karomo* in the United States were found.

Remarks

Information searches for this screening were conducted using the valid name *Oreochromis karomo* and the synonym *Tilapia karomo*.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Eschmeyer et al. (2018), *Oreochromis karomo* (Poll 1948) is the valid name for this species. It was originally described as *Tilapia karomo* Poll 1948.

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*
Species *Oreochromis karomo* (Poll, 1948)

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 28.0 cm SL male/unsexed; [Eccles 1992]”

Environment

From Froese and Pauly (2018):

“Freshwater; benthopelagic. [...]; 22°C - 28°C [assumed to be recommended aquarium temperature] [Baensch and Riehl 1985]; [...]”

Climate

From Froese and Pauly (2018):

“Tropical; [...]; 4°S - 6°S”

Distribution Outside the United States

Native

From Froese and Pauly (2018):

“Africa: endemic to the Malagarasi River basin [Poll 1956; Trewavas 1983; De Vos et al. 2001].”

“Present in the Malagarasi River [Tanzania] [Poll 1956; Thys van den Audenaerde 1963; Lowe-McConnell 1982; Trewavas 1983; Baensch and Riehl 1985; Brichard 1989; Trewavas and Teugels 1991; Eccles 1992; De Vos et al. 2001] from the delta into the swamps [Bailey 1968].”

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Introduced

No records of *Oreochromis karomo* introductions were found.

Means of Introduction Outside the United States

No records of *Oreochromis karomo* introductions were found.

Short Description

From Froese and Pauly (2018):

“Dorsal spines (total): 15 - 16; Dorsal soft rays (total): 12-13; Anal spines: 3; Anal soft rays: 10 - 11; Vertebrae: 29. Diagnosis: tasselled species [Trewavas 1983]. Adults with all teeth of the jaws tricuspid [Thys van den Audenaerde 1964; Trewavas 1983], with long, slender shafts and curved crowns, arranged in broad bands [Trewavas 1983]. Jaws much enlarged, projecting forwards to form a long snout [Trewavas 1983], with the tooth bands meeting in the horizontal plane

[Trewavas 1983; Eccles 1992]. Maxilla with a flange resting on the premaxilla at the curve between its two arms [Trewavas 1983].”

“Description: [...]; maxillary not reaching anterior border of eye [Poll 1956]. [...] Broad bands of teeth visible when the mouth is closed [Bailey 1968]. [...] Scales on cheek in 2 or 3 rows [Poll 1948, 1956; Trewavas 1983]. 4-5 scales between bases of pectoral and pelvic fins [Trewavas 1983]. Upper lateral line with 20-21 scales, lower with 11-12 scales; 14 scales between upper lateral line and medioventral line; abdominal and especially thoracic scales relatively small [Poll 1948, 1956]. Lateral line extending for 2 scales on caudal fin base [Poll 1948]. Dorsal fin almost reaching middle of caudal fin in adults and the caudal fin base in juveniles; anal fin reaching as far as dorsal fin; pectoral fin always reaching beyond vent [Thys van den Audenaerde 1964]. Pelvic fins extending to vent or genital papilla [Trewavas 1983], but never as far as the pectoral fins [Thys van den Audenaerde 1964]. Caudal fin finely scaled, except at the border [Poll 1948, 1956]. Genital papilla enlarged, bifid and dendritic in mature fishes of both sexes [Trewavas 1983], in breeding males up to 10-15cm, with semitransparent filaments and blobs of bright orange tissue [Lowe 1956; Trewavas 1983], but in mature females only about 5mm long [Trewavas 1983].”

“Coloration: Non-breeding fishes: ground color olive, darker on the upper part of the body by reason of black center to each scale [Lowe 1956; Trewavas 1983]. 3-4 large, dark mid-lateral blotches, in preserved fishes often united by a vague band; black spots associated with the openings of the lateralis system of the temporal region, the infraorbital canal and the vertical limb of the preopercular; series of spots or stripes on the dorsal fin; caudal covered with dark spots, often mixed with pale spots [Trewavas 1983]. Spots on caudal fin may become elongated [Bailey 1968]. Pectoral fins transparent; pelvic fins blackish [Thys van den Audenaerde 1964]. Breeding males: in life brilliantly colored, giving a general impression of bright blue and orange [Lowe 1956; Trewavas 1983], the orange coloring the margins of dorsal [Lowe 1956; Bailey 1968; Trewavas 1983; Eccles 1992] and caudal fins [Lowe 1956; Trewavas 1983], and the long genital papilla [Lowe 1956; Bailey 1968; Trewavas 1983]. General body color blue-grey with purplish sheen; head blue-green with peacock-blue lips; the broad bands of teeth appearing pink; pectoral fins grey; pelvic fins with blue markings and black leading edge; caudal and soft dorsal with light blue spots and streaks [Lowe 1956; Trewavas 1983]. Mature females: less brightly colored, without the orange of the caudal margin [Lowe 1956; Trewavas 1983], but with orange dorsal fin margin [Lowe 1956; Bailey 1968; Trewavas 1983; Eccles 1992] and below it oblique rows of whitish spots [Lowe 1956; Trewavas 1983]. General body color greenish-brown [Lowe 1956]. Lips peacock-blue as in male; opercular spot violet [Lowe 1956; Trewavas 1983].”

Biology

From Froese and Pauly (2018):

“Occurs at a temperature range of 21.5-29.0 °C; occasionally forms schools; is mainly diurnal [Trewavas 1983]. Males were seen scooping algal debris from the bottom, occasionally moving to adjacent weed beds to rasp epiphytic algae; maternal mouthbrooder [Lowe 1956; Trewavas 1983]. [...] occurs in shallow water; common but localized [Poll 1956].”

“Males construct and maintain a mating platform which is a circular area of fine sand [Trewavas 1983], usually only about 10-15cm in diameter which is much smaller than the length of the fish [Lowe 1956], surrounded by a low ridge, on the top of a mound about 10 cm high [Trewavas 1983], but the mound might be 1m in diameter at its base and 30cm high [Lowe 1956; Thys van den Audenaerde 1964]. The plaque of sand is kept very clean, making the nest visible from a considerable distance [Lowe 1956]. Little boundary fighting between close neighbours, but males seen to drive away individuals of other species (e.g. *Labeo* and *Clarias* as well as other cichlids) [Lowe 1956; Trewavas 1983]. Females are seen in the nests at various times throughout the day; the number of times a male spawns appears to be limited by the number of ripe females available; females cruise over the spawning grounds singly or in small shoals [Lowe 1956]. Courtship behaviour short and not particularly complex [Fryer and Iles 1972], including displaying by the male to attract a female, snout shaking (nose wagging) and tassel dragging [Lowe 1956; Fryer and Iles 1972]. Female lays a batch of eggs and immediately picks them up while the male drags his tassel over the nest [Lowe 1956; Trewavas 1983], but it remains unclear whether the eggs are fertilised in the water or in the mouth of the female [Lowe 1956]. 2, 3 or more batches of eggs may be laid by the same female before she leaves the nest [Lowe 1956; Trewavas 1983], and the larger the female the more numerous the eggs [Lowe 1956]. Normal spawning generally takes less than 5 minutes [Lowe 1956]. Breeding individuals spend little time feeding [Trewavas 1983], and males do not leave their territory to feed [Lowe 1956]. Young of 11mm still with large yolk sacs were the largest seen from the mouth of a female [Lowe 1956]. Young of 2-6cm remain in schools in the shallows [Lowe 1956; Trewavas 1983].”

Human Uses

From Froese and Pauly (2018):

“Excellent to eat; [...]. Important in swamp fishery [Eccles 1992].”

“Fisheries: commercial; aquaculture: likely future use; aquarium: commercial”

Diseases

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

Poelen et al. (2014) list *Gyrodactylus niloticus*, *Gyrodactylus shariffi*, and *Polyacanthorhynchus kenyensis* as parasites of *O. karomo*.

From Nkwengulila (2015):

“In addition, a number of acanthocephalans were isolated from *Oreochromis karomo*, [...].”

Threat to Humans

From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions

No records of *Oreochromis karomo* introductions were found.

4 History of Invasiveness

Oreochromis karomo endemic to the Malagarasi River basin of Africa. No known introduced populations exist, therefore, the history of invasiveness is classified as “No Known Nonnative Population.”

5 Global Distribution



Figure 1. Known global distribution of *Oreochromis karomo*. Locations are in Tanzania (central Africa). Map from GBIF Secretariat (2018).

An additional location of Mindu Dam in eastern Tanzania is given in Nkwengulila (2015).

6 Distribution Within the United States

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

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Oreochromis karomo* was low for most of the contiguous United States. There were small areas of medium match in southern Florida, Texas, and 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.

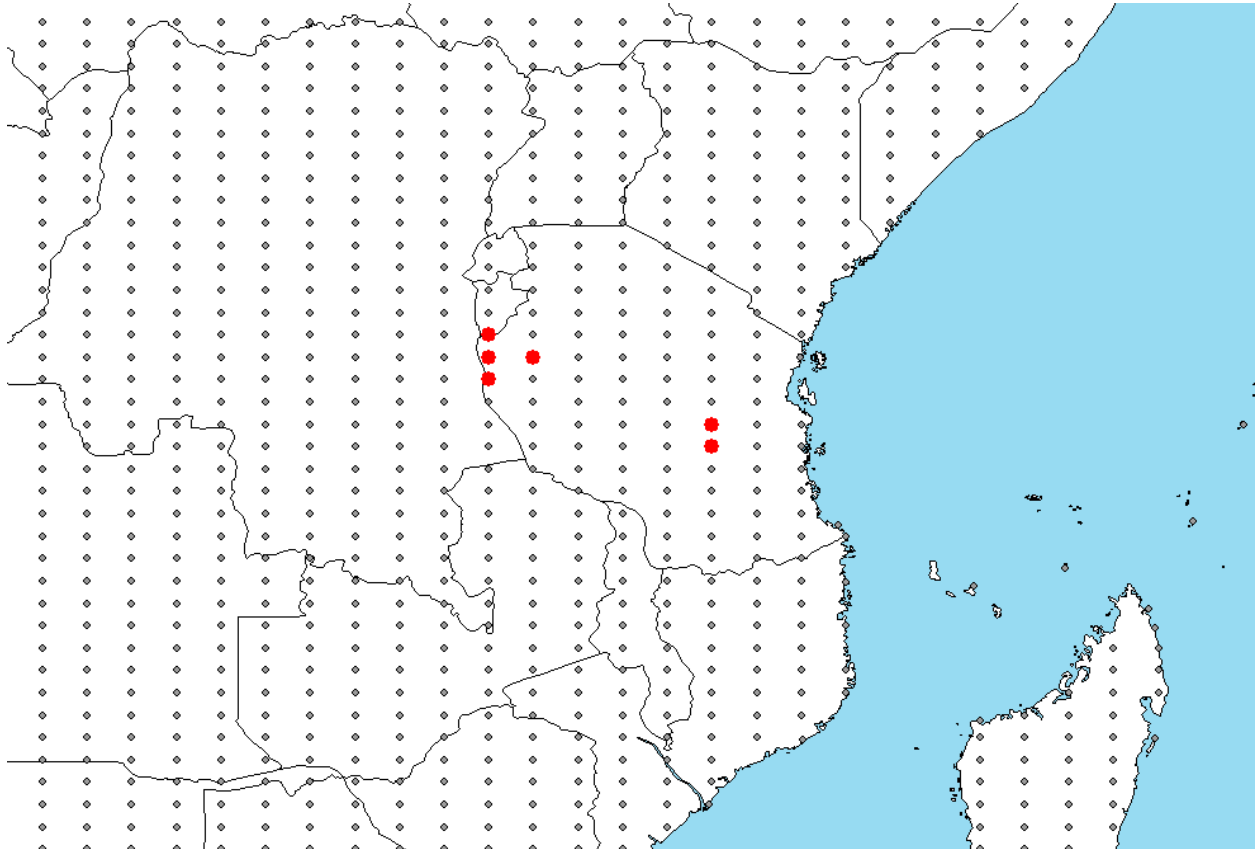


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Tanzania (central Africa) selected as source locations (red) and non-source locations (gray) for *Oreochromis karomo* climate matching. Source locations from Nkwengulila (2015) and GBIF Secretariat (2018). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

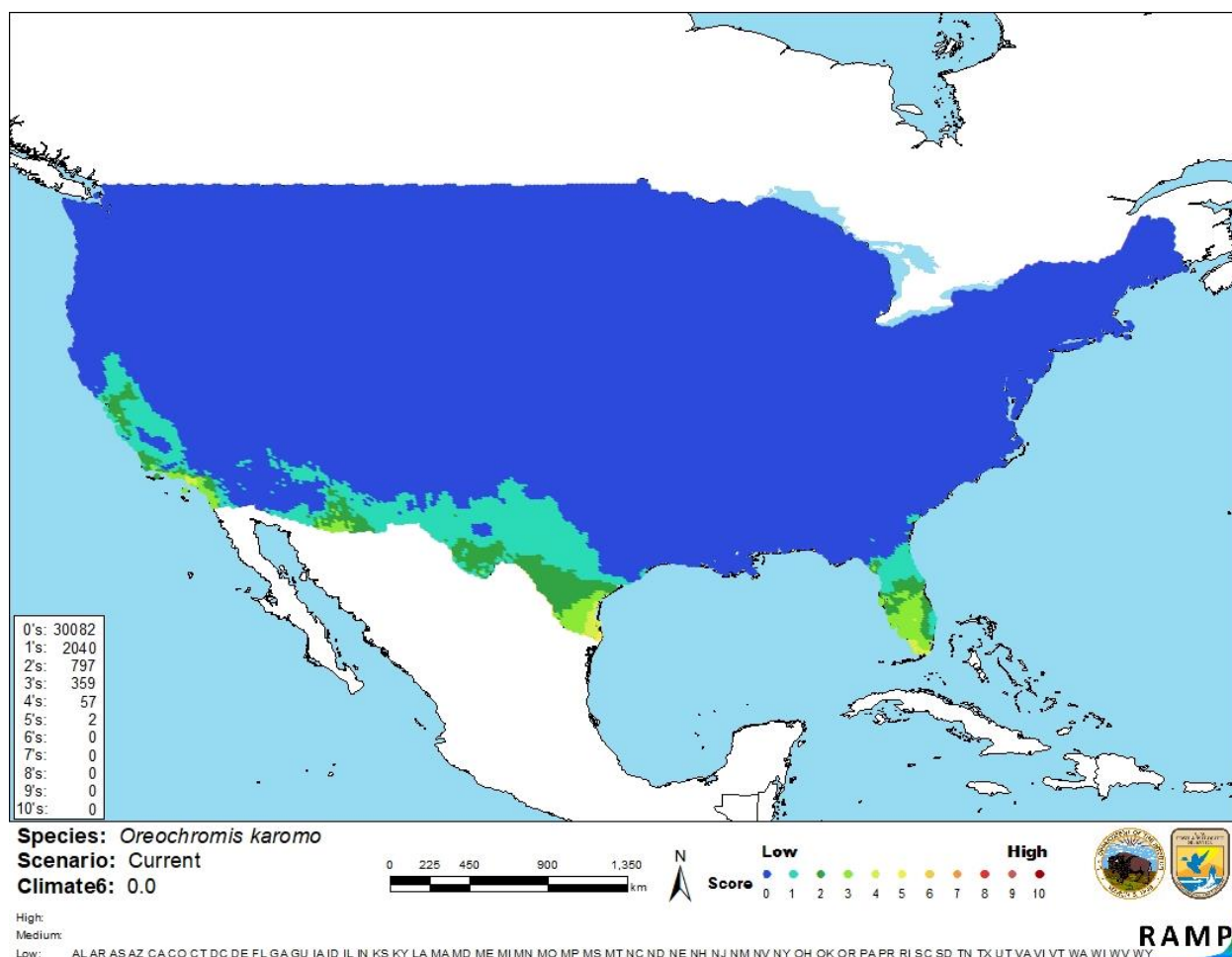


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Oreochromis karomo* in the contiguous United States based on source locations reported by Nkwengulila (2015) and GBIF Secretariat (2018). Counts of climate match are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

8 Certainty of Assessment

The certainty of assessment for *Oreochromis karomo* is low. There was some general biological information available for this species. There were no records of introductions and therefore no information on impacts of introductions.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Oreochromis karomo is a species of tilapia that is endemic to the Malagarasi River basin in Tanzania. The history of invasiveness for *O. karomo* is classified as “no known nonnative population.” No records of introductions were found. The climate match is low with only small areas of medium match in southern Florida, Texas, and California. The certainty of assessment is low and the overall risk assessment category 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:** 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.

Eschmeyer WN, Fricke R, 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> (June 2018).

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

Froese R, Pauly D, editors. 2018. *Oreochromis karomo* (Poll, 1948). FishBase. Available: <http://www.fishbase.org/summary/Oreochromis-karomo.html> (June 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Oreochromis karomo* (Poll, 1948). Copenhagen: Global Biodiversity Information Facility. Available: <https://www.gbif.org/species/2372392> (June 2018).

[ITIS] Integrated Taxonomic Information System. 2018. *Oreochromis karomo* (Poll, 1948). Reston, Virginia: Integrated Taxonomic Information System. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=648842 (June 2018).

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.

- New Mexico Department of Game and Fish. 2010. Director's species importation list. Santa Fe, New Mexico: New Mexico Department of Game and Fish. Available: http://www.wildlife.state.nm.us/download/enforcement/importation/information/Directors-Species-Importation-List-08_03_2010.pdf (November 2020).
- Nkwengulila G. 2015. Parasites and macroinvertebrates as indicators of environmental stress: the case of Mindu Catchment Area. *Huria Journal* 20:20–30.
- Poelen JH, Simons JD, Mungall CJ. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. *Ecological Informatics* 24:148–159.
- [OIE] World Organisation for Animal Health. 2020. OIE-listed diseases, infections and infestations in force in 2020. Available: <http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2020/> (November 2020).
- Oklahoma Secretary of State. 2019. List of restricted exotic species. Oklahoma Administrative Code, Title 800, Chapter 20-1-2.
- Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.
- Texas Parks and Wildlife. 2020. Invasive, prohibited and exotic species. Austin, Texas: Texas Parks and Wildlife. Available: https://tpwd.texas.gov/huntwild/wild/species/exotic/prohibited_aquatic.phtml (November 2020).
- 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.

- Baensch HA, Riehl R. 1985. *Aquarien atlas. Band 2*. Melle, Germany: Mergus, Verlag für Natur- und Heimtierkunde GmbH.
- Bailey RG. 1968. Fishes of the genus *Tilapia* (Cichlidae) in Tanzania, with a key for their identification. *East African Agricultural and Forestry Journal* 34:194–202.

- Bell-Cross G, Kaoma J. 1971. Additions and amendments to the check list of the fishes of Zambia - 3. Fisheries Research Bulletin Zambia 5:235–244.
- Brichard P. 1989. Pierre Brichard's book of cichlids and all the other fishes of Lake Tanganyika. T.F.H. Publications.
- Coulter GW. 1962. The sardine (Ndagaa) fishery on southern Lake Tanganyika, with notes on the introduction of the Chirimila net. J.F.R.O. Annual Report 1960:9–17.
- De Vos L, Seegers L, Taverne L, Thys van den Audenaerde DFE. 2001. L'ichtyofaune du bassin de la Malagarasi (système du lac Tanganyika): une synthèse de la connaissance actuelle. Annales du Musée Royal de l'Afrique Centrale: Sciences Zoologiques 285:117–135.
- Eccles DH. 1992. FAO species identification sheets for fishery purposes. Field guide to the freshwater fishes of Tanzania. Rome: FAO. United Nations Development Programme, Project URT/87/016.
- Fryer G, Iles TD. 1972. The cichlid fishes of the Great Lakes of Africa: their biology and evolution. Edinburg, U.K: Oliver and Boyd.
- Lowe RH. 1956. The breeding behaviour of *Tilapia* species (Pisces, Cichlidae) in natural waters: observations on *T. karomo* Poll and *T. variabilis* Boulenger. Behaviour 9(2-3):140–163.
- Lowe-McConnell RH. 1982. Tilapias in fish communities. Pages 83–113 in Pullin RSV, Lowe-McConnell RH, editors. The biology and culture of tilapias. ICLARM Conference Proceedings 7.
- Poll M. 1948. Descriptions de Cichlidae nouveaux recueillis par la mission hydrobiologique Belge au Lac Tanganika (1946-1947). Mémoires du Musée royal d'histoire naturelle de Belgique 24(26):1–31.
- Poll M. 1956. Poissons Cichlidae. Bruxelles, Belgium: Institut Royal des Sciences Naturelles de Belgique.
- Thys van den Audenaerde DFE. 1963. La distribution géographique des *Tilapia* au Congo. Bulletin des Séances. Académie Royale des Sciences d'Outre-Mer 9:570–605.
- Thys van den Audenaerde DFE. 1964. Révision systématique des espèces congolaises du genre *Tilapia* (Pisces, Cichlidae). Annales du Musée Royal de l'Afrique Centrale: Sciences Zoologiques 124.
- Trewavas E. 1983. Tilapiine fishes of the genera *Sarotherodon*, *Oreochromis* and *Danakilia*. London: British Museum of Natural History.

Trewavas E, Teugels GG. 1991. *Oreochromis*. Pages 307–346 in Daget J, Gosse J-P, Teugels GG, Thys van den Audenaerde DFE, editors. Checklist of the freshwater fishes of Africa. Brussels, Belgium: ISNB; Tervuren, Belgium: MRAC; and Paris: ORSTOM.