

# ***Oreochromis karongae* (a tilapia, no common name)**

## **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

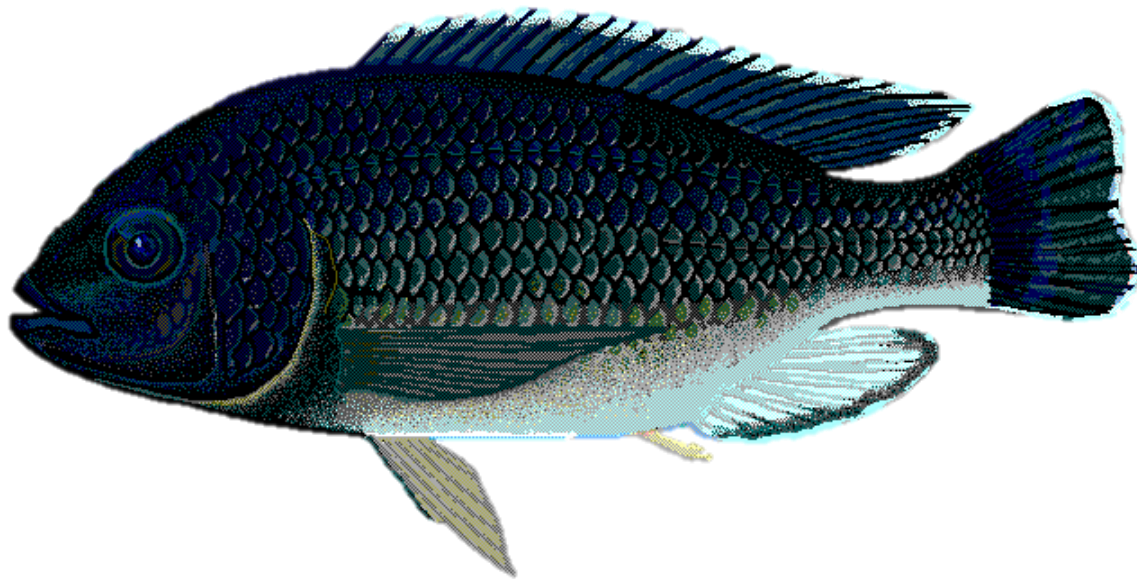


Photo: Robbie N. Cada. Licensed under Creative Commons BY 3.0 Unported. Available: <http://www.fishbase.org/photos/PicturesSummary.php?resultPage=3&ID=2042&what=species>. (June 19, 2018).

## **1 Native Range and Status in the United States**

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### **Native Range**

From Froese and Pauly (2018):

“Known from Lake Malawi [Turner et al. 1991a, b; Msiska and Costa-Pierce 1997], east of Domwe Island [Snoeks and Hanssens 2004] [Malawi] and Lake Malombe [Malawi] [Turner et al. 1991a; Seisay et al. 1992; Turner and Mwanyama 1992; Msiska and Costa-Pierce 1997].”

From Kazembe and Makocho (2004):

“Endemic to Lake Malawi, Lake Malombe and the Upper and Middle Shire river [sic].”

## **Status in the United States**

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

The Florida Fish and Wildlife Conservation Commission has listed the tilapia *O. karongae* 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. karongae* 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 karongae* in the United States were found.

## **Remarks**

From D’Amato et al. (2007):

“Hybridization of *O. mossambicus* was indicated by the presence of [...] *O. karongae* mtDNA in specimens from Malawi.”

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

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

According to Eschmeyer et al. (2018), *Oreochromis karongae* (Trewavas 1941) is the valid name for this species. *O. karongae* was originally described as *Tilapia karongae* Trewavas 1941.

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 karongae* (Trewavas, 1941)

### Size, Weight, and Age Range

From Froese and Pauly (2018):

“Maturity:  $L_m$  28.9, range 20 - 38 cm

Max length : 42.0 cm TL male/unsexed; [Turner and Mwanyama 1992]; 38.0 cm SL (female)”

### Environment

From Froese and Pauly (2018):

“Freshwater; benthopelagic, usually ? - 10 m [Konings 1990]. [...]; 22°C - 28°C [assumed to be recommended aquarium temperature]; [...]”

### Climate

From Froese and Pauly (2018):

“Tropical; [...]; 8°S - 15°S”

## Distribution Outside the United States

### Native

From Froese and Pauly (2018):

“Known from Lake Malawi [Turner et al. 1991a, b; Msiska and Costa-Pierce 1997], east of Domwe Island [Snoeks and Hanssens 2004] [Malawi] and Lake Malombe [Malawi] [Turner et al. 1991a; Seisay et al. 1992; Turner and Mwanyama 1992; Msiska and Costa-Pierce 1997].”

From Kazembe and Makochi (2004):

“Endemic to Lake Malawi, Lake Malombe and the Upper and Middle Shire river [sic].”

### Introduced

FAO (2018) lists *Oreochromis karongae* as introduced to and probably established in Malawi from Nkhata Bay (Malawi). The specific location of introduction in Malawi was not given therefore it is unknown if this is a record of an introduction outside the species’ native range.

## Means of Introduction Outside the United States

FAO (2018) lists aquaculture and research as the reasons of introduction by an international organization.

From D’Amato et al. (2007):

“This phylogenetic reconstruction allows for the inference of anthropogenic translocations, examples being the presence of *O. andersonii*–*mortimeri* in the Limpopo basin and *O. karongae* in Sucoma.”

“The presence of *O. karongae* mtDNA in Sucoma may likely result from hybridization with escapees from fish farms.”

## Short Description

From Froese and Pauly (2018):

“Dorsal spines (total): 15 - 17; Dorsal soft rays (total): 10-12; Anal spines: 3; Anal soft rays: 8 - 10; Vertebrae: 30 - 32. Diagnosis: head length 30.8-36.0% SL; length of lower jaw 28.4-34.5% head length; teeth of jaws in 4-5(6) rows [Trewavas 1983]. Massive (lower) pharyngeal bone with large toothed area [Lowe 1952; Trewavas 1983], with straight [Ricardo Bertram et al. 1942; Jackson 1961; Trewavas 1983] or slightly convex sides [Trewavas 1983]. Median length of bone 1.14-1.32 times its width and 38.2-42.2 % length of head; blade 1.0-1.7 times median length of toothed area; breeding male black [Trewavas 1983].”

“Caudal fin scaly [Trewavas 1941, 1983] and emarginate [Trewavas 1983]. In adults both upper and lower lobes of caudal fin rounded; caudal peduncle as long as or longer than deep; genital papilla prominent and bifid in breeding fishes [Trewavas 1983]. Males develop a breeding dress

[Konings 1990] and a genital tassel [Konings 1990; Sodsuk et al. 1995], each branch bearing tubercles and filaments [Trewavas 1983].”

“Coloration: Non-breeding fish: silver-grey, darker on the dorsum, with black vertical bars of uneven length from the dorsum to mid-flanks [Trewavas 1983]. Ripe females: very dark, almost black [Turner and Robinson 1991]. At some times of the year [Turner and Robinson 1991] females, juveniles and non-breeding fish develop a yellowish-brown body with yellow margin to the dorsal fin [Turner and Robinson 1991; Turner and Mwanyama 1992]. Courting male: black [Lowe 1952; Turner and Robinson 1991; Eccles 1992; Turner and Mwanyama 1992], often with iridescent patches on the head or body [Turner and Robinson 1991]. Flank scales often with coppery metallic spot [Turner and Robinson 1991]. Broad white margins to dorsal [Trewavas 1941, 1983] and caudal fin and sometimes also to the anal fin [Trewavas 1983]. Black color lost in a few seconds when alarmed, turning a pale grey, often with iridescent greenish or coppery areas on the flanks or head [Turner et al. 1991b].”

Froese and Pauly (2018) also list 33–36 scales on lateral line.

## Biology

From Froese and Pauly (2018):

“Occurs in shallow vegetated bays, over sand, in purely rocky biotopes and other kinds of habitats; mostly found at shallow depths; feeds on phytoplankton and on diatom sediment on the sand [Konings 1990]. Maternal mouthbrooder [Turner and Mwanyama 1992].”

“Breeding period extends over several months as noted in Lake Malombe, at present one of the main breeding areas for this species [Turner and Mwanyama 1992]. Males build nests on a variety of substrata and at depths of 0.5m to at least 28m; nests generally 0.3-1.9m diameter, with dimensions correlated to male size [Turner and Robinson 1991]. Nest with a characteristic spawning cone in its center [Konings 1990]. Courtship appears to occur mainly in the early morning [Turner and Robinson 1991; Turner et al. 1991b], and consist of leading, followed by tilting and head-down quivering if the female follows the male to the nest [Turner et al. 1991b]. A female with 324 young of 15mm long in the mouth has been caught [Lowe 1952]. Females keep guarding their fry until they are about 24 mm [Lowe 1952; Turner and Mwanyama 1992].”

## Human Uses

From Kazembe and Makocho (2004):

“The total chambo [*Oreochromis karongae* and two other *Oreochromis* spp.] catch (for Lake Malawi, Upper Shire and Lake Malombe combined) in 1980 was 10,711 tons, increasing to 17,439 tons in 1982. However, by 1990 it had declined to 6,483 dropping further to 2,774 tons in 1996. This infers a reduction of more than 70% in the catches over a ten-year period. Further monitoring in southern Lake Malawi has found that chambo stocks have continued to decline at the same rate during 1994–1999.”

“Chambo are the most valuable food fishes in Malawi.”

## Diseases

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

From García-Vásquez et al. (2011):

“*G[yrodactylus]. cichlidarum* was also found to infect *Oreochromis karongae* (Trewavas) [...]”

## Threat to Humans

From Froese and Pauly (2018):

“Harmless”

## 3 Impacts of Introductions

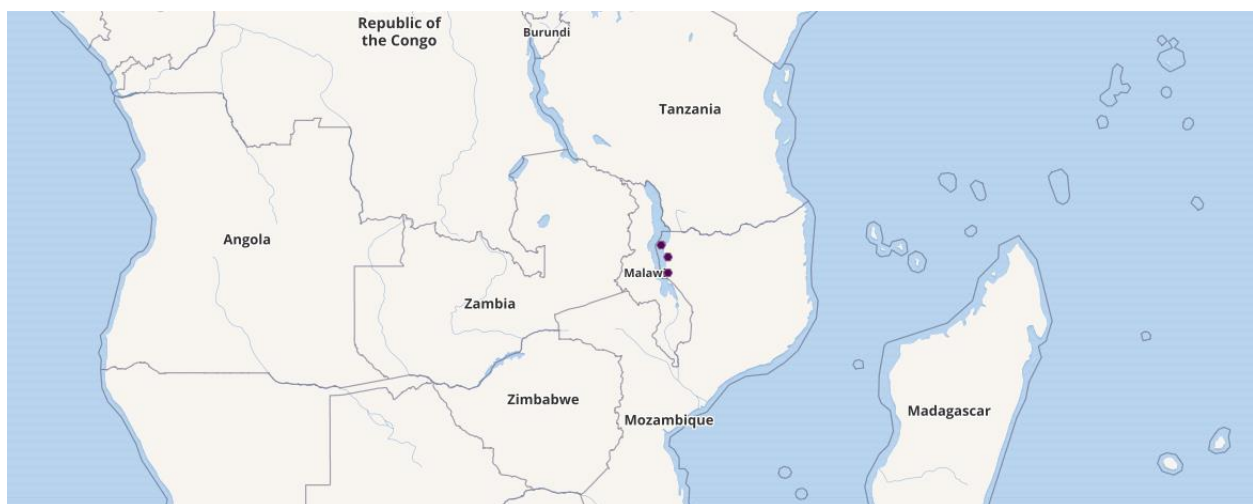
A single record of introduction was found but no information was available on any potential or realized impacts.

*Oreochromis karongae* is a regulated species in multiple States. See Section 1 for more information.

## 4 History of Invasiveness

A single record of introduction was found that did indicate it possibly resulted in an established population. However, the only location information given was that it was introduced to Malawi, which contains part of the native range of this species. The history of invasiveness is classified as “No Known Nonnative Population.”

## 5 Global Distribution



**Figure 1.** Known global distribution of *Oreochromis karongae*. Locations are in Malawi (eastern Africa). Map from GBIF Secretariat (2018).

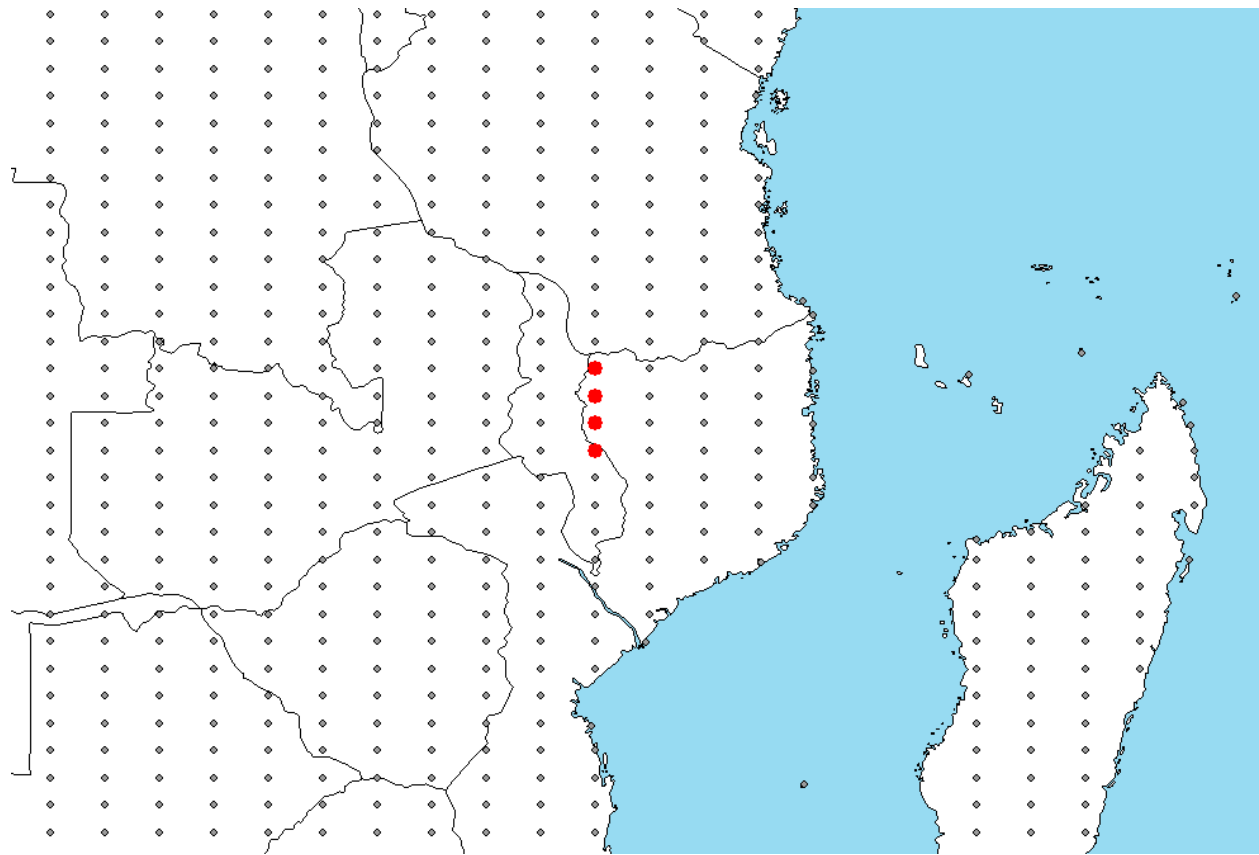
## 6 Distribution Within the United States

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

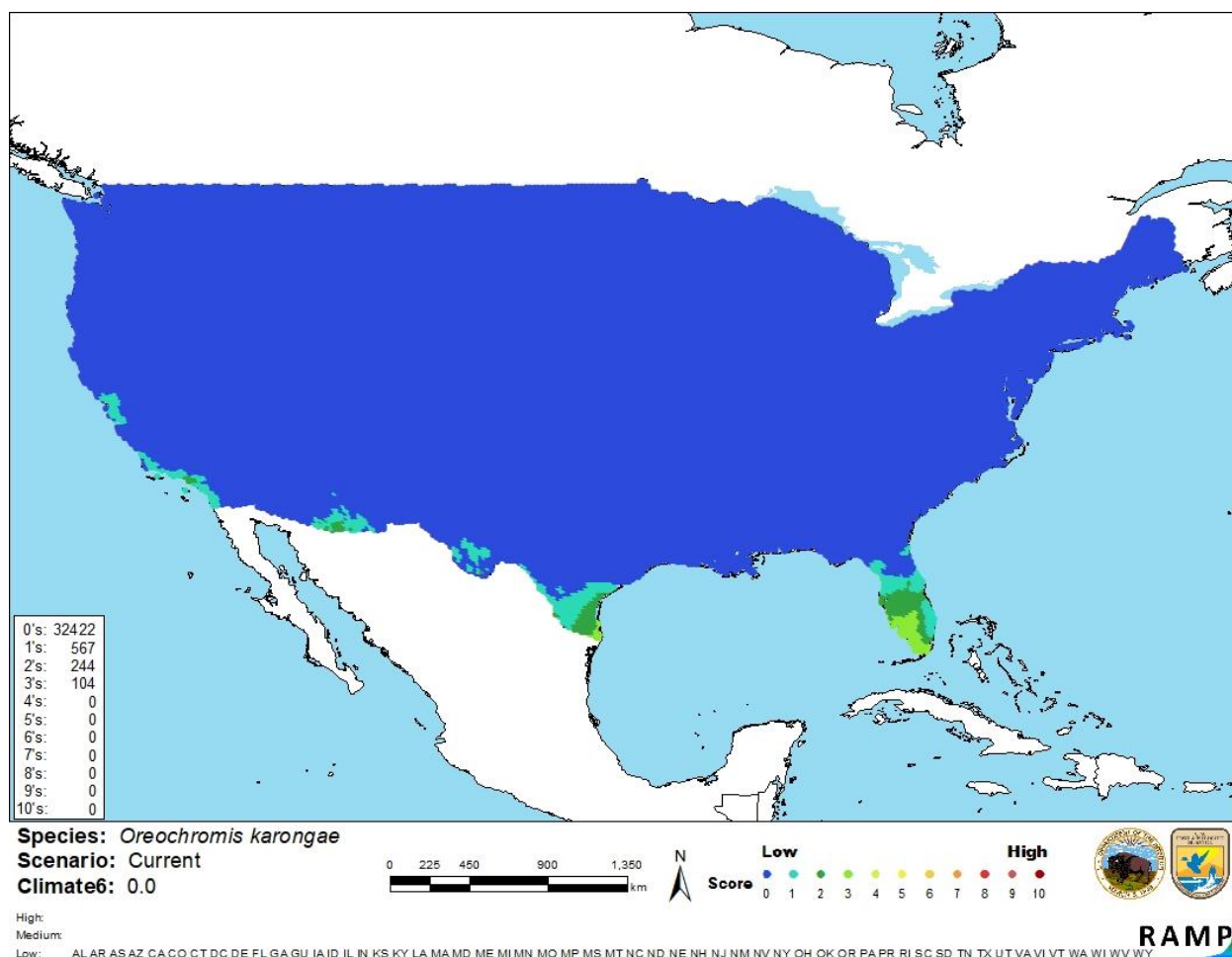
## 7 Climate Matching

### Summary of Climate Matching Analysis

The climate match for *Oreochromis karongae* was low across all of the contiguous United States. 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; Malawi and Tanzania) and non-source locations (gray) for *Oreochromis karongae* 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 karongae* in the contiguous United States based on source locations reported by 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:<br>(Count of target points with climate scores 6-10)/<br>(Count of all target points) | Overall<br>Climate Match<br>Category |
|--------------------------------------------------------------------------------------------------|--------------------------------------|
| $0.000 \leq X \leq 0.005$                                                                        | Low                                  |
| $0.005 < X < 0.103$                                                                              | Medium                               |
| $\geq 0.103$                                                                                     | High                                 |

## 8 Certainty of Assessment

The certainty of assessment for *Oreochromis karongae* is low. General biological information is available from reliable sources. A single record of introduction was found but it did not contain much information and there was no information on any impacts from that introduction.

## 9 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Oreochromis karongae* is a species of tilapia native to Lake Malawi in Africa. It is locally important in the commercial fish harvest. The history of invasiveness for *O. karongae* is classified as “No Known Nonnative Population.” A single record of introduction was found that did indicate it possibly resulted in an established population. However, it is unknown if this introduction was outside of the native range. *O. karongae* is a regulated species in multiple States. The climate match is low with no areas of medium or high match. 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 information
- **Overall Risk Assessment Category: Uncertain**

## 10 Literature Cited

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**Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.**

- D’Amato ME, Esterhuyse MM, van der Wall BCW, Brink D, Volckaert FAM. 2007. Hybridization and phylogeography of the Mozambique Tilapia *Oreochromis mossambicus* in southern Africa evidenced by mitochondrial and microsatellite DNA genotyping. *Conservation Genetics* 8:475–488.
- 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).
- [FAO] Fisheries and Agriculture Organization of the United Nations. 2018. Database on introductions of aquatic species. Rome: FAO. Available: <http://www.fao.org/fishery/introsp/search/en> (June 2018).
- [FFWCC] Florida Fish and Wildlife Conservation Commission. 2018. Prohibited species list. Tallahassee, Florida: Florida Fish and Wildlife Conservation Commission. Available: <http://myfwc.com/wildlifehabitats/nonnatives/regulations/prohibited/> (June 2018).
- Froese R, Pauly D, editors. 2018. *Oreochromis karongae* (Trewavas, 1941). FishBase. Available: <http://www.fishbase.org/summary/Oreochromis-karongae.html> (June 2018).

- García-Vásquez A, Hansen H, Christison KW, JBron JE, Shinn AP. 2011. Description of three new species of *Gyrodactylus* von Nordmann, 1832 (Monogenea) parasitizing *Oreochromis niloticus niloticus* (L.) and *O. mossambicus* (Peters) (Cichlidae). *Acta Parasitologica* 56:20–33.
- GBIF Secretariat. 2018. GBIF backbone taxonomy: *Oreochromis karongae* (Trewavas, 1941). Copenhagen: Global Biodiversity Information Facility. Available: <https://www.gbif.org/species/2372285> (June 2018).
- [ITIS] Integrated Taxonomic Information System. 2018. *Oreochromis karongae* (Trewavas, 1941). Reston, Virginia: Integrated Taxonomic Information System. Available: [https://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=648843](https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=648843) (June 2018).
- Kazembe J, Makocho P. 2004. *Oreochromis karongae*. The IUCN Red List of Threatened Species 2004: e.T61293A12450379. Available: <http://www.iucnredlist.org/details/full/61293/0> (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](http://www.wildlife.state.nm.us/download/enforcement/importation/information/Directors-Species-Importation-List-08_03_2010.pdf) (November 2020).
- Oklahoma Secretary of State. 2019. List of restricted exotic species. Oklahoma Administrative Code, Title 800, Chapter 20-1-2.
- [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).
- 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](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

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**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.**

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.

Jackson PBN. 1961. Check list of the fishes of Nyasaland. The National Museum of Southern Rhodesia. Occasional Papers 3(25B).

Konings A. 1990. Ad Konings's book of cichlids and all the other fishes of Lake Malawi. T.F.H. Publications.

Lowe RH. 1952. Report on the *Tilapia* and other fish and fisheries of Lake Nyasa 1945-47. Col. Off. Fish. Publs. 1(2):1–126.

Msiska OV, Costa-Pierce BA. 1997. Factors influencing the spawning success of *Oreochromis karongae* (Trewavas) in ponds. Aquaculture Research 28:87–99.

Ricardo Bertram CK, Borley HJH, Trewavas E. 1942. Report on the fish and fisheries of Lake Nyasa. London: The Crown Agents for the Colonies.

Seisay MBD, van Zalinge NP, Turner GF. 1992. Population dynamics and stock estimates of chambo (*Oreochromis* spp.) in the south east arm of Lake Malawi and Lake Malombe - length based approach. Malawi: GOM/UNDP/FAO Chambo Fisheries Research Project. FAO FI:DP/MLW/86/013, Field Document 19.

Snoeks J, Hanssens M. 2004. Identification guidelines to other non-mbuna. Pages 266–310 in Snoeks J, editor. The cichlid diversity of Lake Malawi/Nyasa/Niassa: identification, distribution and taxonomy. El Paso, Texas: Cichlid Press.

Sodsuk PK, McAndrew BJ, Turner GF. 1995. Evolutionary relationships of the lake Malawi *Oreochromis* species: evidence from allozymes. Journal of Fish Biology 47:321–333.

Trewavas E. 1941. Nyasa fishes of the genus *Tilapia* and a new species from Portuguese East Africa. Annals and Magazine of Natural History, Series 11 7:294–306.

Trewavas E. 1983. Tilapiine fishes of the genera *Sarotherodon*, *Oreochromis* and *Danakilia*. London: British Museum (Natural History).

- Turner GF, Grimm AS, Mhone OK, Robinson RL, Pitcher TJ. 1991a. The diet of *Oreochromis lidole* (Trewavas) and other chambo species in Lakes Malawi and Malombe. *Journal of Fish Biology* 39:15–24.
- Turner GF, Mwanyama NC. 1992. Distribution and biology of chambo (*Oreochromis* spp.) in Lake Malawi and Malombe. GOM/UNDP/FAO Chambo Fisheries Research Project, Malawi. FAO FI:DP/MLW/86/013, Field Document 21.
- Turner GF, Robinson RL. 1991. Ecology, morphology and taxonomy of the Lake Malawi *Oreochromis* (Nyasalapia) species flock. *Annales du Musée Royal de l'Afrique Centrale: Sciences Zoologiques* 262:23–28.
- Turner GF, Witimani J, Robinson RL, Grimm AS, Pitcher TJ. 1991b. Reproductive isolation and the nest sites of Lake Malawi chambo, *Oreochromis* (Nyasalapia) spp. *Journal of Fish Biology* 39:775–782.