Banded Tilapia (*Tilapia sparrmanii*)

Ecological Risk Screening Summary

U.S. fish & Wildlife Service, December 2019
Revised, March 2020
Web Version, 2/5/2021

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

"Africa: middle Congo River basin in the Kwilu [Poll 1967], Kwango, Kasai drainage [Angola and Democratic Republic of the Congo] [Thys van den Audenaerde 1964; Poll 1967] and Lomami [Democratic Republic of the Congo] [Moelants 2015]; upper Congo River basin including the Lualaba, upper Lualaba, Lufira, Upemba region, Luvua [Democratic Republic of the Congo], Lake Mweru [Democratic Republic of the Congo and Zambia], Luapula [Thys van den Audenaerde 1964] and Bangweulu [Zambia] [Teugels and Thys van den Audenaerde 1991;

Steenberge et al. 2014]; Cunene [Angola and Namibia], Okavango [Namibia and Bostwana], Lake Ngami [Botswana], Zambezi [Zambia, Malawi, Zimbabwe], Limpopo [South Africa], northern tributaries of the Orange River [South Africa and Swaziland] [Poll 1967; Teugels and Thys van den Audenaerde 1991], upper Cuanza [Angola], Sabi [South Africa and Swaziland], Lundi [South Africa] and Lake Malawi [Malawi, Tanzania, and Mozambque] [Teugels and Thys van den Audenaerde 1991]."

Froese and Pauly (2019) list *Tilapia sparrmanii* as native to: Angola, Botswana, Democratic Republic of the Congo, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

Information from Froese and Pauly (2019) on the status of *Tilapia sparrmanii* in Tanzania and South Africa is conflicting, listing *T. sparrmanii* as both native and introduced to these countries. However, according to another peer-reviewed source, *T. sparrmanii* has been introduced to South Africa and is not native there (Ellender and Weyl 2014). Another source states that *Tilapia sparrmanii* is native to part of Tanzania (Genner et al. 2018, see below).

From Genner et al. (2018):

"Its [*Tilapia sparrmanii*] native range in Tanzania is probably confined to the catchments of Lakes Nyasa and Rukwa and upper tributaries of the Ruaha system. In the Mbeya District, it occurs in Lake Ikapu […]"

Status in the United States

From Nico et al. (2019):

"Failed in Florida (Courtenay and Stauffer 1990; Courtenay and Williams 1992)."

"In response to suggestions that *T. sparrmani* [sic] be introduced into California, Pelzman (1972) evaluated its life history and recommended it be placed on the prohibited list because of its potential for competition with native sport fishes."

No records of *Tilapia sparrmanii* in trade in the United States were found.

The Florida Fish and Wildlife Conservation Commission has listed the Banded Tilapia (*Tilapia sparrmanii*) 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.

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

A permit is required to import, possess, or sell any species of tilapia in Virginia (Virginia Department of Game and Inland Fisheries 2020).

T. sparrmanii is a restricted species in California (California Department of Fish and Wildlife 2019). "It shall be unlawful to import, transport, or possess live animals restricted in subsection (c) below except under permit issued by the department [California Department of Fish and Wildlife]."

A permit is required to import, possess, or sell any species of tilapia in Massachusetts (Massachusetts Division of Fisheries and Wildlife 2014).

Tilapia sparrmanii falls within Group IV of New Mexico's Department of Game and Fish Director's Species Importation List (New Mexico Department of Game and Fish 2010). Group IV species "are prohibited for the general public but may be allowed for, scientific study, department approved restoration and recovery plans, zoological display, temporary events/entertainment, use as service animal or by a qualified expert."

From State of Nevada (2018):

"Except as otherwise provided in this section and NAC 504.486, the importation, transportation or possession of the following species of live wildlife or hybrids thereof, including viable embryos or gametes, is prohibited: […] All species in the genera *Tilapia* and *Sarotherodon*"

From Oklahoma Secretary of State (2019):

"(b) Tilapia:

(1) The sale and use of all Tilapia species as bait is prohibited.

(2) The stocking of all Tilapia species in any heated-water reservoir including Sooner, Konawa and Boomer Reservoirs is prohibited.

(3) This shall not interfere with the sale of dead and/or processed Tilapia for human food or the sale or transport of Tilapia species for the purpose of aquatic vegetation control in privately owned ponds."

From Texas Parks and Wildlife (2020):

"The organisms listed here [including all species of *Tilapia*] are legally classified as exotic, harmful, or potentially harmful. No person may possess or place them into water of this state except as authorized by the department. Permits are required for any individual to possess, sell, import, export, transport or propagate listed species for zoological or research purposes; for aquaculture(allowed only for Blue, Nile, or Mozambique tilapia, Triploid Grass Carp, or Pacific White Shrimp); or for aquatic weed control (for example, Triploid Grass Carp in private ponds)."

From Utah Office of Administrative Rules (2019):

"All species of fish listed in Subsections (2) through (30) are classified as prohibited for collection, importation and possession, […] (30) Tilapia, (Tilapia and Sarotherodon) (All species) family Cichlidae."

From Washington State Senate (2019):

"The following species are classified regulated Type A species: […] Family Cichlidae: Tilapia: All members of the genera Tilapia, Oneochromis, and Sartheradon."

From Washington State Senate (2014):

Regulated Type A species are those "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

From Nico et al. (2019):

"Probable fish farm release or escape (Smith-Vaniz, personal communication)."

Remarks

This ERSS was previously published in June 2015. Revisions were made to incorporate new information and conform to updated standards.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Fricke et al. (2019), *Tilapia sparrmanii* Smith 1840 is the current valid name for this species.

From ITIS (2019):

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 *Tilapia*
Species *Tilapia sparrmanii* Smith, 1840

Size, Weight, and Age Range

From Froese and Pauly (2019):

"Max length : 23.5 cm TL male/unsexed; [Seegers 1996]; max. published weight: 445.00 g [Skelton 1993]"

Environment

From Froese and Pauly (2019):

"Freshwater; benthopelagic; pH range: 7.0 - ? ; dH range: 10 - ?; potamodromous; depth range 5 - ? m [Philippart and Ruwet 1982]. […] 22°C - 25°C [Baensch and Riehl 1991; assumed to be recommended aquarium temperature]; […]"

From Caulton (1975):

"Adult *T. sparrmanii* compensated to a depth of 15 m at 22°C. *T. sparrmanii* took about 100 h to reach their maximum compensation depth and a similar time was required to decompress and return to surface pressures. Therefore 8 days were necessary for this species to descend to 15 m and return to the surface if complete equilibration were maintained. […] Subadult *T. sparrmanii* showed the same maximum depth compensation as adult fish, but the rate of descent was faster since only 36 h were required to attain the maximum depth, of compensation. There was no apparent difference in rates or maximum compensation depth between males and females in […] *T. sparrmanii*. […] *T. sparrmanii* is an omnivore and the maximum compensation depth of 15 m, at 22° C, would enable these fish to utilize a wide variety of habitats."

From Nico et al. (2019):

"It [*Tilapia sparrmanii*] can tolerate low temperatures of about 7°C (De Moor and Bruton 1988) and, based on its distribution in Africa, *T. sparrmani* [*sic*] may be "more restricted by high (above 32°C) than low temperatures" (Skelton 1993)."

Climate

From Froese and Pauly (2019):

"Tropical; […]; 10°S - 30°S"

Distribution Outside the United States

Native

From Froese and Pauly (2019):

"Africa: middle Congo River basin in the Kwilu [Poll 1967], Kwango, Kasai drainage [Angola and Democratic Republic of the Congo] [Thys van den Audenaerde 1964; Poll 1967] and Lomami [Democratic Republic of the Congo] [Moelants 2015]; upper Congo River basin including the Lualaba, upper Lualaba, Lufira, Upemba region, Luvua [Democratic Republic of

the Congo], Lake Mweru [Democratic Republic of the Congo and Zambia], Luapula [Thys van den Audenaerde 1964] and Bangweulu [Zambia] [Teugels and Thys van den Audenaerde 1991; Steenberge et al. 2014]; Cunene [Angola and Namibia], Okavango [Namibia and Bostwana], Lake Ngami [Botswana], Zambezi [Zambia, Malawi, Zimbabwe], Limpopo [South Africa], northern tributaries of the Orange River [South Africa and Swaziland] [Poll 1967; Teugels and Thys van den Audenaerde 1991], upper Cuanza [Angola], Sabi [South Africa and Swaziland], Lundi [South Africa] and Lake Malawi [Malawi, Tanzania, and Mozambque] [Teugels and Thys van den Audenaerde 1991]."

Froese and Pauly (2019) list *Tilapia sparrmanii* as native to: Angola, Botswana, Democratic Republic of the Congo, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

Information from Froese and Pauly (2019) on the status of *Tilapia sparrmanii* in Tanzania and South Africa is conflicting, listing *T. sparrmanii* as both native and introduced to these countries. However, according to another peer-reviewed source, *T. sparrmanii* has been introduced to South Africa and is not native there (Ellender and Weyl 2014). Another source states that *Tilapia sparrmanii* is native to part of Tanzania (Genner et al. 2018, see below).

From Genner et al. (2018):

"Its [*Tilapia sparrmanii*] native range in Tanzania is probably confined to the catchments of Lakes Nyasa and Rukwa and upper tributaries of the Ruaha system. In the Mbeya District, it occurs in Lake Ikapu […]"

Introduced

Froese and Pauly (2019) lists *Tilapia sparrmanii* as introduced and established in Madagascar (from unknown), South Africa (from the Congo), Japan (from the United States), and as introduced but probably not established in Tanzania (from unknown).

Information from Froese and Pauly (2019) on the status of *Tilapia sparrmanii* in Tanzania and South Africa is conflicting, listing *T. sparrmanii* as both native and introduced to these countries. However, according to another peer-reviewed source, *T. sparrmanii* has been introduced to South Africa and is not native there (Ellender and Weyl 2014). Another source states that *Tilapia sparrmanii* is native to part of Tanzania and introduced by stocking in another part of the country (Genner et al. 2018, see below).

From Genner et al. (2018):

"In the Mbeya District [Tanzania], it [*Tilapia sparrmanii*] […] has been stocked in Lake Kiungululu (apparently misidentified as 'black bass') […]"

From Moelants (2010):

"It [*Tilapia sparrmanii*] has probably also been introduced to Libya, Egypt, Chad and Sudan."

According to Chiba et al. (1989), *Tilapia sparrmanii* was introduced to Japan from the United States in 1959. Chiba et al. (1989), lists *Tilapia sparrmanii* as Status 2 [in Japan], being reproduced in certain experimental or natural ponds, rather than Status 1 which indicates established self-reproducing populations.

According to Ellender and Weyl (2014), *Tilapia sparrmanii* is an established, "fully invasive species, with individuals dispersing, surviving and reproducing at multiple sites across a greater or lesser spectrum of habitats and extent of occurrence (Blackburn et al. 2011)" in the Swartkops River system and the Berg River system in South Africa.

Means of Introduction Outside the United States

From Nico et al. (2019):

"In Africa, this species has been introduced outside its native range as a forage fish for bass (De Moor and Bruton 1988)."

From Froese and Pauly (2019):

"A relatively small species, so unlikely to play much of a role in capture fisheries, but cultured in ponds in Njombe, Tanzania, and apparently stocked into Lake Kiungululu, Tanzania, where it is not presently exploited [Genner et al. 2018]."

From Chiba et al. (1989):

"Nine species of tilapia have been introduced into Japan for the purpose of pond culture utilizing heat from hot springs or cooling-water discharge from power plants or factories. […] *Tilapia sparmanii* and […] have colonized estuarine waters in the Okinawa Islands (Imai 1980)."

According to Burton and Merron (1985), *Tilapia sparrmanii* has been translocated to southern Africa as an indigenous species for "fish culture", "sport fishing (including forage fish for bass)", "translocated intentionally for various reasons (eg stocking man-made lakes, increasing the range of rare fish)", "translocated unintentionally via intercatchment connections", and "biological control of nuisance plants and animals."

Short Description

From Froese and Pauly (2019):

"Dorsal spines (total): 13 - 15. Diagnosis: A small, deep-bodied species with a narrow head and small strong jaws [Genner et al. 2018]. Often appearing a rich deep yellow with wide dark brown bands, and red/orange fin margins; mature adults are very dark with prominent black stripes and a patch of scarlet scales behind the head [Genner et al. 2018]."

"Description: Moderately deep-bodied; head small; frontal profile rounded to steep; caudal fin rounded [Lamboj 2004].

Colouration: Body grayish-brown to bronze; sometimes with 7-8 dark vertical bars, more prominent in dorsal body parts, may be visible; dorsal fin often reddish-brown with an iridescent bluish flush in its upper parts and outlined in red, and some dark stripes in soft portion; caudal fin essentially unmarked, although in males there may occasionally be some bluish spots; outermost region anal fin fairly dark, with some pale spots at its base; pelvic fin rays may become moderately elongated and have a pale reddish-brown anterior edge [Lamboj 2004]."

Biology

From Froese and Pauly (2019):

"Found in widely diverse habitat [Philippart and Ruwet 1982]; it favors areas where plant cover exists along the edges of rivers, lakes or swamps [Philippart and Ruwet 1982], but tends to be confined to shallow weedy areas, so it does not build up large populations in deep lakes [Genner et al. 2018]. It is reported to be cold-confined [Genner et al. 2018]. Adults are omnivorous, feeding on animal and plant matter [Genner et al. 2018], preferentially on filamentous algae, aquatic macrophytes and vegetable matter of terrestrial origin like leaves, plants, etc. [Philippart and Ruwet 1982]. Juveniles feed on small crustaceans and midge larvae [De Moor and Bruton 1988]. It is forage fish for bass [Skelton 1993]. A substrate spawner [Lamboj 2004; Genner et al. 2018]. Male and female form pairs to rear the young [Genner et al. 2018]. It undertakes seasonal upstream migration and breeds before and during these migrations [Bell-Cross and Minshull 1988; Lamboj 2004]."

"A substrate spawner [Genner et al. 2018]. Male spreads his milt over the cluster of eggs which are deposited on the bottom or even attached to the branches of aquatic weeds; parents guard the eggs; eggs and fry may be moved into the mouth to alternative sites during hatching operations but there is no evidence of actual mouth brooding [Bell-Cross and Minshull 1988]."

Human Uses

From Froese and Pauly (2019):

"Fisheries: subsistence fisheries; aquaculture: commercial; gamefish: yes"

From Konings et al. (2018):

"*Tilapia sparrmanii* is a species that is commercially used for aquaculture. Since the demise of the larger cichlid species in river/floodplain fisheries throughout the Middle and Upper Zambezi (Tweddle *et al.* 2015), *T. sparrmanii* has become the main fisheries target species with small meshed monofilament gillnets and seine nets in these systems. This could constitute a threat if this trend continues to escalate and the widespread use of dragnets destroys the weeded habitats in which this species occurs."

According to Burton and Merron (1985), *Tilapia sparrmanii* has been translocated to southern Africa as an indigenous species for "fish culture", "sport fishing (including forage fish for bass)", "translocated intentionally for various reasons (eg stocking man-made lakes, increasing the range of rare fish)", "translocated unintentionally via intercatchment connections", and "biological control of nuisance plants and animals."

Tilapia sparrmanii is regulated in multiple U.S. States.

Diseases

According to Kanchanakhan (2013), *Tilapia sparrmanii* is listed as a fish species susceptible to infection with *Aphanomyces invadans*, an OIE-reportable disease (OIE 2020).

From Kanchanakhan (2013):

"*Aphanomyces invadans* causes disease and mortality in farmed and wild fish, worldwide. […] When infection with *A. invadans* spreads into a fish culture pond, such as a snakehead fish pond, high morbidity (>50%) and high mortality (>50%) might be observed in those years that have a long cold season, with water temperatures between 18 and 22°C. However, mortality and morbidity may vary greatly depending on the fish species. Some infected fish may recover when the cold period is over."

According to Bittencourt et al. (2014), *Tilapia sparrmanii* is a host of the parasite *Trichodina centrostrigeata*.

According to Poelen et al. (2014), *Tilapia sparrmanii* is a host for the parasite *Cichlidogyrus papernastrema.*

From Froese and Pauly (2015):

"Fish tuberculosis (FishMB), Bacterial diseases"

Threat to Humans

From Froese and Pauly (2019):

"Harmless"

3 Impacts of Introductions

From Darwall et al. (2009):

"[…] banded tilapia (*Tilapia sparrmanii* A. Smith, 1840) from further north in Africa now dominate the fish fauna in more than 80% of the Olifants River system, with indigenous fish often surviving in less than 1 km of river in headwater streams."

"*Tilapia sparrmanii* is beginning to out-compete the indigenous Cape kurper (*Sandelia capensis*) populations that occupy a similar niche."

From Ellender and Weyl (2014):

"At system scale, a study on the Berg River noted range contractions from historical distribution data for three endemic native fishes (*P. burgi*, *G. zebratus* and *S. capensis*) which were now limited to non-invaded stream reaches often above natural barriers such as waterfalls which inhibit non-native fish dispersal (Clark et al. 2009). While a suite of non-native fishes have been introduced into the Berg River system [Africa] ([…] *T. sparrmanii*, […]), disentangling impacts of non-native species from other anthropogenic stressors such as pollution and water abstraction was considered unrealistic (Clark et al. 2009). However, given the invasive nature of the non-native fishes present in the Berg River system, and the limitation of native fish distributions to non-invaded stream reaches, impacts on native fishes are inferred."

From Ellender et al. (2011):

"*Tilapia sparrmanii* has been widely translocated in South Africa as fodder fish for both *M. salmoides* and *M. dolomieu*, including Eastern Cape rivers (De Moor & Bruton 1988). Studies on their invasive potential are limited, although it has been suggested that they compete with native fishes for food resources and possibly prey on juvenile native fish (De Moor & Bruton 1988). The successful establishment of *T. sparrmanii* in the Blindekloof stream may be due to its wide habitat tolerance and generalist nature. The species prefers quiet or standing waters, typical of the pools on the Blindekloof stream. *Tilapia sparrmanii* is predominantly macrophagous, but may feed on small invertebrates and in some cases even small fish (Skelton 2001; Zengeya & Marshall 2007). There may be food resource competition between *T. sparrmanii* and the two native species *P. afer* (diet of filamentous algae and invertebrates) and *S. capensis* (diet of terrestrial and aquatic invertebrates as well as small fish) (Skelton 2001). The invasive potential of *T. sparrmanii* is, however, still inconclusive and needs to be investigated further."

From Genner et al. (2018):

"In the Mbeya District [Tanzania], it occurs in Lake Ikapu and has been stocked in Lake Kiungululu […] where it is now the most numerous species and may represent a threat to the endemic *Oreochromis chungruruensis*."

Tilapia sparrmanii is regulated in multiple U.S. States.

4 History of Invasiveness

Tilapia sparrmanii has been introduced outside of its native range and has become established in Madagascar, South Africa, and Japan. The Florida Fish and Wildlife Conservation Commission has listed the Banded Tilapia (*Tilapia sparrmanii*) as a prohibited species. Some information on impacts of invasiveness is available. According to Darwall et al. (2009), *T. sparrmanii* competes with and to the detriment of a native species. However, no evidence or sources are given to support that statement. Ellender et al. (2011), Ellender and Weyl (2014), and Genner et al. (2018) imply that *Tilapia sparrmanii* competes with native fish in the areas of introduction and may contribute to reductions in native fish stocks as well as exclusion of native species from invaded stretches of rivers. Again, however, no scientifically defensible supporting evidence is available and no definitive statements about *T. sparrmanii* as the causal agent are made. Due to the lack of

scientifically defensible evidence that *T. sparrmanii* is itself the cause of an impact in an introduced area the history of invasiveness is data deficient.

5 Global Distribution

Figure 1. Known global distribution of *Tilapia sparrmanii*. Observations are reported from Angola, Botswana, Democratic Republic of the Congo, Malawi, Madagascar, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. Map from GBIF Secretariat (2019). Locations in the United States, Brazil, and Myanmar were not used to select source points for the climate match as they do not represent currently established, wild populations. The location in Myanmar represents a museum specimen and the coordinates are for the museum. The location in Brazil has inaccurate coordinates and is supposed to represent a location in Africa. The locations in North America represent a failed introduction according to Nico et al. (2019).

6 Distribution Within the United States

Figure 2. Known distribution of *Tilapia sparrmanii* in the United States. Map from Nico et al. (2019). Neither point represents an established population, therefore neither will be used as a source location in the climate match.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Tilapia sparrmanii* were highest along the southern border of the United States and in Florida. Areas of medium match were found in central United States, as well as along both coasts. Low match areas were found primarily in the northern parts of the country. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.174, high (scores greater than 0.103, inclusive, are classified as high). The following states had high individual Climate 6 scores: Arizona, California, Colorado, Florida, Kansas, New Mexico, Nevada, Oklahoma, and Texas. Nebraska and Utah both had individual medium Climate 6 scores. All other states and territories had low individual climate scores.

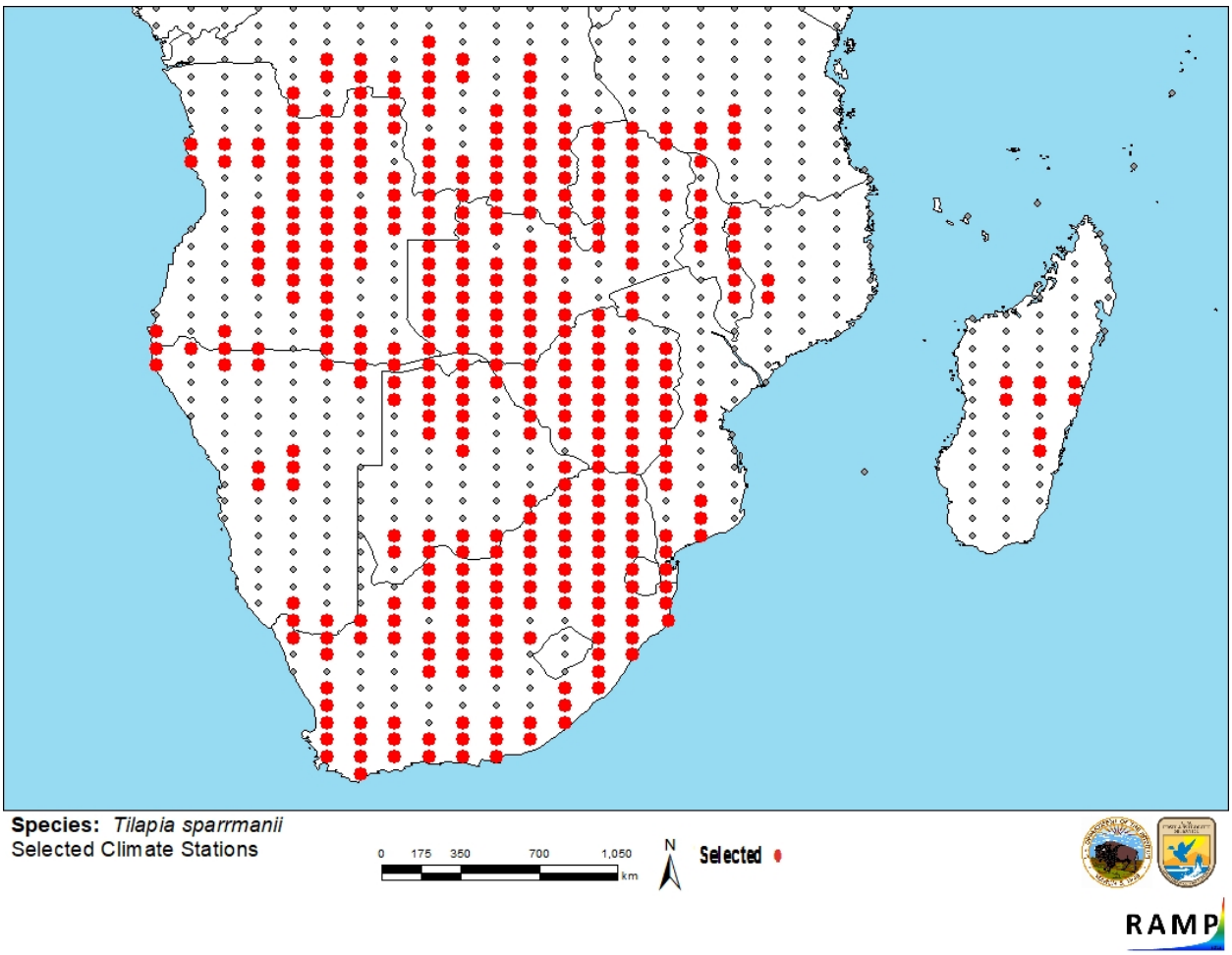

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in Angola, Botswana, Democratic Republic of the Congo, Malawi, Madagascar, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe selected as source locations (red) and non-source locations (gray) for *Tilapia sparrmanii* 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.

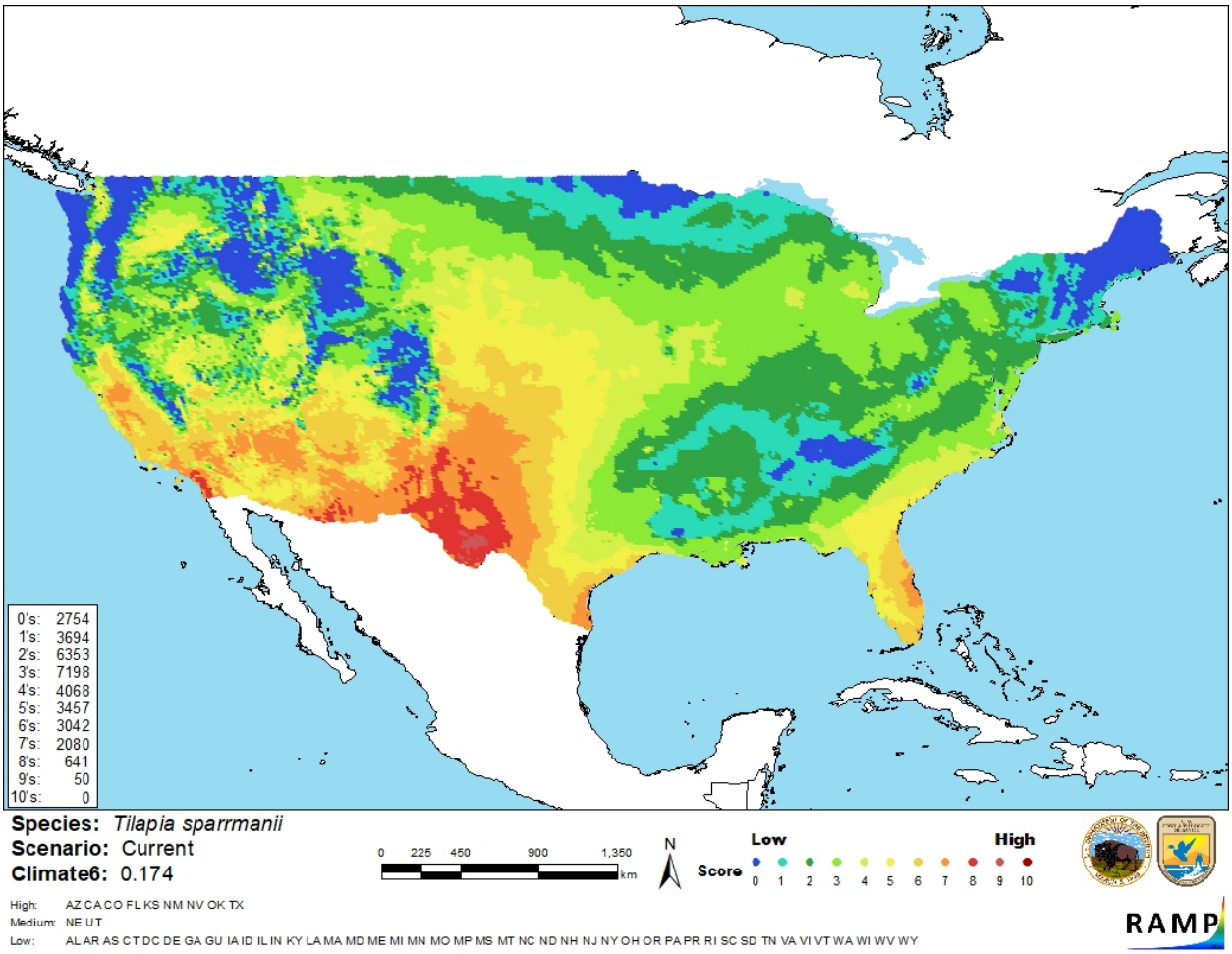

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Tilapia sparrmanii* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

The certainty of assessment is medium. There is quality information available about the biology and ecology of *Tilapia sparrmanii*. Records of introduction were found. Some information was available regarding impacts of introduction. Information on impacts was from peer-reviewed sources and grey literature but the information was limited, mostly pertaining to potential

impacts, and consisted of general statements without supporting evidence. Therefore, the certainty is reduced from high to medium.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Tilapia sparrmanii, the Banded Tilapia, is a tilapia native to southern Africa (Angola, Botswana, Democratic Republic of the Congo, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe). *T. sparrmanii* is used for aquaculture, as a forage fish for bass, stocking man-made lakes, and as a biological control for nuisance plants and animals. *Tilapia sparrmanii* can be infected by *Aphanomyces invadans* (epizootic ulcerative syndrome), an OIE-reportable disease. *Tilapia sparrmanii* is regulated in multiple U.S. States. *T. sparrmanii* has been introduced outside of its native range, where in some locations (Madagascar, South Africa and Japan) it has become established. In these areas, *T. sparrmanii* has begun to outcompete native fish for food. The history of invasiveness is classified as "data deficient." The overall climate match was high. States along the United States and Mexico border were generally very high, with medium match found in the center of the country and along the coasts. The certainty of this assessment is medium. The overall risk assessment category for *Tilapia sparrmanii* is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Medium**
- **Remarks/Important additional information:** *Tilapia sparrmanii* can be infected by *Aphanomyces invadans* (epizootic ulcerative syndrome), an OIE-reportable disease.
- **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.

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