

# Redtail Notho (*Nothobranchius guentheri*)

## Ecological Risk Screening Summary

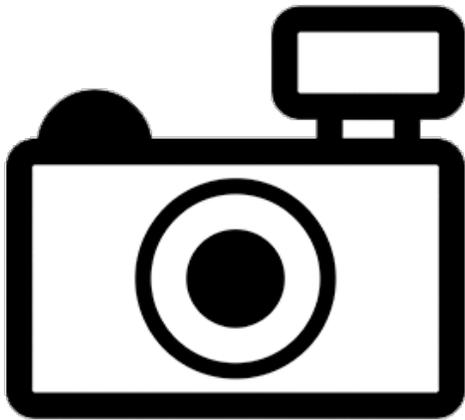
U.S. Fish & Wildlife Service, February 2011

Revised, April 2019

Web Version, 11/12/2020

Organism Type: Fish

Overall Risk Assessment Category: Uncertain



No Photo Available

## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2019):

“Known only from Zanzibar [Island in eastern Tanzania].”

### Status in the United States

From Nico and Neilson (2019):

“*Nothobranchius guentheri* was used for experimental purposes at the Agricultural Experiment Station at the University of California at Riverside, California. However, the experiment lasted only one year (1964-1965) and was terminated, supposedly because the species was intolerant of low water temperatures (Dill and Cordone 1997). There is no evidence that the species was ever released into California open waters. Additionally, this species was introduced into Oahu, Hawaii, ca. 1967 (Kanayama 1968; Maciolek 1984).”

“Status: Failed in California and Hawaii. Kanayama (1968) listed this species as one that may become established in Hawaii; however, later accounts (e.g., Devick 1991) indicated that it did not persist.”

*Nothobranchius guentheri* is in trade in the United States (e.g. LiveAquaria 2020).

## Means of Introductions in the United States

Froese and Pauly (2019) lists that the *Nothobranchius guentheri* introduction in Hawaii was due to ornamental or mosquito control.

From Nico and Neilson (2019):

“Means of Introduction: Imported and released by the Hawaii State Department of Health for possible use as mosquito control agents (Kanayama 1968). Imported and used in experimental plots as potential mosquito control agents (along with other annual fishes) by University of California researchers (Dill and Cordone 1997).”

## Remarks

No additional remarks.

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

“**Current status:** Valid as *Nothobranchius guentheri* (Pfeffer 1893).”

From ITIS (2019):

Kingdom Animalia  
  Subkingdom Bilateria  
    Infrakingdom Deuterostomia  
      Phylum Chordata  
        Subphylum Vertebrata  
          Infraphylum Gnathostomata  
            Superclass Actinopterygii  
              Class Teleostei  
                Superorder Acanthopterygii  
                  Order Cyprinodontiformes  
                    Suborder Aplocheiloidei  
                      Family Aplocheilidae  
                        Subfamily Aplocheilinae  
                          Genus *Nothobranchius*  
                            Species *Nothobranchius guentheri* (Pfeffer, 1893)

## **Size, Weight, and Age Range**

From Froese and Pauly (2019):

“Max length : 5.5 cm TL male/unsexed; [Huber 1996]; 6.3 cm TL (female)”

## **Environment**

From Froese and Pauly (2019):

“Freshwater; benthopelagic; pH range: 6.0 - 7.0; dH range: 4 – 10; non-migratory. [...]; 22°C - 25°C [Riehl and Baensch 1991; assumed to be recommended aquarium temperature]”

## **Climate**

From Froese and Pauly (2019):

“Tropical; [...]”

## **Distribution Outside the United States**

Native

From Froese and Pauly (2019):

“Known only from Zanzibar [Island in eastern Tanzania].”

Introduced

Froese and Pauly (2019) lists introductions of *Nothobranchius guentheri* to Turkey, India, and the Solomon Islands. None of these introductions are determined to have led to established populations.

## **Means of Introduction Outside the United States**

Froese and Pauly (2019) lists introductions of *Nothobranchius guentheri* to Turkey, India, and the Solomon Islands due to mosquito control.

## **Short Description**

From Bailey (1972):

“As in other members of the genus, *N. guentheri* exhibits clear sexual dichromatism. The adult male is very colourful with a preponderance of red, whereas the female is bluish-grey with a scattering of dark spots.”

## Biology

From Froese and Pauly (2019):

“Found in seasonal pools and streams [Wildekamp et al. 1986]. Used for biological control of mosquitoes. [...] One of the so called 'annual fishes' which has eggs that can withstand seasonal droughts [Welcomme 1988]. Bottom spawner, 3-4 months incubation.”

“Thrives in seasonal rainwater pools. Spawns throughout the short breeding period until the pool dries up and all fish die except their drought-resistant eggs. Eggs go through a dry period of many weeks. When rain comes and pool fills, most of the eggs begin to develop and hatch within hours. Fry grow very fast. In only 6 to 8 weeks they are sexually mature and start breeding [Burton 1972]. In aquaria, males showed aggressive behavior toward each other. Females were being pushed down to the substratum by the males as a prelude to spawning.”

From Nico and Neilson (2019):

“Remarks: *Nothobranchius* are annual fishes; they are able to maintain permanent populations in temporary habitats by combining rapid growth and development with diapausing eggs that survive the dry season buried in the mud.”

From Matias and Adrias (2010):

“Food preference studies show that *N. guentheri* preferred to prey on mosquito larvae than either chironomid or rotifers. When hibernating killifish embryos were added to ponds simultaneously with the addition of freshwater, the embryos hatched and fed on mosquito larval population resulting in complete elimination of the immature stages.”

## Human Uses

From Froese and Pauly (2019):

“Used for biological control of mosquitoes. Quite popular with aquarists.”

“Fisheries: of no interest; aquarium: commercial”

From Matias and Adrias (2010):

“The introduction of juvenile fish to ponds with high density of mosquito larvae resulted in total eradication of the mosquito population due to predation by fish. Complete biocontrol of the mosquito larval population was achieved in the presence of 3 fish per m<sup>2</sup> of pond surface area.”

From Bailey (1972):

“Due to attractive male colouration and their interesting breeding behaviour, species of *Nothobranchius*, together with other annual fishes, are well known to aquarists and in particular those specialists grouped to form 'killifish' associations. *Nothobranchius*, including *N. guentheri*, became available commercially in the United Kingdom during the 1950's (ROWE 1958). At the present time a pair of fish may fetch up to £1 sterling and a dozen eggs approximately 50 pence.”

## Diseases

**No OIE-reportable diseases (OIE 2020) were found to be associated with *Nothobranchius guentheri*.**

Froese and Pauly (2019) lists Costia disease and bacterial infections as diseases of *N. guentheri*.

## Threat to Humans

From Froese and Pauly (2019):

“Harmless”

## 3 Impacts of Introductions

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From Nico and Neilson (2019):

“Impact of Introduction: The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made.”

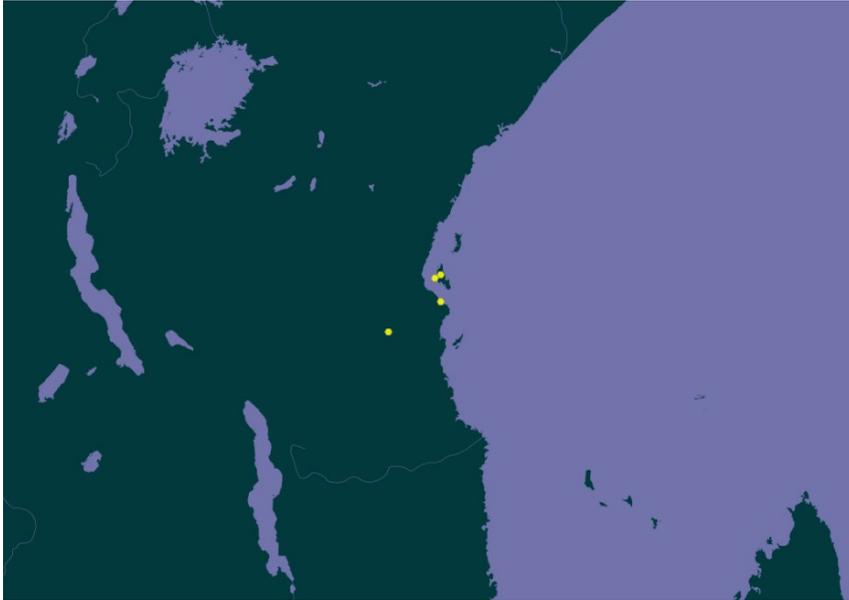
## 4 History of Invasiveness

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*Nothobranchius guentheri* is a small fish native to Zanzibar that was introduced to California (research), Turkey (mosquito control) and Hawaii (mosquito control), but no known wild populations became established. The species is identified as being used in aquaria and for mosquito control. For these reasons the history of invasiveness is classified as “No Known Nonnative Population”.

## 5 Global Distribution

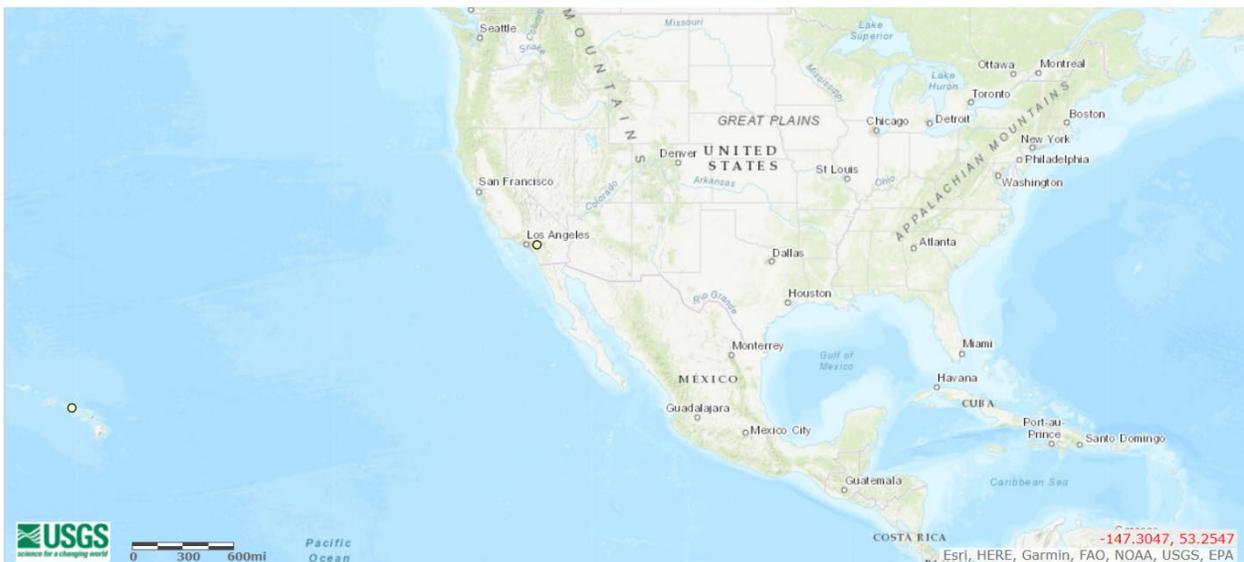
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**Figure 1.** Known global distribution of *Nothobranchius guentheri*. Locations are in east Africa (Tanzania) and the island of Zanzibar. Map from GBIF Secretariat (2019). The locations on the mainland were not used to select source points for the climate match as there are no records of populations outside the island of Zanzibar.

## 6 Distribution Within the United States

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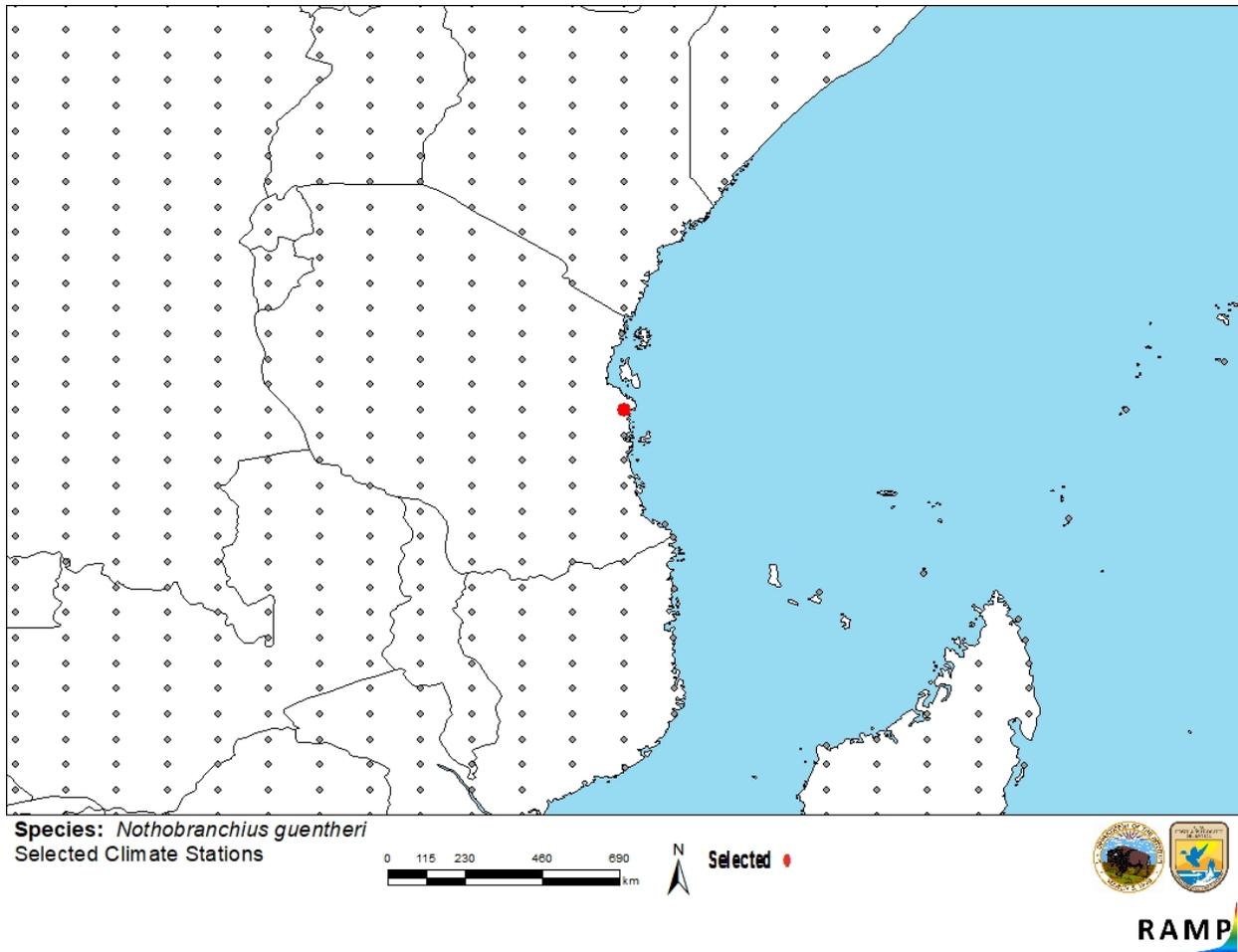


**Figure 2.** Distribution of *Nothobranchius guentheri* in the United States. The location is in Hawaii and California. Map from Nico and Neilson (2019).

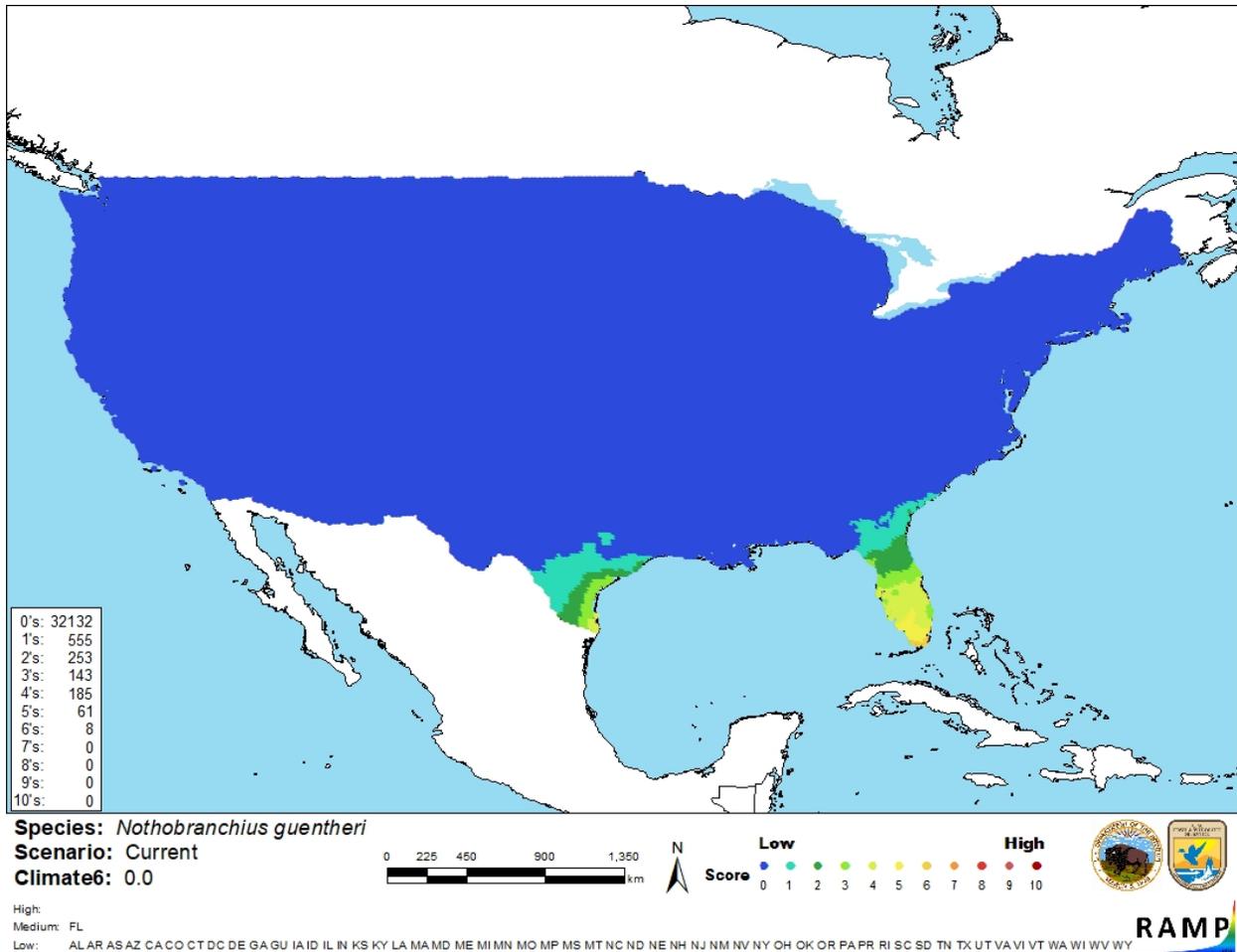
# 7 Climate Matching

## Summary of Climate Matching Analysis

The climate match for the contiguous United States was low across the majority states with patches of medium climate match in southern Texas and Florida. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.000, (scores between 0.00 and 0.005, inclusive, are classified as low). All States received individually low climate scores except for Florida, which had an individually medium climate score.



**Figure 3.** RAMP (Sanders et al. 2018) source map showing weather stations in eastern Africa selected as source locations (red; Tanzania) and non-source locations (gray) *Nothobranchius guentheri* 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. As there are no source points on the island of Zanzibar the closest point on the mainland was selected.



**Figure 4.** Map of RAMP (Sanders et al. 2018) climate matches for *Nothobranchius guentheri* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). 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
$\geq 0.103$	High

## 8 Certainty of Assessment

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Limited information is available for *Nothobranchius guentheri*. Nico and Neilson (2019) and Froese and Pauly (2019) lists *Nothobranchius guentheri* as introduced in California, Hawaii, Turkey, Solomon Islands, and India due to mosquito control. The introductions have failed and do not indicate an established population. The certainty of assessment is low.

## 9 Risk Assessment

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### Summary of Risk to the Contiguous United States

Redtail Notho (*Nothobranchius guentheri*) is a fish native to Tanzania. Nico and Neilson (2019) lists *Nothobranchius guentheri* as introduced in California, Hawaii, Turkey, Solomon Islands, and India due to mosquito control. The introductions have failed and do not indicate an established population therefore the history of invasiveness is classified as “No Known Nonnative Population.” The climate match for the contiguous United States is low, with small patches of medium match in southern Texas and Florida. All states received individually low climate scores except for Florida, which had an individually medium climate score. The certainty of assessment is low. The overall risk assessment category for *Nothobranchius guentheri* is uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Populations**
- **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.**

Bailey RG. 1972. Observations on the biology of *Nothobranchius guentheri* (Cyprinodontidae), an annual fish from the coastal region of East Africa. *The African Journal of Tropical Hydrobiology and Fisheries* 1:33–43.

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- Sanders S, Castiglione C, Hoff M. 2018. Risk Assessment Mapping Program: RAMP. Version 3.1. U.S. Fish and Wildlife Service.

## 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.**

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- Dill WA, Cordone AJ. 1997. History and status of introduced fishes in California, 1871-1996. *California Department of Fish and Game Fish Bulletin*. Volume 178.
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