Bluegray Mbuna (*Pseudotropheus johannii*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2013
Revised, May 2019
Web Version, 2/4/2021

Organism Type: Fish
Overall Risk Assessment Category: Uncertain

Photo: B W. Licensed under CC BY-NC-ND. Available: https://www.inaturalist.org/photos/11582283. (April 2019).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

"Africa: endemic to Lake Malawi. Occurs in Masinje Rocks, Cape Ngombo."

From Konings (2018):

"This species is endemic to Lake Malawi. It occurs along the eastern shore between Chuanga (Mozambique) and Makanjila Point (Malawi)."

Status in the United States

From Nico (2019):

"Established, or possibly established, in Hawaii. Reported from Nevada."

From Froese and Pauly (2019):

"Thriving populations can be found on the windward side of O'ahu, Ho'omaluhia Reservoir and the adjacent Kamo'oalii Stream [Hawaii] [Yamamoto and Tagawa 2000]."

Pseudotropheus johannii 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." Species within family Cichlidae have the additional restriction of "Not to be used as bait fish."

P. johannii is in trade in the United States (e.g. Arizona Aquatic Gardens 2021).

Means of Introductions in the United States

From Nico (2019):

"Probable aquarium release."

Remarks

Both the valid name *Pseudotropheus johannii* and the synonym *Melanochromis johannii* (Fricke et al. 2019) were used to conduct the research for this assessment.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

"**Current status:** Valid as *Pseudotropheus johannii* Eccles 1973."

From Konings (2018):

"Kingdom Animalia
Phylum Chordata
Class Actinopterygii
Order Perciformes
Family Cichlidae

Genus *Pseudotropheus*
Scientific name *Pseudotropheus johannii*"

Size, Weight, and Age Range

From Froese and Pauly (2019):

"Max length : 10.0 cm TL male/unsexed; [Maréchal 1991]"

Environment

From Froese and Pauly (2019):

"Freshwater; benthopelagic; pH range: 8.0 - 8.0; dH range: 9 - 19. […]; 22°C - 25°C [Riehl and Baensch 1991; assumed to be recommended aquarium temperature]"

Climate

From Froese and Pauly (2019):

"Tropical; […] 13°S - 14°S"

Distribution Outside the United States

Native

From Froese and Pauly (2019):

"Africa: endemic to Lake Malawi. Occurs in Masinje Rocks, Cape Ngombo."

From Konings (2018):

"This species is endemic to Lake Malawi. It occurs along the eastern shore between Chuanga (Mozambique) and Makanjila Point (Malawi)."

Introduced

According to Froese and Pauly (2019), *Pseudotropheus johannii* has been introduced to the Philippines. No information was available on the status of the introduced population.

Means of Introduction Outside the United States

Pseudotropheus johannii was introduced for ornamental purposes (Froese and Pauly 2019).

Short Description

From Froese and Pauly (2019):

"Males are brilliant sky blue to dark blue; the colors show a "checkerboard" pattern with alternating light and dark patches; several light-colored "egg spots" on their anal fin; females and juveniles bright yellow-orange in color [Yamamoto and Tagawa 2000]."

Biology

From Froese and Pauly (2019):

"Found in rocky habitats of shoreline areas [Mundy 2005]. Omnivorous and feed on both plant and animal matter [Yamamoto and Tagawa 2000]."

"Maternal mouthbrooders; males establish territories and maintain a harem of females; female deposits eggs and picks them up in the mouth for incubation; male spreads out his anal fin showing the "eggs pots"; the females mistake these spots for her eggs and try to also take them inside her mouth; the male then releases his milt and the female takes them in, thus fertilizing the eggs inside her mouth [Yamamoto and Tagawa 2000]."

From Konings (2018):

"It is found in the intermediate habitat mostly near rocks at about five metres depth. It feeds from both rocky and sand substrate, as well as on suspended matter in the water column, with the diet consisting of blue-green algae and diatoms. Males do not show territoriality but chase conspecific males in breeding colouration from the foraging ground."

Human Uses

From Konings (2018):

"It is regularly collected by the ornamental fish trade where it is known by its scientific name."

P. johannii is in trade in the United States (e.g. Arizona Aquatic Gardens 2021).

Diseases

No records of OIE-reportable diseases were found to for *Pseudotropheus johannii*. No information on diseases was found.

Threat to Humans

From Froese and Pauly (2019):

"Harmless"

3 Impacts of Introductions

From Nico (2019):

"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

Pseudotropheus johannii has been reported in Nevada and Hawaii, as well as the Philippines, presumably all introduced via the aquarium trade. It is known to be established in Hawaii. However, there was no information found regarding any impacts of introduction. The history of invasiveness is therefore classified as "data deficient."

5 Global Distribution

Figure 1. Known global distribution of *Pseudotropheus johannii*. Map from GBIF Secretariat (2019). The location in Nevada in the southwestern United States was not used to select source points for the climate match due to uncertainty if the population has become established or failed (Nico 2019).

6 Distribution Within the United States

Figure 2. Known distribution of *Pseudotropheus johannii* in Hawaii. Map from Nico (2019).

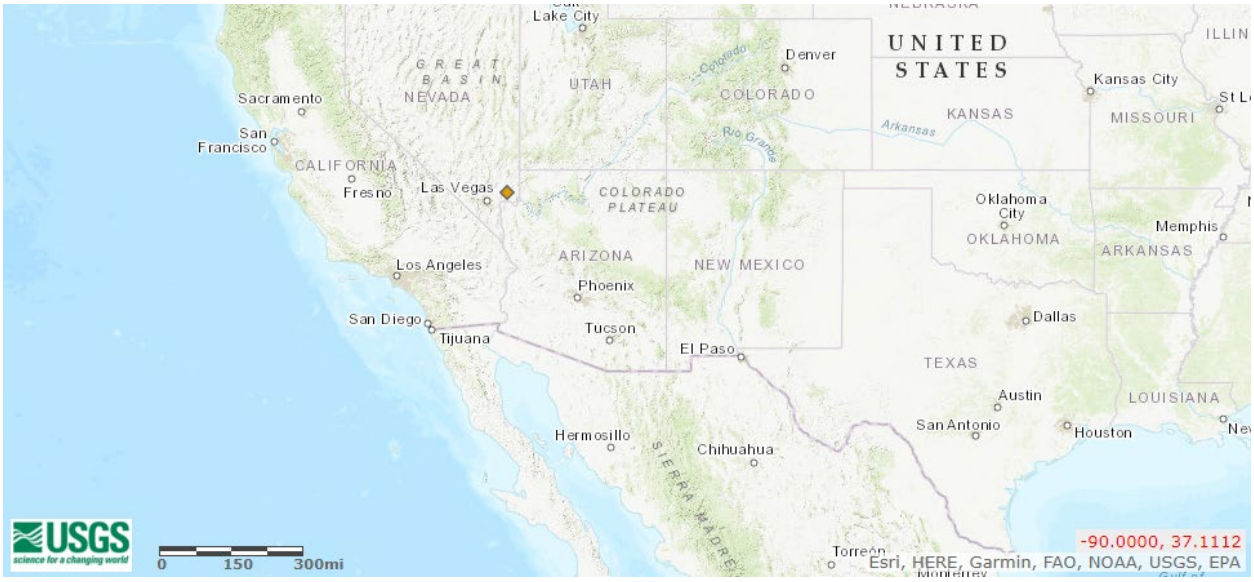

Figure 3. Known distribution of *Pseudotropheus johannii* in the contiguous United States. Map from Nico (2019). The status of the population in Nevada is uncertain and the observation does not necessarily represent an established population, therefore this location was not used to select source points for the climate match.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for the contiguous United States is generally low. There were no areas of high match. Small areas of medium match were along the southern border in California, Arizona, Texas, and Florida. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for contiguous United States was 0.000, a low score (scores between 0.000 and 0.005, inclusive, are classified as low). The range for a low climate scores is 0.000 to 0.005, inclusive. All States had low individual climate scores.

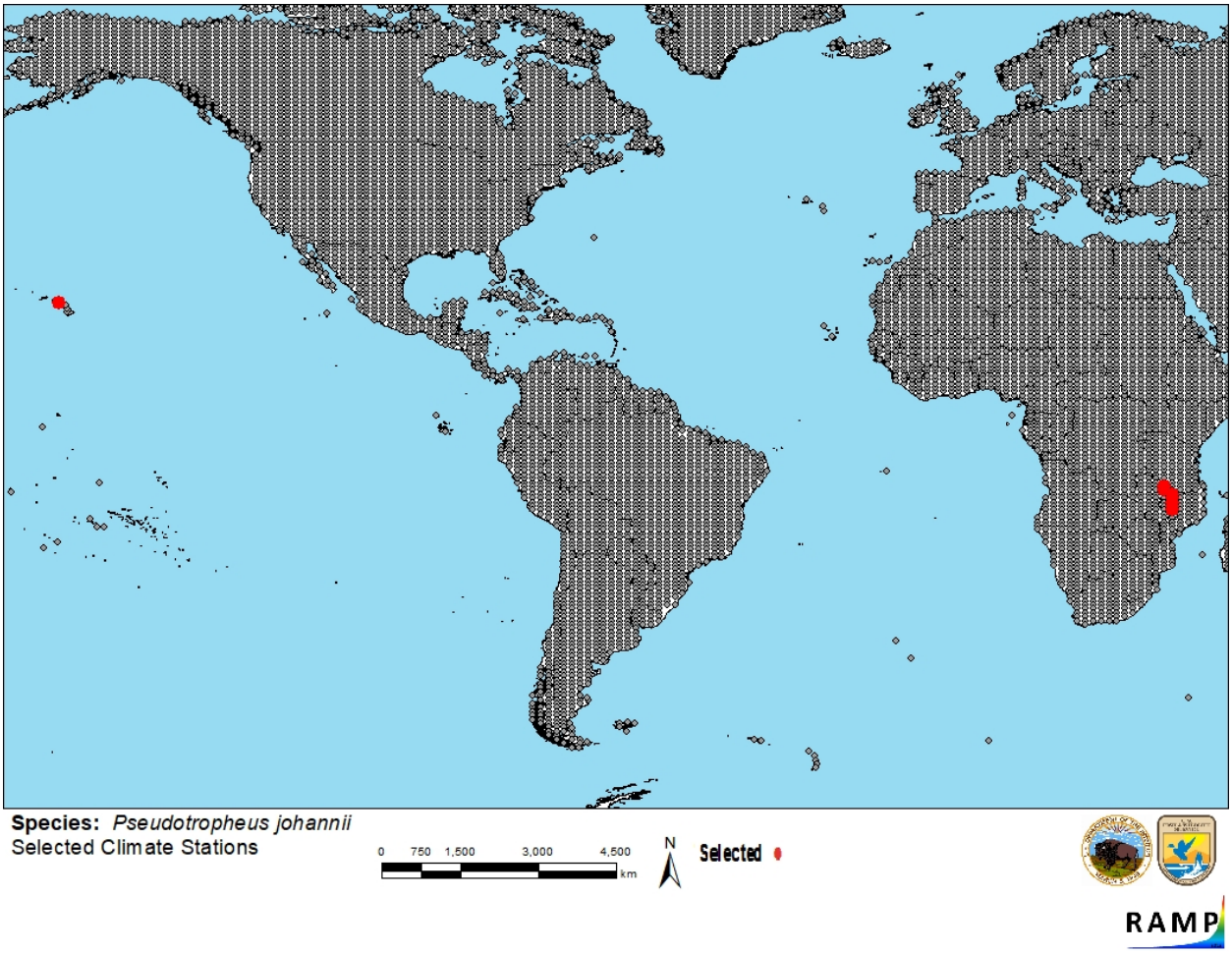

Figure 4. RAMP (Sanders et al. 2018) source map showing weather stations in Africa and the United States selected as source locations (red; Malawi, Mozambique, Hawaii) and non-source locations (gray) for *Pseudotropheus johannii* climate matching. Source locations from GBIF Secretariat (2019) and Nico (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

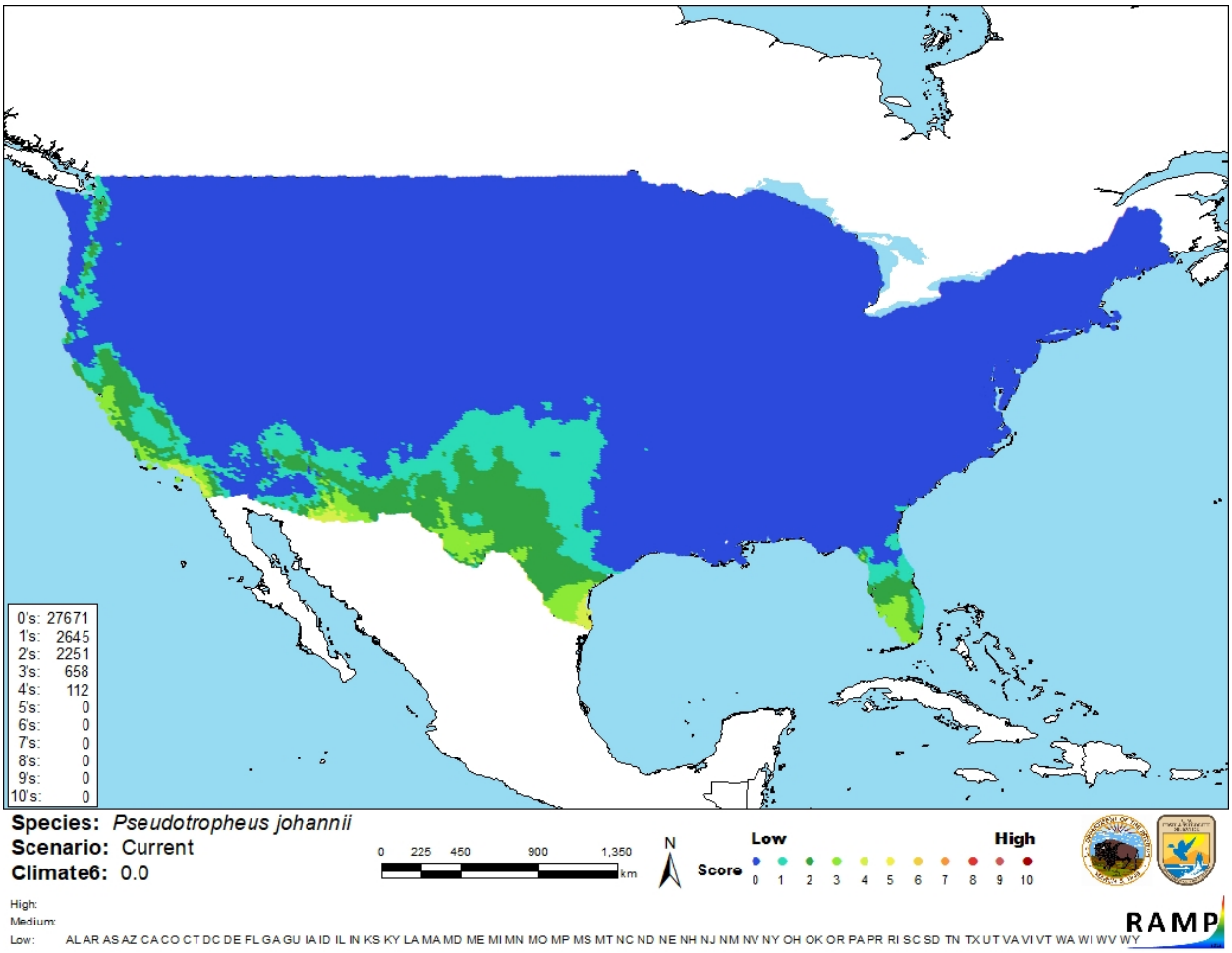

Figure 5. Map of RAMP (Sanders et al. 2018) climate matches for *Pseudotropheus johannii* in the contiguous United States based on source locations reported by GBIF Secretariat (2019) and Nico (2019). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

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

Certainty of assessment is low. Limited information is available on *Pseudotropheus johannii*. *P. johannii* has been reported as introduced and established outside of their native range but no information has been found regarding the impacts of introduction.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Bluegray Mbuna (*Pseudotropheus johannii*), is a freshwater cichlid native to Lake Malawi in Mozambique and Malawi. *Pseudotropheus johannii* is a popular aquarium fish. This species has been introduced outside of its native range, likely due to an aquarium release. *P. johannii* has been introduced and established in Hawaii, and has been collected in Nevada and the Philippines. No information has been reported on the impacts of introduction, thus the history of invasiveness is classified as "data deficient." The climate match for the contiguous United States was 0.000, a low climate score. All individual states received low climate scores. The certainty of assessment is low. The overall risk assessment category for *Pseudotropheus johannii* is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **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

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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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

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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