Freshwater Angelfish (*Pterophyllum scalare*)
Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2011
Revised, October 2018
Web Version, 1/2/2020

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"South America: Amazon River basin, in Peru, Colombia, and Brazil, along the Ucayali, Solimões and Amazon rivers; rivers of Amapá (Brazil), Rio Oyapock in French Guiana; Essequibo River in Guyana."

Status in the United States

According to Nico and Neilson (2018), *Pterophyllum scalare* has been reported as non-native in the following States (years of reports and watersheds given after State name):

- California (1964–1968; Salton Sea, Seal Beach)
- Florida (1979; Florida Southeast Coast)
- Kentucky (1984; no watershed given)

From Nico and Neilson (2018):

"Failed in California, Florida and Kentucky."

Pterophyllum scalare is currently in trade within the United States (Arizona Aquatic Gardens 2020).

According to Chapman et al. (1994), *P. scalare* accounted for 5.2% of all ornamental fish imported to the United States in 1972 and 0.8% in 1992. In October of 1992, 127,534 individuals of *P. scalare* were imported.

Means of Introductions in the United States

From Nico and Neilson (2018):

"Unknown. California and Florida introductions represent either escape from aquaculture facilities or aquarium releases; Kentucky record is likely a result of aquarium release."

From Gozlan et al. (2010):

"High volumes of ornamental fish are imported into western industrialized countries, especially from South-east Asia, Africa and South America (Keller and Lodge, 2007). These non-native species are reared in local farms or imported from abroad for ornamental or aesthetic reasons, such as private or public aquaria or gardens, for example, […], *Pterophyllum* sp. (*scalar*) […]. It is unlikely that many of these fishes could survive and spread as invasive alien species in temperate waters because of their particular ecological and physiological requirements (warm water >15 °C) […]. Some species, however, find ideal conditions in lower latitudes (e.g. southern Europe or the southern U.S.A.) where water temperatures do not fall below the lower temperature thresholds, or are able to tolerate the ambient conditions. Furthermore, some species find refuge in waters artificially warmed by effluent discharge, for example, downstream of power stations and other industrial facilities."

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

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 Cichilidae
Genus *Pterophyllum*
Species *Pterophyllum scalare* (Schultze in Lichtenstein, 1823)"

"Current standing: valid"

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Maximum length 15 cm TL [Mills and Vevers 1989]."

Environment

From Froese and Pauly (2018):

"Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 – 13. […] 24°C - 30°C [Stawikowski and Werner 1998]."

Climate/Range

From Froese and Pauly (2018):

"Tropical; […] 6°N - 10°S, 78°W - 51°W"

Distribution Outside the United States

Native

From Froese and Pauly (2018):

"South America: Amazon River basin, in Peru, Colombia, and Brazil, along the Ucayali, Solimões and Amazon rivers; rivers of Amapá (Brazil), Rio Oyapock in French Guiana; Essequibo River in Guyana."

Introduced

According to Froese and Pauly (2018), *Pterophyllum scalare* has been introduced to Fiji; introduced and probably established in Suriname; introduced but probably not established in Canada, Guyana, and Israel; introduced but status unknown in Spain and the Philippines.

Means of Introduction Outside the United States

Froese and Pauly (2018) list aquaculture as the means of introduction for Israel and ornamental for Spain and the Philippines.

Short Description

From Froese and Pauly (2018):

"Body compressed and disc-shaped; dorsal and anal spiny rays increasing in length from anterior to posterior part of the fin; first branched rays also very long; body height at anal fin level 1.07 to 1.29 times in SL; body color silvery with dark vertical bars (7 in juveniles, 4 in adults) [Keith et al. 2000]."

Biology

From Froese and Pauly (2018):

"Inhabit swamps or flooded grounds where the aquatic and riverine vegetation are dense and the water is either clear or silty. Its color is deeper in clear water [Keith et al. 2000]."

"Males court females during the breeding season. Both male and female guard the eggs which are attached to the surface of aquatic vegetation in a nest area [Yamamoto et al. 1999]. During the entire brooding cycle, bonding of the original pair of parents is maintained complete with defence [*sic*] of each partner against aggression or potential rivals [Yamamoto et al. 1999]."

Human Uses

From Froese and Pauly (2018):

"Aquarium: highly commercial"

"One of the most frequently found species in the pet and aquarium stores [in Spain] [Maceda-Veiga et al. 2013]."

"One of the most popular of all the tropical aquarium fish."

From Gozlan et al. (2010):

"High volumes of ornamental fish are imported into western industrialized countries, especially from South-east Asia, Africa and South America (Keller and Lodge 2007). These non-native species are reared in local farms or imported from abroad for ornamental or aesthetic reasons, such as private or public aquaria or gardens, for example, […], *Pterophyllum* sp. […]."

Pterophyllum scalare is currently in trade within the United States (Arizona Aquatic Gardens 2020).

According to Chapman et al. (1994), *P. scalare* accounted for 5.2% of all ornamental fish imported to the United States in 1972 and 0.8% in 1992. In October of 1992, 127,534 individuals of *P. scalare* were imported.

Diseases

No OIE-reportable diseases (OIE 2020) are associated with *Pterophyllum scalare*.

According to Poelen et al. (2018), *Pterophyllum scalare* is a host of *Mycobacterium angelicum*, Infectious pancreatic necrosis virus, and *Saprolegnia parasitica*. *P. scalare* can also have the following parasites: *Proteocephalus, Ancyrocephalus, Gussevia spiralocirra, Sciadicleithrum iphthimum, Spirocamallanus inopinatus, Clinostomum complanatum, Euclinostomum heterostomum* and *Necocapillaria pterophilli.*

According to Froese and Pauly (2018), *Pterophyllum scalare* is also known to be susceptible to the following diseases: fin-rot disease, bacterial diseases, Dactylogyrus Gill Flukes Disease, parasitic infestations, Columnaris Disease, Nematode Infestation, Hole-in Head Disease, Pop-eye disease, *Pseudomonas* infection, Turbidity of the Skin, Bacterial infections, Hexamitosis, Pasteurellosis, Costia Disease, Neopasia, Ichthyobodo Infection, Hidden Viral Infection, Fungal infections and diseases, fish tuberculosis, Angelfish Disease, Congenital Deformities, Blockage Disease and Capillaria Infestation 4.

Threat to Humans

From Froese and Pauly (2018):

"Harmless"

3 Impacts of Introductions

No information on any impacts of introductions was found.

4 Global Distribution

Figure 1. Known global distribution of *Pterophyllum scalare*. Locations are in California, Southeast Asia, and northern South America. Map from GBIF Secretariat (2018). Note locations in Southeast Asia and California do not represent established populations and were not used to select source points for the climate match.

5 Distribution Within the United States

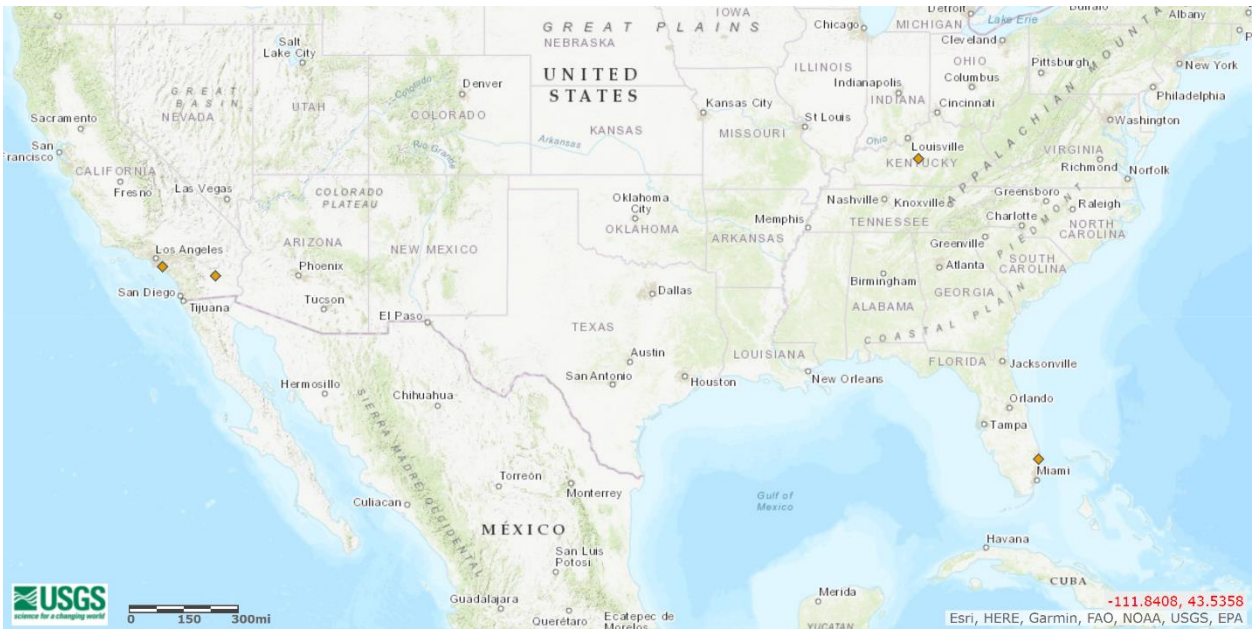

Figure 2. Known locations of *Pterophyllum scalare* in the United States. Map from Nico and Neilson (2018). Note that each location only represents a recorded sighting, none of which have resulted in an established population. Therefore, none of these locations were used to select source points in the climate match.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Pterophyllum scalare* was low across most of the contiguous United States. It was medium along parts of the Gulf Coast and peninsular Florida. A small area of southeast Florida had a high match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.001, a low score. (Scores between 0.000 and 0.005, inclusive, are classified as low.) Florida had a medium individual Climate 6 score, while all other States in the contiguous United States had a low climate score.

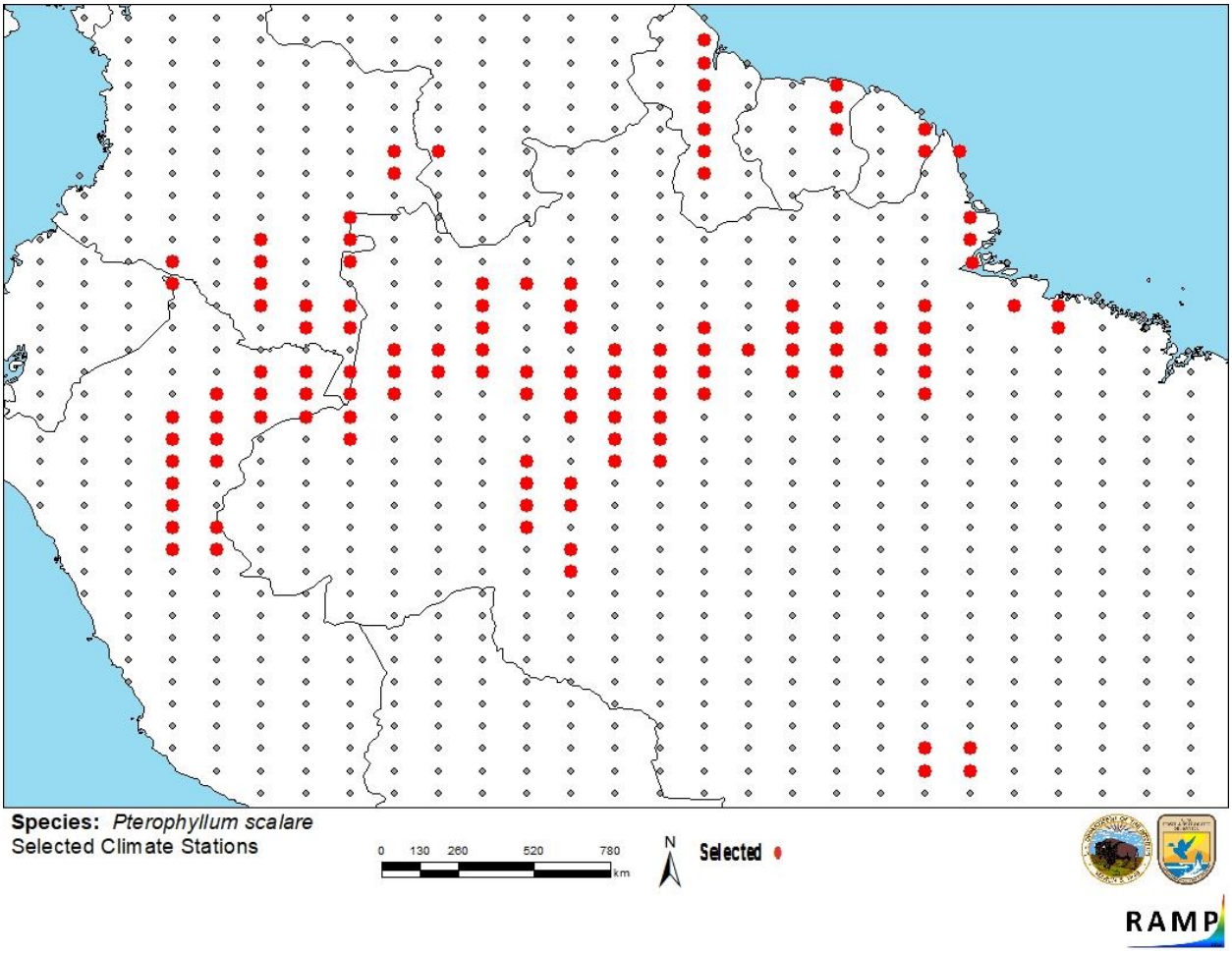

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in northern South America selected as source locations (red; Peru, Colombia, Venezuela, French Guiana, Suriname, Guyana, Brazil) and non-source locations (gray) for *Pterophyllum scalare* climate matching. Source locations from GBIF Secretariat (October 2018). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

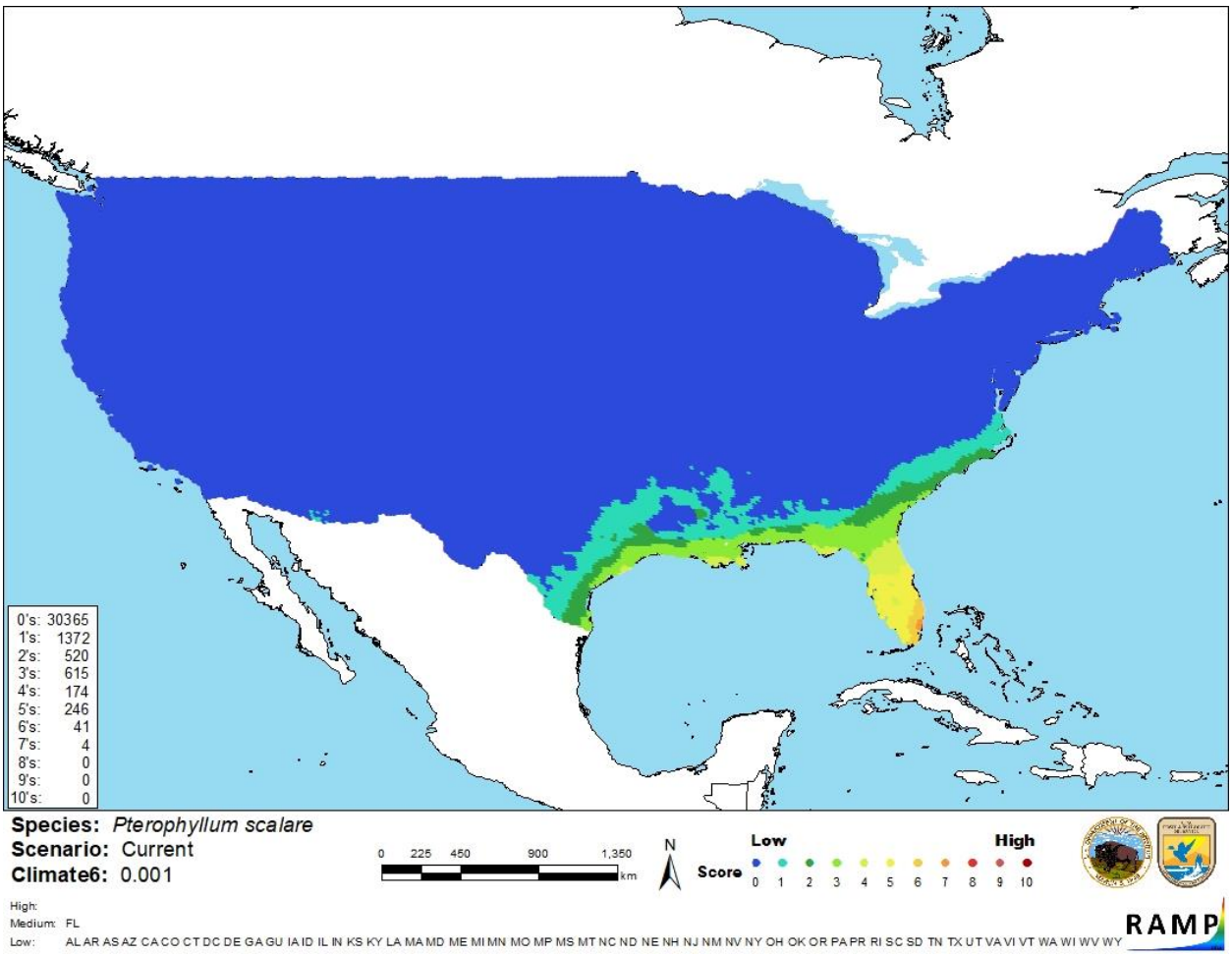

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Pterophyllum scalare* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). 0 = Lowest match, 10 = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

The certainty of assessment for *Pterophyllum scalare* is medium. Information is known about their biology and native range. There is some documentation of a history of introductions but no definitive information on establishment and no information on any impacts from introduction. *P. scalare* is a population aquarium species and has a strong history of trade which has been documented in the grey literature.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Freshwater Angelfish (*Pterophyllum scalare*) is native to river basins the northern region of South America, primarily the Amazon River Basin. Limited information is available on *P. scalare* in the wild, yet it is a popular aquarium fish. The history of invasiveness is low. If the trade volume from October 1992 (127,534 individuals; Chapman et al. 1994) is extrapolated across the years since then, it amounts to over 27 million individuals in trade in just under 30 years. That number would only account for importation to the United States since late 1992. *P. scalare* is in trade internationally and has been imported to the United States since at least 1972. Introductions have been recorded but only one of the records (Suriname) indicates that it is 'probably established', the others are either not established or unknown. It should be noted that Suriname is surrounded by the native range of this species. The climate match was very low for the contiguous United States. The only areas where medium match could be found was in southern Florida and in small pockets along the Gulf Coast. The certainty of assessment is medium due to the source of trade information being grey literature and not peer-reviewed. The overall risk of assessment for *Pterophyllum scalare* is low.

Assessment Elements

- **History of Invasiveness (Sec. 3): Low**
- **Climate Match (Sec. 6): Low**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information: No additional remarks**
- **Overall Risk Assessment Category: Low**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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Sanders, S., C. Castiglione, and M. Hoff. 2018. Risk assessment mapping program: RAMP, version 3.1. U.S. Fish and Wildlife Service.

10 References Quoted But Not Accessed

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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