

# Guppy (*Poecilia reticulata*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, March 2011  
Revised, July 2015 and February 2018  
Web Version, 4/10/2018



Photo: "Guppy *Poecilia reticulata*" by H. Krisp. Licensed under CC BY 3.0. Available: [https://commons.wikimedia.org/wiki/File:Guppy\\_Poecilia\\_reticulata.jpg#/media/File:Guppy\\_Poecilia\\_reticulata.jpg](https://commons.wikimedia.org/wiki/File:Guppy_Poecilia_reticulata.jpg#/media/File:Guppy_Poecilia_reticulata.jpg). (July 2015).

## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2017):

“South America: Venezuela, Barbados, Trinidad, northern Brazil and the Guyanas.”

## Status in the United States

From Nico et al. (2018):

“**Nonindigenous Occurrences:** This species is known from **Arizona** (Minckley 1973; Courtenay et al. 1984, 1991); **California** (St. Amant and Hoover 1969; Shapovalov et al. 1981; Courtenay et al. 1984, 1991; Dill and Cordone 1997; Moyle 2002); **Colorado** (Zuckerman and Behnke 1986); **Connecticut** (Whitworth 1996); **Florida** (Courtenay et al. 1974; J. D. Williams, personal observation); **Hawaii** (Brock 1960; Kanayama 1968; Maciolek 1984; Devick 1991; Tilmant 1999; Mundy 2005); **Idaho** (Linder 1964; Baxter and Simon 1970; Simpson and Wallace 1978; Courtenay 1985; Courtenay et al. 1987; Idaho Fish and Game 1990); **Missouri** (Keevin 1978); **Nevada** (Deacon et al. 1964; Bradley and Deacon 1967; Moyle 1976; Williams and Williams 1981; Courtenay and Deacon 1982, 1983; Deacon and Williams 1984); **New Mexico** (Sublette et al. 1990); **Texas** (Edwards 1976; Hubbs et al. 1978; Courtenay et al. 1984; Conner and Suttkus 1986; Courtenay et al. 1991; Hubbs et al. 1991; Howells 1992); **Utah** (F. B. Guttermuth, personal communication); **West Virginia**; **Wisconsin** (Becker 1983); and **Wyoming** (Baxter and Simon 1970; Courtenay et al. 1987; Hubert 1994; Stone 1995; Tilmant 1999). Also introduced in several reservoirs in **Puerto Rico** (Erdsman 1984; Lee et al 1980 et seq); the **U.S. Virgin Islands** (Loftus 2004); and **Guam** (S. Walsh, pers. comm.).”

“**Status:** Locally established in warmwater sites in Hawaii (Devick 1991), Idaho (Courtenay et al. 1987), New Mexico (Sublette et al. 1990), Nevada (Courtenay and Deacon 1983), Texas (Hubbs et al. 1991), and Wyoming (Courtenay et al. 1987); reported from California (Shapovalov et al. 1981), Colorado (Zuckerman and Behnke 1986), Connecticut (Whitworth 1996), Missouri (Keevin 1978), Montana (Moyle 1976), and Wisconsin (Becker 1983). Considered established in Arizona by Minckley (1973); however, according to Courtenay and Meffe (1989), populations in Arizona and Florida do not appear to be self-sustaining. Although introduced widely in Texas, the only established population is found in the San Antonio River near Brackenridge Park (Hubbs et al. 1991).”

From NatureServe (2017):

“In U.S., introduced populations have been found in warm springs and canal systems.”

Shafland et al. (2008) include *P. reticulata* in their list of currently non-reproducing (formerly reproducing) exotic freshwater fishes collected from Florida fresh waters.

From Chapman et al. (1997):

“Using import and export documents we report trends in total values for the U.S. trade in ornamental fish. Also, we determined the number and value of the most commonly imported ornamental fish [as of 1992]. [...] The two most popular ornamental fish species imported into the U.S. were the live bearer, guppy *Poecilia reticulata*, and the egg layer, neon tetra *Paracheirodon innesi*. These two species accounted for 37% of the total number of fish imported and were valued at approximately half a million dollars.”

## Means of Introduction into the United States

From Nico et al. (2018):

“Most introductions probably are fish farm or aquarium releases (e.g., Zuckerman and Behnke 1986; Courtenay and Meffe 1989; Howells 1992; Dill and Cordone 1997). Some California introductions were made intentionally for mosquito control (Shapovalov et al. 1981; Dill and Cordone 1997).”

## Remarks

From CABI (2018):

“Other Scientific Names

*Acanthophaelus guppil* (Günther, 1866)  
*Acanthophaelus reticulatus* (Peters, 1859)  
*Girardinus guppil* Günther, 1866  
*Girardinus reticulatus* (Peters, 1859)  
*Haridichthys reticulatus* (Peters, 1859)  
*Heterandria guppyi* (Günther, 1866)  
*Lebistes poecilioides* De Filippi, 1861  
*Lebistes poecilioides* De Filippi, 1861  
*Lebistes reticulatus* (Peters, 1859)  
*Poecilia reticulatus* Peters, 1859  
*Poecilioides reticulatus* (Peters, 1859)”

“International Common Names

English: barbados millions; guppies; million fish; millions; millions fish; rainbow fish”

From Nico et al. (2018):

“Some fish reported from the United States as *P. reticulata* actually may represent other species in the genus. In 1989, M. Rauchenberger (personal communication) examined the *P. reticulata* voucher specimens (UF 91918) taken from Kelly Warm Springs, Wyoming, in 1984 by Courtenay et al. (1987), but she could not confirm that identification and labeled them as *Poecilia* species. In light of the enormous numbers of guppies produced in aquaculture each year and its prevalence in pet stores and the aquarium hobby, it is surprising that so few established populations exist. The guppy is known to require warm water to thrive, which may explain its inability to establish throughout most of the continental U.S. but other factors, presently unknown, must limit its distribution in suitable locations such as southern Florida.”

## 2 Biology and Ecology

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### 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 Cyprinodontiformes  
Suborder Cyprinodontoidei  
Family Poeciliidae  
Subfamily Poeciliinae  
Genus *Poecilia*  
Species *Poecilia reticulata* Peters, 1859”

“Taxonomic Status: valid”

## Size, Weight, and Age Range

From Froese and Pauly (2017):

“Max length : 5.0 cm SL male/unsexed; [Kottelat and Freyhof 2007]; 6.0 cm SL (female);  
common length : 2.8 cm TL male/unsexed; [Hugg 1996]”

“Males mature at 2 months and females at 3 months of age [Riehl and Baensch 1991].”

## Environment

From Froese and Pauly (2017):

“Freshwater; brackish; benthopelagic; pH range: 7.0 - 8.0; dH range: 9 - 19; non-migratory.”

From CABI (2018):

“*P. reticulata* can live and breed in pH of 5-9 and salinities ranging from 0 to 45 ppt. However, *P. reticulata* cannot tolerate water temperatures below 15°C, and is only found in temperate regions in artificially warmed water bodies, for example at cooling lakes of power stations. Critical thermal maxima ranging of 39-41°C and death points of 41-43°C were reported by Chung (2004) for Venezuelan guppies.”

## Climate/Range

From Froese and Pauly (2017):

“Tropical;[...]; 14°N - 2°N, 67°W - 52°W”

## Distribution Outside the United States

### Native

From Froese and Pauly (2017):

“South America: Venezuela, Barbados, Trinidad, northern Brazil and the Guyanas.”

From CABI (2018):

“*P. reticulata* is native to Trinidad and Tobago and parts of South America including Venezuela, Guyana, Surinam (Farr, 1975). It also occurs in Antigua and Barbuda, Barbados, Brazil, Guyana, Netherlands Antilles, and the US Virgin Islands (Kenny, 1995), and it has been found in Barbados, Cuba and Grenada (Magurran, 2005), but it is not certain whether the species naturally colonised these regions or was introduced.”

### Introduced

From Froese and Pauly (2017):

“Year / Period	From	To	Established	Ecol. effects
unknown	Unknown	Zambia	established	
unknown	Unknown	Mauritius	unknown	
unknown	Unknown	Martinique	established	
unknown	Venezuela	Malaysia	established	
unknown	Singapore	Malaysia	established	
unknown	Brazil	Malaysia	established	
unknown	Unknown	Madagascar	established	
unknown	Unknown	Laos	not established	unknown
unknown	South America	Japan	established	unknown
unknown	Unknown	Jamaica	established	
unknown	Unknown	central Italy	established	
unknown	Unknown	Hong Kong	established	probably some
unknown	Unknown	Guam	established	
unknown	Unknown	French Polynesia	established	
unknown	Unknown	Namibia	established	unknown
unknown	Unknown	Netherlands	established	
unknown	Unknown	New Caledonia	probably established	
unknown	Unknown	Western Samoa	established	
unknown	unknown	United Arab Emirates	established	unknown
unknown	Unknown	Spain	established	
unknown	Unknown	South Africa	established	
unknown	Unknown	Slovakia	probably established	
unknown	Unknown	Seychelles	probably established	no data
unknown	unknown	Saudi Arabia	established	unknown

<b>“Year / Period</b>	<b>From</b>	<b>To</b>	<b>Established</b>	<b>Ecol. effects</b>
unknown	Venezuela	Reunion	established	unknown
unknown	Unknown	East Timor	established	
unknown	Unknown	Palau	established	
unknown	Unknown	Vanuatu	probably established	
unknown	Unknown	New Zealand	established	
unknown	unknown	Vanuatu	unknown	unknown
unknown	Unknown	Tahiti	established	
unknown	Unknown	Fiji	established	
unknown	Unknown	Czech Republic	probably established	
unknown	Unknown	Russia	established	unknown
unknown	Unknown	Albania	probably established	unknown
unknown	Unknown	Béni Abbès	not established	
unknown	Unknown	Australia	established	probably some
unknown	Unknown	Taiwan	established	
Unknown	Unknown	Comoros	Yes	
unknown	Unknown	Cook Islands	established	
unknown	Venezuela	Costa Rica	established	
unknown	Unknown	Cuba	established	
1930 - 1939	Unknown	Sri Lanka	established	
1960 - 1969	Unknown	Canada	not established	
1905	Hawaii	Philippines	established	some
1908	South America	India	established	probably none
1920	Unknown	Indonesia	established	some
1922	South America	USA	established	probably some
1922	Unknown	Hawaii	established	
1924	Germany?	Hungary	established	unknown
1935	Central America	Puerto Rico	established	
1937	South America	Singapore	established	probably some
1940	Unknown	Colombia	established	
1940	Central America	Peru	established	
1950	USA	Uganda	established	probably some
1950	Uganda	Kenya	established	
1957	Thailand	Bangladesh	unknown	
1960	Singapore	Thailand	established	
1963	Unknown	UK	probably not established	
1967	Unknown	Papua New Guinea	established	some
1971	Unknown	Mexico	established	
1972	UK	Nigeria	probably not established	

<b>“Year / Period</b>	<b>From</b>	<b>To</b>	<b>Established</b>	<b>Ecol. effects</b>
1977	Dominican Republic	Haiti	unknown	no data
1984	Unknown	Malawi	probably not established	probably none”

## Means of Introduction Outside the United States

From CABI (2018):

“*P. reticulata* has been widely introduced throughout temperate and tropical regions since the early 1900s (Welcomme, 1992). Initial introductions of *P. reticulata* were conducted as a means of mosquito control in Asia, the Pacific, Africa, and Europe [...] It is likely that *P. reticulata* has been introduced into many countries via accidental or intentional release of aquarium fish into waterways and many introduced populations have become established.”

## Short Description

From Froese and Pauly (2017):

“Dorsal spines (total): 0; Dorsal soft rays (total): 7-8; Anal spines: 0; Anal soft rays: 8 - 10”

From CABI (2018):

“*P. reticulata* belongs to the poeciliids, a group of small freshwater fishes with internal fertilisation and viviparous reproduction. *P. reticulata* has clear sexual dimorphism. Males are 25-35 mm (SL) and have conspicuous polymorphic colour patterns consisting of combinations of black, white, red-orange, yellow, green, iridescent spots, lines and speckles. Males have a gonopodium; a slender, modified anal fin used as an intromittent organ, whereas the anal fin of females is rounded. Females are uniform silver grey, and are larger and deeper bodied than males (40-60 mm SL). Juvenile fish resemble females, and are independent from birth.”

## Biology

From Froese and Pauly (2017):

“Inhabits warm springs and their effluents, weedy ditches and canals [Page and Burr 1991]. Found in various habitats, ranging from highly turbid water in ponds, canals and ditches at low elevations to pristine mountain streams at high elevations [Kenny 1995]. Occurs in wide variety of habitats with low predation pressure, usually in very small streams and densely vegetated lakes and springs [Kottelat and Freyhof 2007]. [...] Feeds on zooplankton, small insects and detritus.”

“Males are about half the size of females with colorful tail and caudal fin; the anal fin is transformed into a gonopodium for internal fertilization. Males are continuously chasing and mating females. Females can store sperms for later fertilization and may produce young every four weeks. Pregnant females are recognizable by black triangle between anal and pelvic fins.

After a gestation period of four to six weeks females give birth to 20-40 live young. No parental care is exercised and parents may even prey on their young.”

From CABI (2018):

“*P. reticulata* is omnivorous; feeding on algae (approximately 50% of the wild diet), invertebrate larvae and benthic detritus (Dussault and Kramer, 1981). Within their natural range they may also prey on larvae of their own species and of *Rivulus hartii* (Houde, 1997). Experimental captive trials have found that the closely related *Gambusia holbrooki* preys on a wide range of larvae of other fish species from areas into which *P. reticulata* has also been introduced (Howe et al., 1997), suggesting that *P. reticulata* may also prey on these species.”

“Females continue to reproduce to 20-34 months old, and there is no significant period of reproductive senescence.”

## **Human Uses**

From Froese and Pauly (2015):

“Fisheries: of no interest; aquarium: commercial”

From CABI (2018):

### **“Economic Value**

*P. reticulata* has considerable economic value as an ornamental aquarium species, and is widely cultured in commercial fish hatcheries. A number of highly ornamented aquarium strains have been developed, and are extremely popular in the retail aquarium trade, being carried by up to 95% of pet shops in one region of Canada. Major producers include Singapore, Malaysia and Taiwan.”

### **“Social Benefit**

*P. reticulata* is one of the most popular aquarium fishes, and has been in the ornamental fish hobby since the early 1900s. It has high recreational and aesthetic value in captivity, but has little or no social benefit in its feral state and is not suitable for recreational fishing.”

### **“Environmental Services**

While initially thought to be a good candidate for mosquito control, *P. reticulata* has had mixed success in controlling mosquito populations (Juliano et al., 1989; Castleberry and Cech, 1990).”

## **Diseases**

From Froese and Pauly (2017):

“*Aonthea* Infestation, Parasitic infestations (protozoa, worms, etc.)”

“*Camallanus* Infection 12, Parasitic infestations (protozoa, worms, etc.)”

“Columnaris Disease (e.), Bacterial diseases”

“Columnaris Disease (l.), Bacterial diseases”

“*Cryptobia* Infestation, Parasitic infestations (protozoa, worms, etc.)”



“*Eustrongylides* Infestation 2 (Larvae), Parasitic infestations (protozoa, worms, etc.)”  
“Fin Rot (early stage), Bacterial diseases”  
“Fin-rot Disease (late stage), Bacterial diseases”  
“Fish tuberculosis (FishMB), Bacterial diseases”  
“*Ichthyobodo* Infection, Parasitic infestations (protozoa, worms, etc.)”  
“*Lernaea* Infestation, Parasitic infestations (protozoa, worms, etc.)”  
“Nematode Infestation, Parasitic infestations (protozoa, worms, etc.)”  
“Skin Flukes, Parasitic infestations (protozoa, worms, etc.)”  
“Skin Fungi (*Saprolegnia* sp.), Fungal diseases”  
“*Tetrahymena* Disease, Parasitic infestations (protozoa, worms, etc.)”  
“White spot Disease, Parasitic infestations (protozoa, worms, etc.)”

From Tavakol et al. (2017):

“[...] the invasive Asian nematode, *Camallanus cotti* Fujita, 1927 (Nematoda: Camallanidae), is reported from the guppy (*Poecilia reticulata*) for the first time in Africa. This parasite is assumed to be introduced into Africa along with the introduction of exotic poeciliid fishes, which are known to be the most common hosts of *C. cotti* in ornamental fish industry worldwide.”

From Vincent and Font (2003):

“Two of the most important freshwater helminths present in Hawaiian streams are *Camallanus cotti* Fujita, 1927 and *Bothriocephalus acheilognathi* Yamaguti, 1934. This roundworm and tapeworm have been introduced into the Hawaiian Islands indirectly through the purposeful introduction of exotic poeciliids for mosquito control and accidentally through unwanted aquarium releases (Devick, 1991; Font and Tate, 1994).”

From Harris and Lyles (1992):

“Two species of *Gyrodactylus* have been reported (Harris, 1986) from guppies in aquaria: *Gyrodactylus bullatarudis* Tumrnbull, 1956, and *Gyrodactylus turnbulli* Harris, 1986, collected from guppies imported into Britain from Singapore.”

From Paperna et al. (2001):

“Systemic iridovirus-like infections have been reported from several exotic ornamental fish [including] in guppy *Poecilia reticulata* and doctor fish *Labroides dimidatus* in the USA, both South East Asian imports (Hedrick & McDowell 1995).”

From Crane and Eaton (1997):

“With regard to the host range, it is noteworthy that the name spring viraemia of carp is misleading. It is generally accepted, if not proven yet, that most if not all cyprinid species are likely to be affected to a lesser or greater degree. In addition, some non-cyprinid fish species such as [...] the poeciliid guppy, *Lebistes reticulatus* (Bachmann and Ahne 1974) [...] are also susceptible to infection and succumb to disease [...]”

**Spring viraemia of carp is an OIE-reportable disease.**

## **Threat to Humans**

From Froese and Pauly (2017):

“Potential pest”

## **3 Impacts of Introductions**

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From Nico et al. (2018):

“The guppy is considered a threat to native cyprinids and killifishes (Sigler and Sigler 1987). For instance, it has adversely affected the White River springfish, *Crenichthys baileyi*, in a Nevada spring (Deacon et al. 1964). Two subspecies of this springfish are now listed as federally endangered (U.S. Fish and Wildlife Service 1993), and three others are proposed for listing (U.S. Fish and Wildlife Service 1994). The guppy has also been implicated in the decline of the Utah sucker, *Catostomus ardens*, in a thermal spring in Wyoming (Courtenay et al. 1987). The guppy has become the dominant species in some warm water springs in the west (Courtenay, personal communication). Courtenay and Meffe (1989) summarized the effect of this species on native fishes. This species also presents a threat because it is a known carrier of certain exotic trematode parasites (Leberg and Vrijenhoek 1994).”

“Guppies, and other introduced poeciliids, have been implicated in the decline of native damselflies on Oahu, Hawaii. The distributions of the damselflies and introduced fishes were often found to be mutually exclusive, probably resulting from predation by the fish on the insects (Englund 1999).”

From GISD (2006):

“It eats the eggs of native fish species and acts as a host for the parasitic nematode *Camallanus cotti*, and the Asian tapeworm *Bothriocephalus acheilognathi* in Hawaii (Eldredge, 2000).”

“Hybrids between *P. reticulata* and *P. mexicana* and between *P. reticulata* and *Xiphophorus helleri* are shown to threaten species of native fish in the western USA (Courtenay and Meffe, 1989 in Eldredge, 2000).”

From Valero et al. (2008):

“Persistent courtship by male Trinidadian guppies (*Poecilia reticulata*) is costly for conspecific females. Since male guppies are known to attempt matings with other poeciliid females, we asked whether persistent courtship is also directed towards morphologically similar but phylogenetically distant females encountered following invasion. *Skiffia bilineata* is one of several endangered viviparous goodeids from Central México, whose remaining habitats are increasingly shared with invasive guppies. Experiments in which guppy sex ratios were manipulated to vary the proportion of heterospecific to conspecific females showed that male

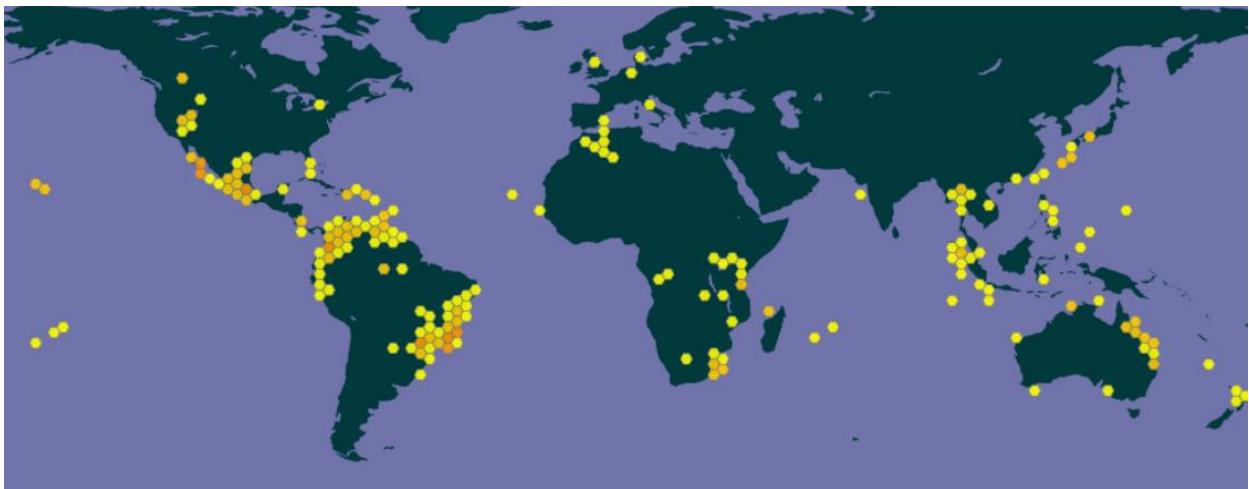
guppies courted and attempted forced copulations with *S. bilineata* females even when females of their own species were in excess. This behaviour places an additional, and previously unrecognized, burden on a group of endemic Mexican fishes already in risk of extinction.”

From Bambaradeniya (2002):

“The Guppy (*Poecilia reticulata*), which is a prolific breeder distributed in aquatic habitats throughout Sri Lanka, has been observed to feed on the eggs of native amphibians (de Silva, 1996).”

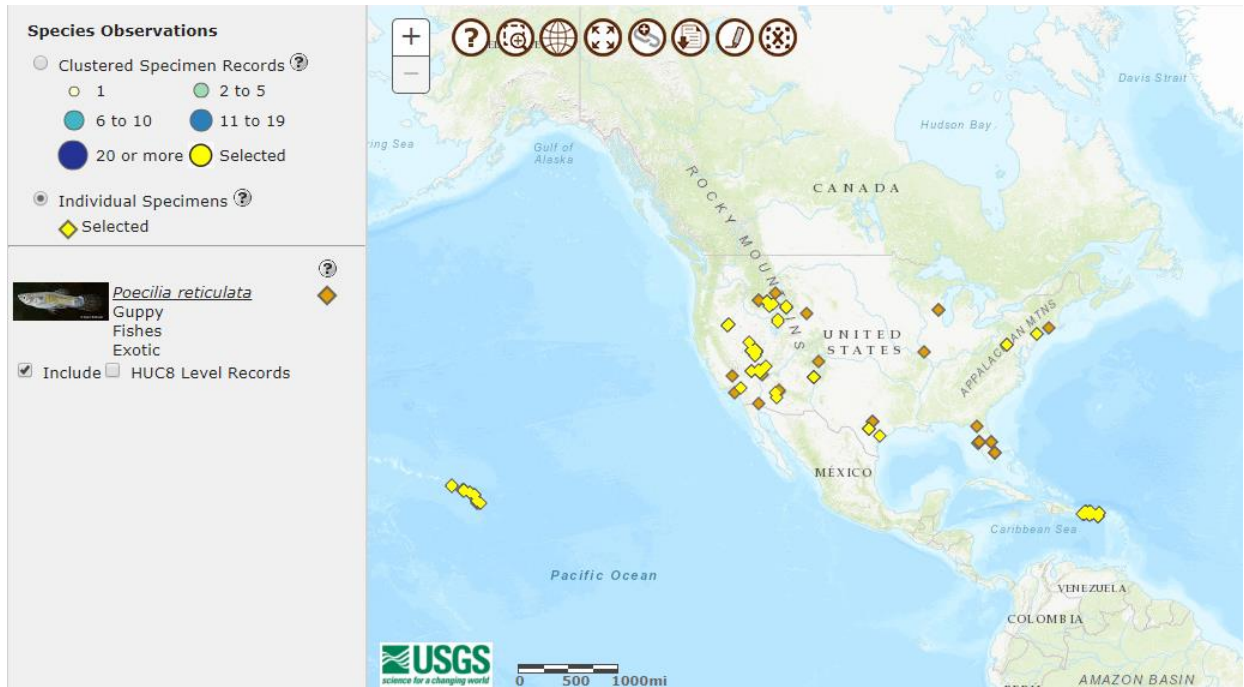
## 4 Global Distribution

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**Figure 1.** Reported global distribution of *Poecilia reticulata*. Map from GBIF Secretariat (2017). Points in Algeria, Canada, Cape Verde, Democratic Republic of the Congo, Denmark, Ecuador, Germany, Malawi, Mauritius, Morocco, Myanmar, Paraguay, Republic of the Congo, Senegal, Tanzania, United Kingdom, Vietnam were not included in the climate matching analysis because these points do not represent known established populations of *P. reticulata* (see Distribution Outside the United States). Furthermore, most points in the United States were not included in the climate matching analysis (see Figure 2 caption for more information).

## 5 Distribution within the United States

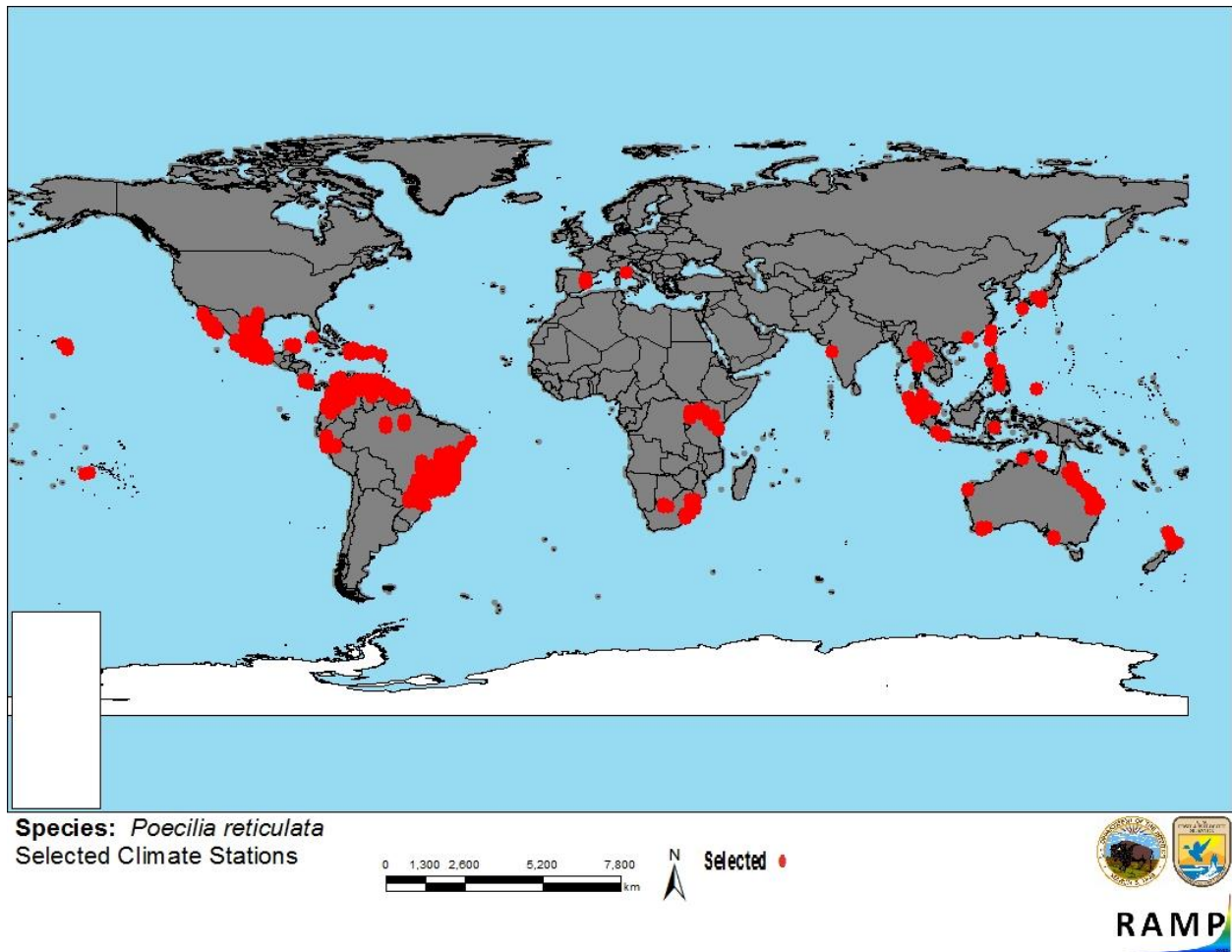


**Figure 2.** Reported distribution of *Poecilia reticulata* in the United States. Map from Nico et al. (2018). Yellow points represent established locations; orange points represent collection locations where the species is not established or establishment is uncertain. Only locations in Puerto Rico, Hawaii, and Texas were included in the climate matching analysis. In all other locations, *P. reticulata* is established in waters that are naturally or artificially warmed above ambient temperatures, so climate matching based on the weather stations near those locations would not accurately reflect the conditions in which *P. reticulata* is established.

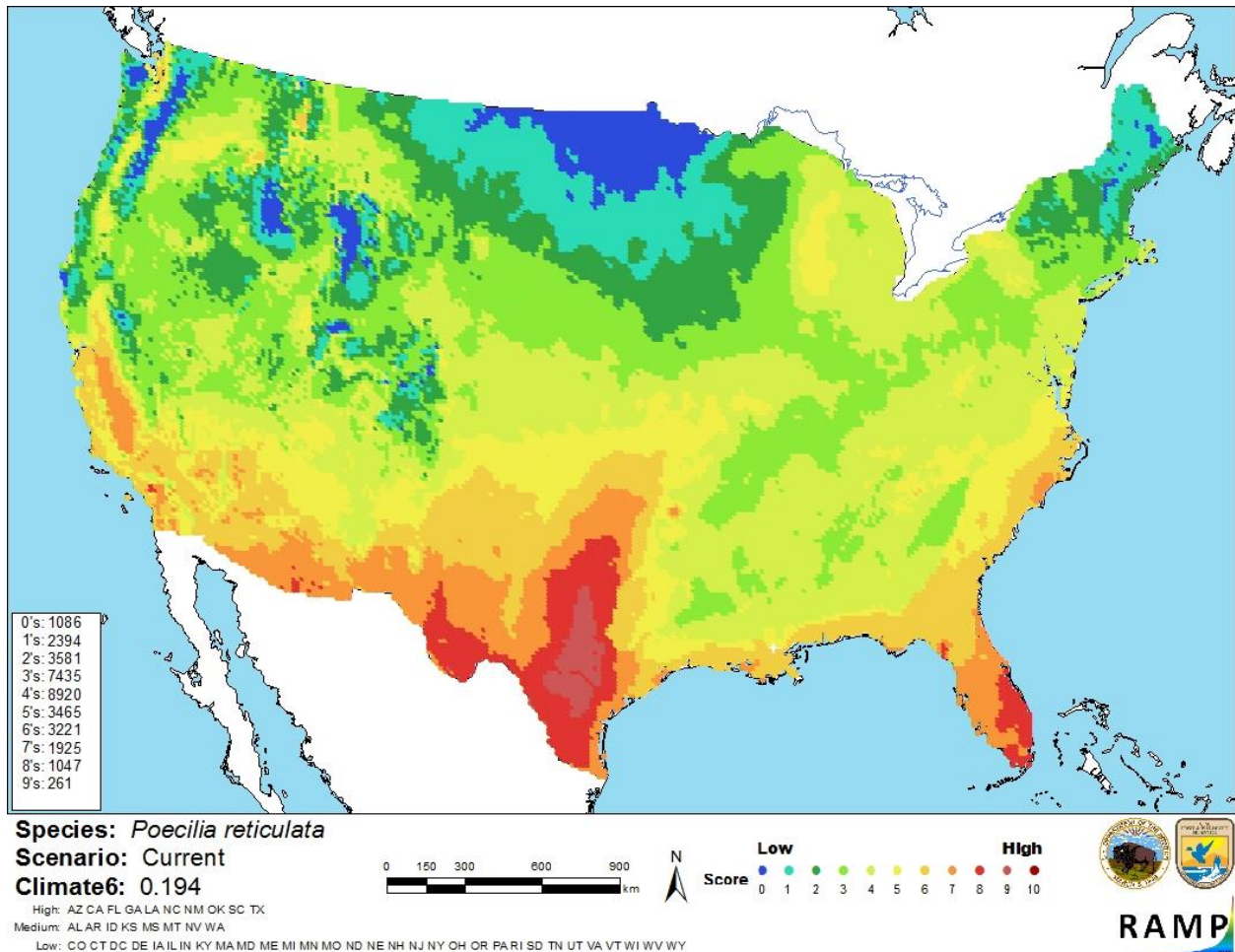
## 6 Climate Matching

### Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high in Texas and southeastern Florida. Medium climate matches were seen in the Southwest, California as far north as San Francisco, along the Atlantic Coast from Florida to North Carolina, and along the Gulf Coast. Low match was found in northern areas of the contiguous U.S. Climate 6 score indicated that the contiguous U.S. has a high climate match overall. The range of scores for a high climate match is 0.103 and greater; Climate 6 score of *Poecilia reticulata* was 0.194.



**Figure 3.** RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Poecilia reticulata* climate matching. Source locations from Froese and Pauly (2017), GBIF Secretariat (2017), and Nico et al. (2018).



**Figure 4.** Map of RAMP (Sanders et al. 2014) climate matches for *Poecilia reticulata* in the contiguous United States based on source locations reported by Froese and Pauly (2017), GBIF Secretariat (2017), and Nico et al. (2018). 0=Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

*P. reticulata* is a well-studied species. Negative impacts from introductions of this species are documented in the scientific literature, but somewhat sparse given the number of countries in which this species has become established. Certainty of this assessment is medium.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Poecilia reticulata* is a popular fish for aquaria and for research, and it was originally introduced to many countries as a method of mosquito control. Where introduced, *P. reticulata* has been documented to have adverse impacts on native fishes, amphibians, and invertebrates through competition, predation, and disease. *P. reticulata* is currently established numerous local warm springs in the western U.S., where it has been implicated in the decline of White River springfish (*Crenichthys baileyi*) and Utah sucker (*Catostomus ardens*). Climate match to the contiguous U.S. is high, with highest matches in Florida and Texas. However, other factors may be limiting risk of establishment in those States since *P. reticulata* is established in only one location in Texas, despite the species being one of the most widely traded species in the aquarium trade for more than a century. Overall risk posed by this species is characterized as high, particularly within thermal spring ecosystems supporting vulnerable fish assemblages.

### Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information: Carries the pathogen causing OIE-reportable Spring Viraemia of Carp.**
- **Overall Risk Assessment Category: High**

## 9 References

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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 10.**

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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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