

Sailfin Molly (*Poecilia latipinna*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2011

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Photo: Noel M. Burkhead, U.S. Geological Survey.

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2016):

“North America: Cape Fear drainage in North Carolina, USA to Veracruz, Mexico. [...] Gulf of Mexico [Smith 1997].”

Status in the United States

From Nico et al. (2017):

“**Nonindigenous Occurrences:** This species has been introduced into several areas of Arizona (Miller and Lowe 1967; Minckley 1973; Lee et al. 1980 et seq.); parts of southern California

(Shapovalov et al. 1959, 1981; St. Amant 1966; Minckley 1973; Mearns 1975; Moyle [1976]; Schoenherr 1979; Lee et al. 1980 et seq.; U.S. Fish and Wildlife Service 1983; Swift et al. 1993; Williams et al. 1998); waters in Conejos County, Colorado (Woodling 1985; Zuckerman and Behnke 1986); all major islands of Hawaii (Seale 1905; Van Dine 1907; Brock 1960; Maciolek 1984; Devick [1991]; Mundy 2005); Trudau Pond, Madison County, Montana (Holton 1990); several springs in Nevada (La Rivers 1962; Deacon et al. 1964; Hubbs and Deacon 1964; Bradley and Deacon 1967; Minckley 1973; Lee et al. 1980 et seq.; Courtenay and Deacon 1982; Deacon and Williams 1984; Vinyard 2001); Dona Ana County, New Mexico (Sublette et al. 1990); and spring-influenced headwaters in central Texas and the San Antonio River, Bexar County (Brown 1953; Hubbs et al. 1978; Hubbs et al. 1991). Recently (2007) reported from Puerto Rico.”

“**Status:** Established or locally established in Arizona (Minckley 1973), California (Swift et al. 1993), Colorado (Zuckerman and Behnke 1986), Montana (Holton 1990), Nevada (Deacon and Williams 1984), and Texas (Hubbs et al. 1991). Although established on most islands of Hawaii at one time (Devick [1991]), recent reports indicated the species may be disappearing in some localities (Yamamoto and Tagawa 2000; Mundy 2005).”

Means of Introductions in the United States

From Nico et al. (2017):

“In most areas this species probably was introduced by way of aquarium releases. It was first brought to Hawaii from Texas in 1905 to test its effectiveness in controlling mosquitoes (Seale 1905; Van Dine 1907; Brock 1960). A failure in Hawaii at mosquito control, this fish has on occasion been used as a tuna baitfish in that state.”

“The sailfin molly has been stocked for mosquito control, even though it is largely or completely herbivorous (Courtenay and Meffe 1989).”

Remarks

From Nico et al. (2017):

“Records of this species in a few areas apparently are based on reports of the black molly, a hybrid, and not pure *P. latipinna* (Courtenay and Meffe 1989). Wischnath (1993) stated that U.S. commercial breeders have released various domestically bred forms, including *P. latipinna* hybrids, into natural waters. Contrary to Brown (1953) and Hubbs et al. (1991), Lee et al. (1980 et seq.) argued that *P. latipinna* found in inland waters of Texas were native. Improperly citing Van Dine (1907), Kanayama (1968) incorrectly used the name *Mollienesia latipes* for the species introduced to Hawaii.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2017):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Acanthopterygii
Order Cyprinodontiformes
Suborder Cyprinodontoidei
Family Poeciliidae
Subfamily Poeciliinae
Genus *Poecilia*
Species *Poecilia latipinna* (Lesueur, 1821)”

“Taxonomic Status: valid”

Size, Weight, and Age Range

From Froese and Pauly (2016):

“Maturity: Lm ? range ? - ? cm
Max length : 15.0 cm TL male/unsexed; [Page and Burr 1991]; 10.0 cm TL (female); common length : 3.4 cm TL male/unsexed; [Hugg 1996]”

From CABI (2017):

“The lifespan of *P. latipinna* is short, particularly in the case of the males, which may live less than one year once sexually mature (Robins, 2014). *P. latipinna* may mature and reproduce within one year under favourable environmental conditions.”

Environment

From Froese and Pauly (2016):

“Marine; freshwater; brackish; benthopelagic; non-migratory; depth range 0 - ? m [Florida Museum of Natural History 2005].”

From CABI (2017):

“*P. latipinna* is euryhaline and occurs in salinities from freshwater to hypersaline conditions (i.e. 95 ppt) (Gonzalez et al., 2005; Kumaraguru et al., 2005; Robbins, 2005; Bac[h]man and Rand, 2008; Hussain et al., 2009; Robins, 2014). [...] Fish at different life stages appear to have differing salinity preferences. Kumaraguru et al. (2005) found that fry production was highest at 25 ppt and the highest growth of recruits was at 10 ppt. While tolerant of a wide range of salinities, acute salinity changes may increase mortality in natural populations.”

“*P. latipinna* is tolerant of low oxygen levels and is able to utilize the oxygen rich layer directly under the water surface with their superior (i.e. upturned) mouth (USGS NAS, 2014; Robins, 2014). The species may become acclimated to hypoxic conditions, with dissolved oxygen concentrations as low as 1 mg per liter (Timmerman and Chapman, 2004).”

From CABI (2017):

“Hussain et al. (2009) recorded monthly environmental data at Al-Hammar Marsh, Iraq with water temperatures ranging from approximately 12.5-29°C at *P. latipinna* collection sites. Fischer and Schlupp (2009) tested the upper and lower critical thermal tolerance limits of *P. latipinna* in the laboratory and recorded minima and maxima of approximately 6°C and 40°C, respectively. These authors noted that the collection sites for the specimens utilized in this research (i.e. Guadalupe River Basin, Texas) do experience such low temperatures suggesting that the species does survive similarly low temperatures in natural environments.”

Climate/Range

From Froese and Pauly (2016):

“Subtropical; [...] 40°N - 16°N, 103°W - 76°W [Florida Museum of Natural History 2005]”

Distribution Outside the United States

Native

From Froese and Pauly (2016):

“North America: Cape Fear drainage in North Carolina, USA to Veracruz, Mexico. [...] Gulf of Mexico [Smith 1997].”

Introduced

Froese and Pauly (2016) report *P. latipinna* as “established” in Saudi Arabia, New Zealand, Kenya, Guam, Colombia, Bahamas, Philippines, Canada, and Australia. *P. latipinna* is reported as “probably established” in Oman, Indonesia, and Singapore.

From CABI (2017):

“Found in the lower reaches and river mouths over the southwestern part of Taiwan”

“Kenya [...] Found in the lower reaches of the Athi-Galana-Sabaki river system”

“Confined to hot springs in Banff National Park, Alberta.”

“New Zealand [...] Introduced to geothermal wetlands at southern end of Lake Taupo”

“*P. latipinna* has been introduced to a number of countries in the Middle East. The species appears to be established in the Al-Hammar Marsh in Iraq though was only collected in one of twelve sampling events (Hussain et al., 2009). In Oman, the species is present in the estuaries in the Gulf of Oman though no further information is available (Randall, 1995; Froese and Pauly, 2014). *P. latipinna* is established in the Wadi Haneefah stream, Riyadh, Saudi Arabia since 2003 (Al-Kahem et al., 2007).”

Means of Introduction Outside the United States

From CABI (2017):

“Natural Dispersal

Further spread of *P. latipinna* by natural dispersal may occur (e.g. flooding), though is most likely in areas with substantial populations. However, *P. latipinna* only inhabits lentic or slow flowing lotic environments; rapidly flowing or highly variable lotic environments may inhibit the species establishment or population growth, a phenomenon that has been observed in other nonindigenous Poeciliid populations, e.g. *Gambusia* species (Pen and Potter, 1991).”

“Accidental Introduction

Magalhães and Jacobi (2008) suggested that commercially important ornamental species, including *P. latipinna*, may be accidentally released from outdoor aquaculture ponds during drainage and/or flood events in the state of Minas Gerais, Brazil.”

“Intentional Introduction

P. latipinna may be intentionally introduced to aquatic habitats as unwanted ornamental fishes and possibly as a mosquito biocontrol agent.”

Short Description

From Froese and Pauly (2016):

“The large sail-like dorsal fin of the male is the most distinctive characteristic of this fish; coloration can vary from green, gray to jet black; speckled forms also common [Yamamoto and Tagawa 2000].”

Biology

From Froese and Pauly (2016):

“Found in still or gently flowing warm water of small creeks and drains [Allen et al. 2002]. Occurs in ponds, lakes, sloughs, and quiet, often vegetated, backwaters and pools of streams [Page and Burr 1991] and also in coastal waters [Robins and Ray 1986]. Abundant in tidal

ditches and brackish canals. Feeds mainly on algae [Robins and Ray 1986; Yamamoto and Tagawa 2000], also consumes animal material: rotifers, small crustaceans (such as copepods and ostracods) and aquatic insects [Hassan-Williams et al. 2007].”

From CABI (2017):

“The large dorsal fin of male fish plays a role in female mate choice (Robins, 2014). There is rudimentary courtship behaviour where the male displays swimming motions and fin postures (Farr, 1989). Fertilisation is internal and the male's gonopodium, a modified anal fin, transfers sperm into the female. Females may store sperm and produce subsequent broods independently of male fish (Farr and Travis, 1986). A study by Girndt et al. (2012) found that more than 70% of broods were sired by at least two males.”

“Brood size and gestation period are variable and influenced by genetic, environmental and social factors. *P. latipinna* produces broods of 10 to between 100-300 young; though a more conservative maxima may be between 100-140 young (Wischnath, 1993; Yamamoto and Tagawa, 2000; Froese and Pauly, 2014; Robins, 2014). Brood size is correlated with female standard length, with larger fish producing larger broods (Girndt et al., 2012). [...] The gestation period is approximately three to four weeks and females may give birth on multiple occasions throughout the year, approximately eight to 10 weeks apart, depending upon environmental conditions (Wischnath, 1993; Yamamoto and Tagawa, 2000; Robins, 2014).”

“Sex ratios of broods are balanced though adult populations are usually female biased (Hubbs and Schlupp; 2008; Robins, 2014).”

“The predominantly herbivorous diet of *P. latipinna* includes dietary food items that are unlikely to be resource limited, though may be of low nutritional quality.”

Human Uses

From Froese and Pauly (2016):

“Aquarium: highly commercial”

From CABI (2017):

“Al-Akel et al. (2010) stated that *P. latipinna* is harvested for human consumption, however no further details are given. *P. latipinna* is also utilized as a biological research model in many disciplines including genetics, ecology and biochemistry (Yang et al., 2009).”

Diseases

From Froese and Pauly (2016):

“*Transversotrema* Infestation [...] *Procerovum* Infestation 1 [...] *Procerovum* Infestation 2 [...] *Capillaria* Infestation 5”

From CABI (2017):

“*P. latipinna* is parasitized by the haploplorid trematode, *Saccocoelioides sogandaresi* (Robins, 2014). A study by Tobler et al. (2005) identified a number of parasites from *P. latipinna*. The most prevalent of these include species of *Ambiphyta*, *Oodinium* and *Trichodina*.”

From Bailly (2015):

“*Ergasilus funduli* Krøyer, 1863 (parasitic: ectoparasitic)
Ichthyobodo necator (Henneguy, 1883) Pinto, 1928 (parasite)
Ichthyophthirius multifiliis Fouquet, 1876 (parasite)”

From Nolan et al. (2015):

“Members of the genus *Megalocytivirus* cause severe systemic disease with characteristic inclusion bodies seen in both freshwater and marine fish (Hyatt & Chinchar 2008). *Megalocytivirus* is a genus within the family *Iridoviridae* which also includes the genera *Iridovirus*, *Chloriridovirus*, *Lymphocystivirus* and *Ranavirus* (Chinchar et al. 2005). [...] *Megalocytivirus* was reported in sailfin mollies *Poecilia latipinna* (Lesueur, 1821) [...] (Paperna, Vilenkin & De Matos 2001).”

Threat to Humans

From Froese and Pauly (2016):

“Potential pest”

3 Impacts of Introductions

From Nico et al. (2017):

“The sailfin molly is responsible for the decline of the desert pupfish *Cyprinodon macularius* in California (U.S. Fish and Wildlife Service 1983). Sigler and Sigler (1987) stated that the sailfin molly has probably impacted native species adversely.”

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

From CABI (2017):

“Juliano et al. (1989) stated that *P. latipinna* competes with the native milkfish, *Chanos chanos*, for food in the Philippines.”

From Lau and Boehm (1991):

“Matsui (1981) documented that Zill's cichlids and sailfin mollies interfered behaviorally with desert pupfish reproduction.”

4 Global Distribution

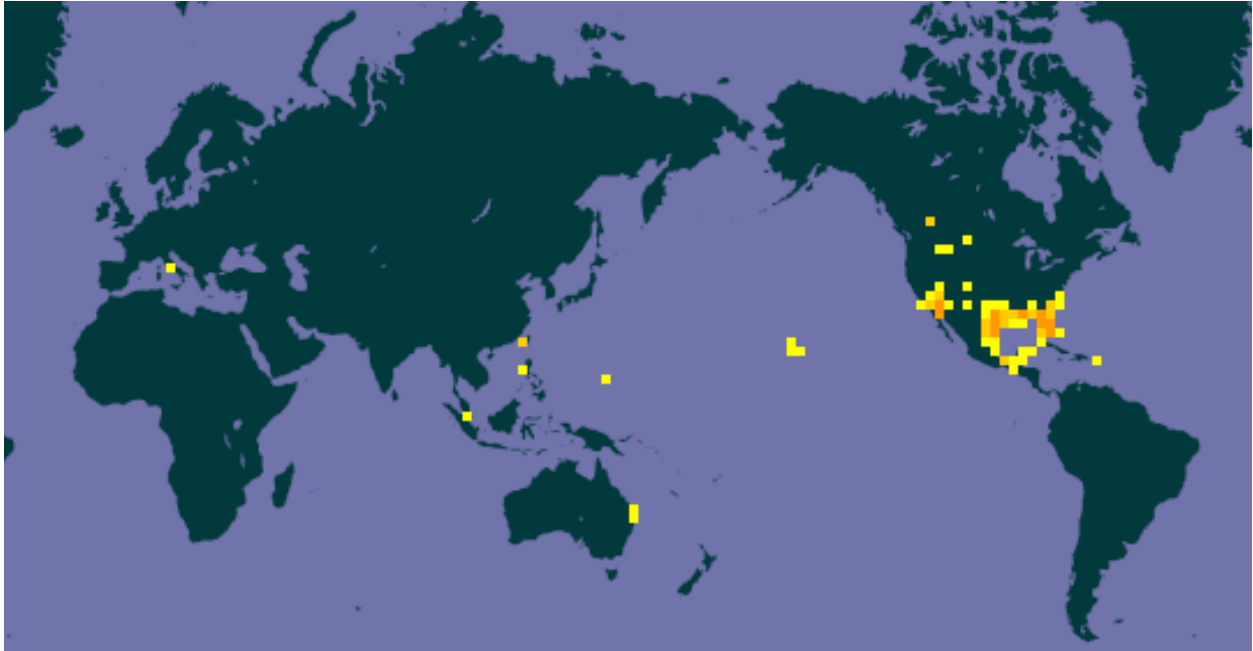


Figure 1. Map of known global distribution of *Poecilia latipinna*. Map from GBIF (2016). Point in Italy does not represent an established population and was excluded from climate matching. Point in Canada was excluded from climate matching as well; this established population exists in a hot spring environment that is substantially different from the environment represented by nearby climate stations.

5 Distribution Within the United States

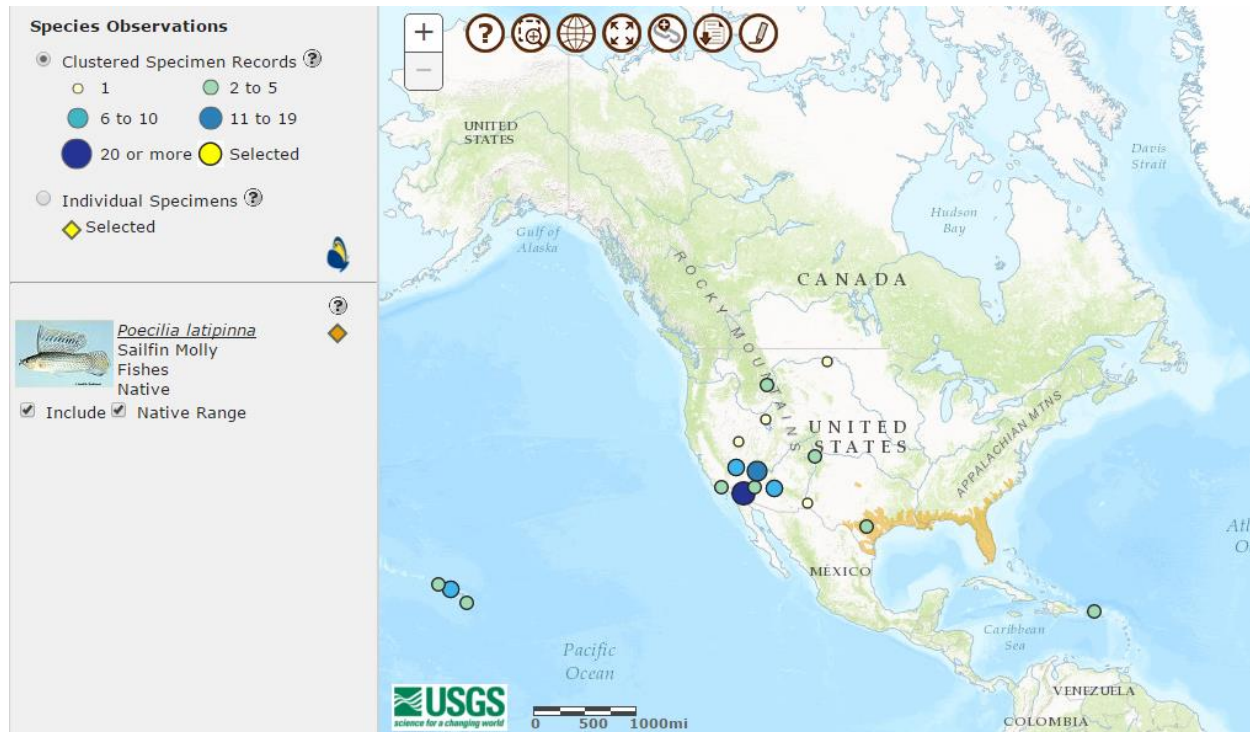


Figure 2. Known distribution of *Poecilia latipinna* in the U.S. Map from Nico et al. (2017).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high throughout the South and much of the West. Medium or low matches were found in the Northeast and eastern Great Lakes region, while the Pacific Northwest showed low match. Climate 6 proportion indicated that the U.S. was a high climate match overall. The range of proportions indicating a high climate match is 0.103 and greater; Climate 6 proportion of *Poecilia latipinna* is 0.762.

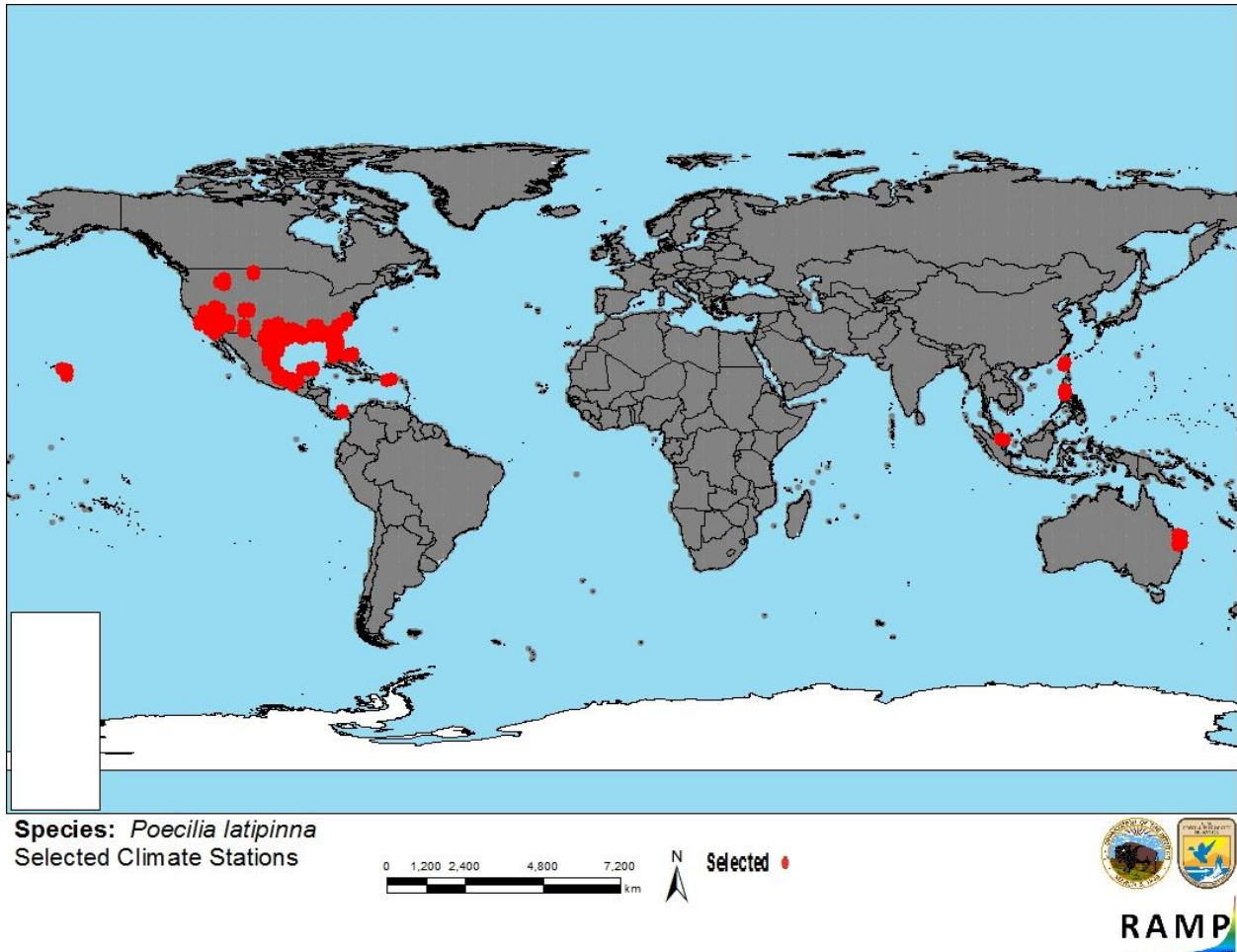


Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Poecilia latipinna* climate matching. Source locations from GBIF (2016).

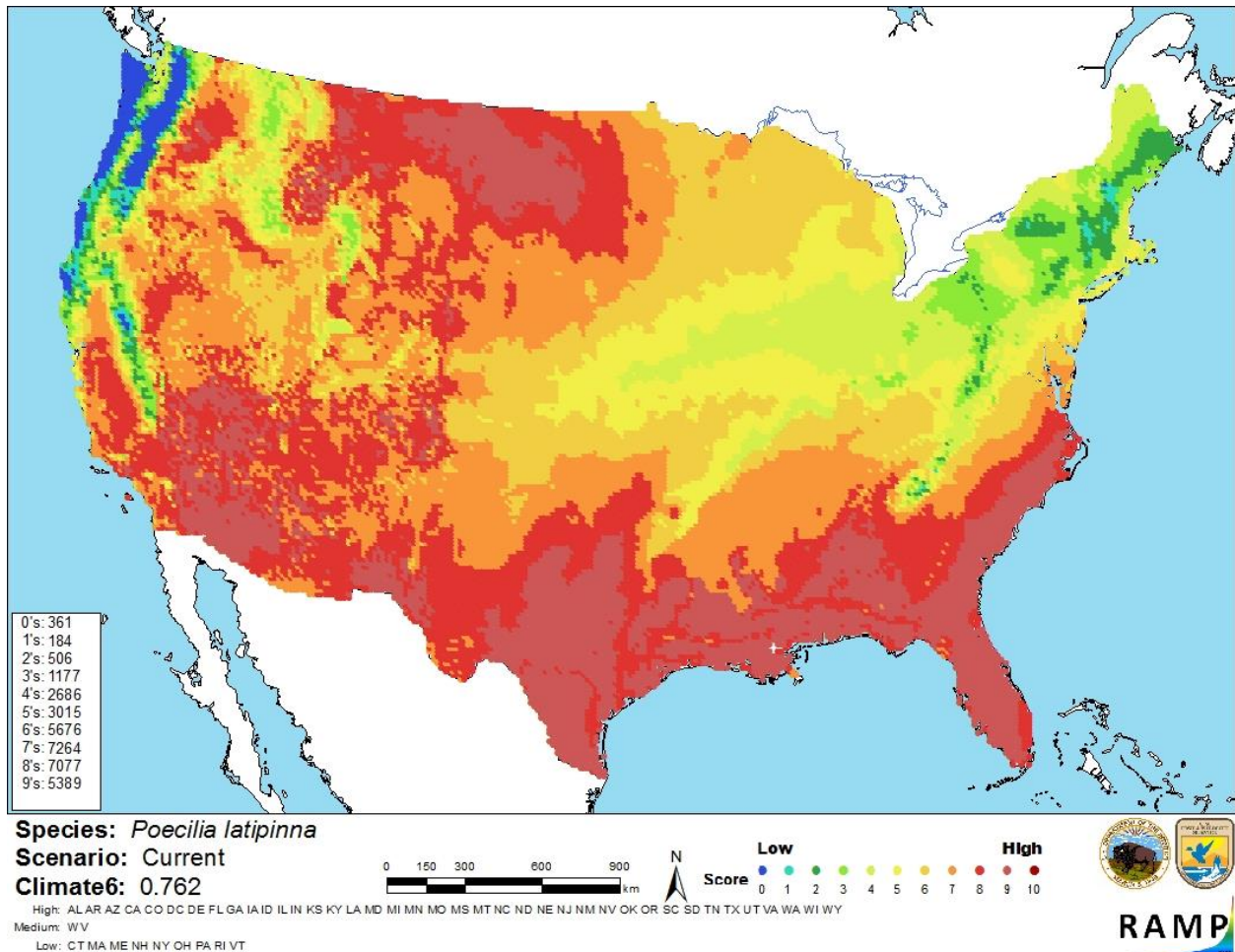


Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Poecilia latipinna* in the contiguous United States based on source locations reported by GBIF (2016). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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

7 Certainty of Assessment

The biology of *P. latipinna* is well-studied, and despite slight disagreement over the extent of the native range, the distribution of *P. latipinna* is well-documented. Negative impacts from introductions of this species are identified in the scientific literature, but more detailed studies of impacts would increase confidence in the risk assessment. Certainty of this assessment is medium.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Poecilia latipinna is native to the southeastern U.S. and has become established in numerous locations throughout the West and Hawaii. *P. latipinna* was shown to interfere with reproduction of an endangered species in the southwestern U.S., and to contribute to loss of damselflies from streams in Hawaii. It competes for food with a native fish species in the Philippines. Climate match to the contiguous U.S. is high. Overall risk posed by *P. latipinna* is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Overall Risk Assessment Category: High**

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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