

# Mexican Molly (*Poecilia sphenops*)

## Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011  
Revised, February 2018  
Web Version, 8/28/2019



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## 1 Native Range and Status in the United States

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### Native Range

From Froese and Pauly (2017):

“Central and South America: Mexico to Colombia.”

From Nico et al. (2018):

“Atlantic Slope of eastern Mexico from north of Veracruz City to Guatemala (Brett and Turner 1983; Miller 1983). Some authors state it ranges south to Colombia (Wischnath 1993) but that may be the result of taxonomic confusion.”

From Bagley et al. (2015):

“Whereas others have considered *P. sphenops* to meet its southern range limit in eastern Guatemala or western Honduras [Schultz and Miller 1971; Ptacek and Breden 1998; Miller 2005; Alda et al. 2013], our results suggest that its range [...] extends further south, terminating at the lake district of Nicaragua, in Lake Nicaragua and its northern tributaries [...].”

## Status in the United States

From Nico et al. (2018):

**“Nonindigenous Occurrences:** This species is known from the Salt River near its confluence with the Gila River, Arizona, in and around the Salton Sea and from the Santa Ana River in southern California (St. Amant and Hoover 1969; Lee et al. 1980 et seq.; Dill and Cordone 1997); unspecified area(s) of Florida (Courtenay et al. 1974); the Ruby River, Madison County, Montana (Lee et al. 1980 et seq.); and several springs and tributaries to Lake Mead, and the Las Vegas Wash, Meadow Valley Wash, and White River drainages, Nevada (W. Courtenay, personal communication, Scopettone 1993). Also found in several locations of Puerto Rico (Grana, personal communication).”

“Previously listed as established in Hawaii (Maciolek 1984); however, recent reports indicate those fish are actually hybrids (Mundy 2005 [...]).”

**“Status:** Locally established in Montana and Nevada; failed in Florida; reported from California and Arizona. Established in Puerto Rico.”

This species is in trade in the United States (see also “Remarks” and “Human Uses,” below, for discussion of hybrids and varieties of *P. sphenops* present in the aquarium trade).

From PetSmart (2018):

“Black Molly [...] \$2.49 [...] Scientific Name *Poecilia sphenops species*”

From LiveAquaria (2019):

“Gold Dust Molly  
(*Poecilia sphenops*) [...] \$ 3.19”

Chapman et al. (1993) report 314,900 individual *P. sphenops* imported into the United States in October 1992.

## Means of Introductions in the United States

From Nico et al. (2018):

“Introductions have resulted from escapes, intentional releases from fish farms, and releases by aquarists (Lee et al. 1980 et seq.; Dill and Cordone 1997).”

## Remarks

From Nico et al. (2018):

“Distinguishing characteristics were given by Miller (1983). However, there appears [*sic*] to be a good deal of confusion among species of shortfin mollies in the literature. [...] This species is part of the *P. sphenops* complex (Rosen and Bailey 1963; Schultz and Miller 1971; Brett and Turner 1983; Miller 1983). Formerly known as *Mollienesia sphenops*.”

“Some, conceivably all, of the records of this species in the United States may turn out to represent one of the other members of the *P. sphenops* species complex and not *P. sphenops*. For instance, the Hawaiian records of *P. sphenops* (Maciolek 1984) and that of *P. mexicana* (Devick 1991) are now considered the same fish (*Poecilia* sp.; Mundy 2005). Similarly, Schoenherr (1979) reported taking *P. sphenops* from a canal northwest of the Salton Sea in California; however, according to Dill and Cordone (1997), later authors questioned the identification and therefore did not include *P. sphenops* in their listings of California fishes (e.g., Hubbs et al. 1979; Shapovalov et al. 1981). At least five members of the *P. sphenops* species complex have been reported from the United States (Courtenay and Hensley 1979).”

From Animal-World (2015):

“Most mollies available [in the aquarium trade] today are selectively bred and are often hybrids. The fish we see are usually beyond the point of clearly belonging to any of the three original species [*P. latipinna*, *P. sphenops*, *P. velifera*].”

“The years of selective development of these three, however, has produced a myriad of fantastic colors and patterns. They range from the solid ebony of the Black Molly, to the orangey rusted speckles of the Sunburst Molly, and the spotted Silver Molly, to name just a few. The albino coloring comes from the "sailfin" species.”

“Most often the large-fin types are cross breeds of the Short-finned Molly *P. sphenops* and the Sailfin Molly *P. latipinna*. These cross breeds include the Lyretail, Moonfish, and Flag.”

## 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 sphenops*”

From Eschmeyer et al. (2018):

“Current status: Valid as *Poecilia sphenops* Valenciennes 1846. Poeciliidae: Poeciliinae.”

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

From Froese and Pauly (2017):

“Max length : 7.5 cm SL male/unsexed; [Velázquez-Velázquez et al. 2015]; common length : 4.0 cm TL male/unsexed; [Hugg 1996]”

From Nico et al. (2018):

“10 cm TL, but commonly smaller.”

## **Environment**

From Froese and Pauly (2017):

“Freshwater; brackish; benthopelagic; pH range: 7.5 - 8.2; dH range: 11 - 30; [...] 18°C - 28°C [Riehl and Baensch 1996; assumed to be recommended aquarium water temperatures]”

## **Climate/Range**

From Froese and Pauly (2017):

“Tropical; [...] 24°N - 1°S, 101°W - 69°W”

## **Distribution Outside the United States**

Native

From Froese and Pauly (2017):

“Central and South America: Mexico to Colombia.”

From Nico et al. (2018):

“Atlantic Slope of eastern Mexico from north of Veracruz City to Guatemala (Brett and Turner 1983; Miller 1983). Some authors state it ranges south to Colombia (Wischnath 1993) but that may be the result of taxonomic confusion.”

From Bagley et al. (2015):

“Whereas others have considered *P. sphenops* to meet its southern range limit in eastern Guatemala or western Honduras [Schultz and Miller 1971; Ptacek and Breden 1998; Miller 2005; Alda et al. 2013], our results suggest that its range [...] extends further south, terminating at the lake district of Nicaragua, in Lake Nicaragua and its northern tributaries [...].”

## Introduced

According to Froese and Pauly (2019), *P. sphenops* has been introduced to Trinidad, Spain, Slovakia, Singapore, Japan, Indonesia, Hungary, the Czech Republic, the Philippines, and Canada. Establishment is known for Trinidad, Singapore, Japan, and Hungary.

From Piazzini et al. (2010):

“During a survey on the distribution of *Melanopsis etrusca* (Brot 1862), a gastropod endemic to the thermal waters of southern Tuscany (Bodon et al. 2005), we discovered an ichthyofauna composed mainly of non-native tropical fishes [...] in a small stream, Fossa Calda (municipality of Campiglia Marittima, province of Livorno). Some species, [including] *Poecilia sphenops* Valenciennes 1846 [...] have never been reported established in Euro-Mediterranean natural freshwater environments (Kottelat and Freyhof 2007) [...] Two of these tropical species (*P. pardalis* and *P. sphenops*) were represented by sporadic specimens (2 of the former and 1 of the latter, respectively) [...].”

From Magalhães and Jacobi (2017):

“Although more than 50 non-native fish species are currently found in Brazilian headwater creeks (Bizerril, Lima, 2001; Magalhães, Jacobi, 2008), a group of seven poeciliids deserve special attention as a threat to native communities due to negative impacts such as changes in the structure of the native fish assemblages and biotic homogenization: [including] black molly *P. sphenops* Valenciennes in Cuvier, Valenciennes, 1846 [...].”

## Means of Introduction Outside the United States

From Amaoka et al. (2001):

“It is believed that small fish were introduced into this area [a drainage area of the hot spring at Kojyohama, Shiraoi-cho, Shiraoi-gun, southern Hokkaido, Japan] longer than 20 years ago to assist in reducing mosquito populations.”

From NIES (2018):

“Deliberate: As pet animal. Most of molly distributed as pet is black variety “black molly” [a selectively bred variety of *P. sphenops*], whereas the introduced population in Hokkaido is not this variety.”

From Magalhães and Jacobi (2017):

“[Poeciliids] all have been introduced into headwater creeks of the southeastern region mainly as by-products of aquaculture-related activities (Bizerril, Lima, 2001; Castellani, Barrella, 2006; Alves et al., 2007; Magalhães, Jacobi, 2008).”

## Short Description

From Headlie (2015):

“The wild variety of the common or short-finned molly [...] has dull silvery colouration, with dispersed black dots on its skin and a bright yellow fringe on the ends of its rounded dorsal and caudal fins. Individuals of this species exhibit wide ranges of colour variation that mainly incorporates silver, black and yellow-orange. The body is oblong with a round caudal peduncle and a small dorso-ventrally flattened head with protruding jaws that function as a scraping tool, ideal for rasping algae from benthic surfaces. Its mouth also possesses many rows of very small teeth, with the outer row being the largest and reducing in size with each successive row. *Poecilia sphenops* displays sexual dimorphism whereby males are smaller (8cm compared to 12cm of females) and more colourful, particularly males’ larger caudal fins (Mills and Vevers, 1982). Males also have a gonopodium (modified fin) to transfer sperm during mating.”

“Female *Poecilia sphenops* have a dark patch that appears between the abdomen and the anal fin (gravid spot) [...] which is present only when carrying young and forms as a result of dark tissue of the uterus pushing against the thin muscle wall of the abdomen (Seriously Fish, 2015).”

## Biology

From Headlie (2015):

“*Poecilia sphenops* inhabits mainly fresh water systems, in shallow areas, spending little time in coastal brackish waters (Wischnath, 1993) before returning to freshwater biotopes. [...] Anomalies have occurred, as it has been found living and breeding in coastal sea waters and brackish swamps. This is a reflection of the species’ exceptional success as generalist; hardy and highly adaptable. They mostly occur in schools under floating vegetation or near structures in the water (Maciolek, 2005). Being a tolerant species these mollies are able to exploit the thin film of oxygen rich surface water with their mouths, and can survive in oxygen-depleted habitats.”

“Fertilization occurs internally and is accomplished via highly modified anal fins of males called the gonopodium. *Poecilia sphenops* produce broods of 10-140 live young, the number of which produced depending on the maturity and size of the female (Seriously Fish, 2015). Gestation periods may vary between 3-4 weeks, depending upon temperature. In addition, females store

sperm and can give birth on multiple occasions throughout the year (Wischnath, 1993). The young mollies stay in schools (groups) of similarly-sized fish [...].”

## Human Uses

From Froese and Pauly (2017):

“Fisheries: of no interest; aquarium: highly commercial”

“The black variety (Black molly) [selectively bred variety of *P. sphenops*] is a very popular aquarium fish and is marketed throughout the world [Welcomme 1988].”

From Animal-World (2015):

“After the Molly was introduced to the hobby in 1899, the popularity of this fish grew very rapidly. The Common Molly *P. sphenops* and the Sailfin Molly *Poecilia latipinna* represented two basic types, distinguished by either short or long fins. A black variety of the Short-finned Molly *P. sphenops*, called the Black molly, is a very popular aquarium fish that is sold throughout the world.”

“Hybridized specimens began appearing as early as the 1920s. As Mollies rose in popularity, they were selectively bred to produce a multitude of strains with different fin shapes and color patterns. Wild fish are now more rare in the hobby, and most of the fish sold in aquarium stores are usually countless generations away from their wild-caught ancestors. A vast number of available Mollies are commercially bred in the Far East and Eastern Europe.”

This species is in trade in the United States.

From PetSmart (2018):

“Black Molly [...] \$2.49 [...] Scientific Name *Poecilia sphenops species*”

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Chapman et al. (1993) report 314,900 individual *P. sphenops* imported into the United States in October 1992.

## Diseases

No OIE-listed diseases (OIE 2019) have been documented for this species.

Poelen et al. (2014) lists the following as parasites of *Poecilia sphenops*: *Gyrodactylus bullatarudis*, *Valipora minuta*, *Glossocercus auritus*, *Dendrouterina papillifera*,

*Gyrodactylus costaricensis*, *Posthodiplostomum minimum*, and *Parvitaenia aurita* (Benesh et al. 2017, Smithsonian Institution, no date).

From Froese and Pauly (2017):

“Parasitic Copepod Infestation (general), Parasitic infestations (protozoa, worms, etc.)  
Capillaria Infestation 5, Parasitic infestations (protozoa, worms, etc.)”

### **Threat to Humans**

From Froese and Pauly (2017):

“Harmless”

## **3 Impacts of Introductions**

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From Nico et al. (2018):

“Introduced populations have adversely affected the Moapa dace *Moapa coriacea* and the White River springfish *Crenichthys baileyi* (both endangered species) and are a potential threat to other native fishes in the Pahrangat Valley, Nevada (Lee et al. 1980 et seq.). Scoppettone (1993) attributed the effects on the Moapa dace to be caused by *P. mexicana*, so the question of identity is raised again.”



## 4 Global Distribution

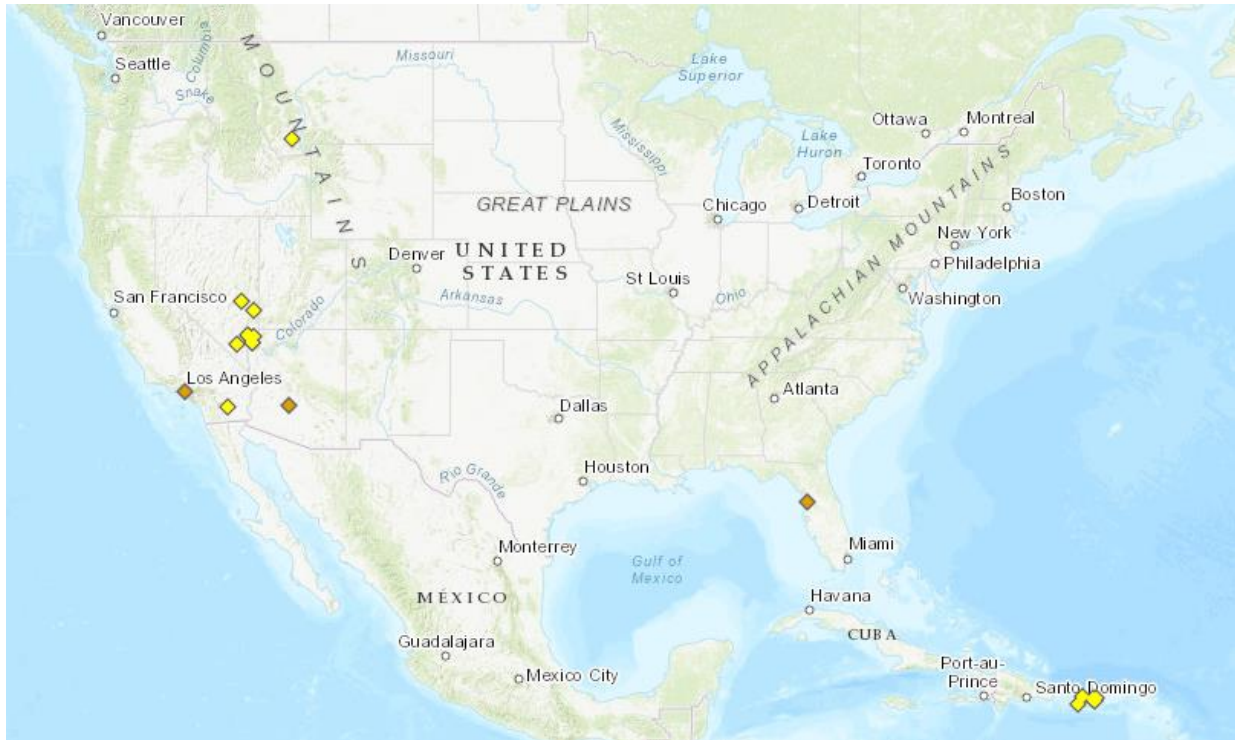
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**Figure 1.** Known global distribution of *Poecilia sphenops*. Map from GBIF Secretariat (2019). The southern limit of the native distribution of *P. sphenops* is unresolved in the literature (see Section 1); the widest available interpretation of native range (extending south to Colombia) was used in the climate matching analysis. Points in Italy and Japan represent populations established in thermal waters (Piazzini et al. 2010, Amaoka et al. 2001), so these points were not included in the climate matching analysis. No georeferenced occurrences are available for the species distribution in Brazil or Hungary. See Figure 2 for information on U.S. distribution.

## 5 Distribution Within the United States

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**Figure 2.** Known distribution of *Poecilia sphenops* in the United States. Map from Nico et al. (2019). Yellow points indicate established occurrences, and orange points indicate other collection locations. Only established occurrences were used as source locations for the climate matching analysis. The point in Montana represents a population established in a thermal water body, so it was also excluded from the climate matching analysis.

## 6 Climate Matching

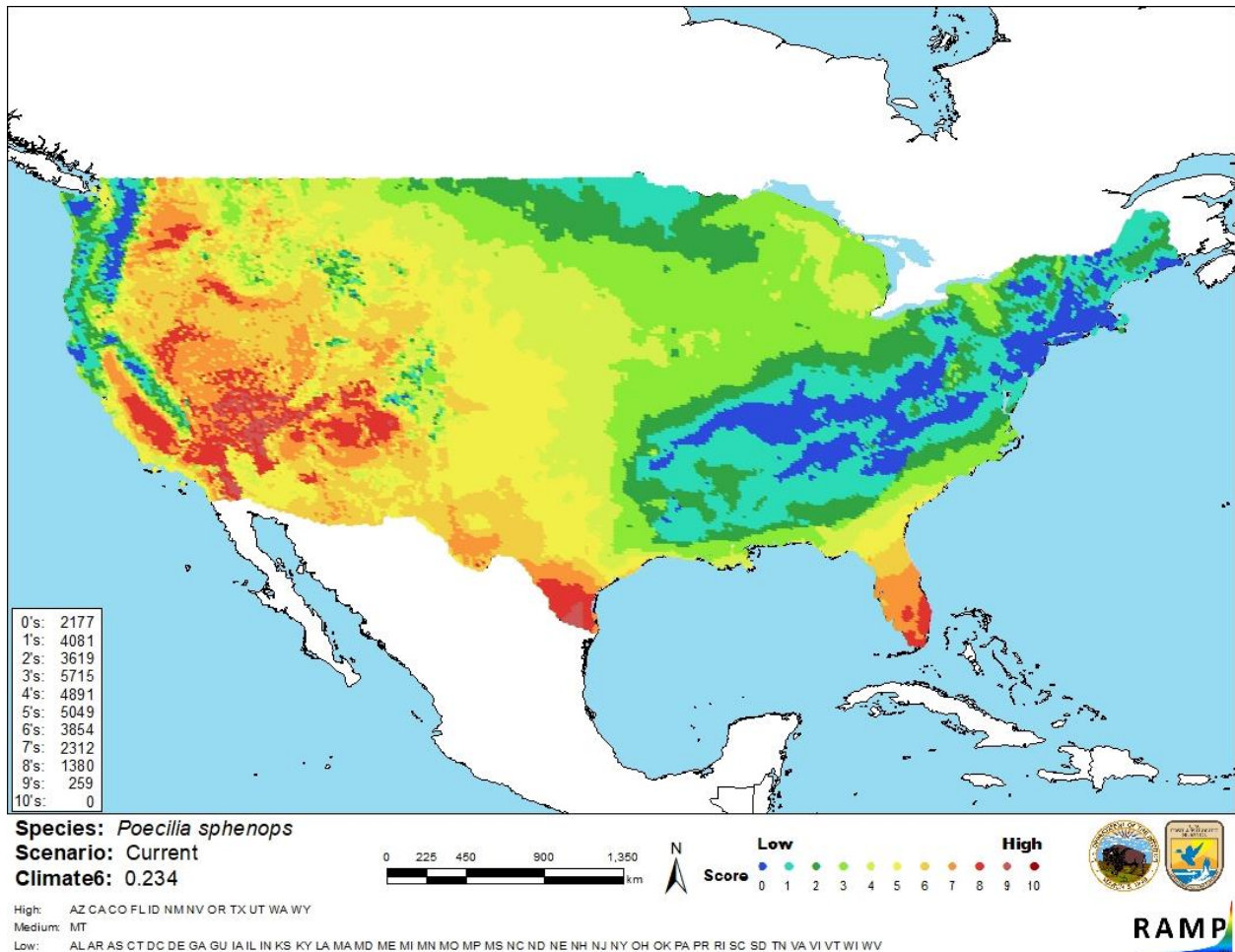
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### Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.234, indicating a high overall climate match. (Scores of 0.103 and greater are classified as high.) The climate score was high in Arizona, California, Colorado, Florida, Idaho, New Mexico, Nevada, Oregon, Texas, Utah, Washington, and Wyoming. Montana had a medium climate score, and all other states had a low climate score. Overall the East had a low climate match, except for coastal areas from South Carolina to Louisiana, where the climate match was medium to high. The west had a medium to high match from Montana in the north to Texas in the south, except along the northern Pacific Coast and the Cascade and Sierra Nevada Mountain ranges, where the climate match was low.



**Figure 3.** RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red; United States, Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Trinidad and Tobago, Singapore) and non-source locations (gray) for *Poecilia sphenops* climate matching. Source locations from GBIF Secretariat (2019) and Nico et al. (2019).



**Figure 4.** Map of RAMP (Sanders et al. 2018) climate matches for *Poecilia sphenops* in the contiguous United States based on source locations reported by GBIF Secretariat (2019) and Nico et al. (2019). 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
$0.000 \leq X < 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

There is adequate information available on the biology of *Poecilia sphenops*. However, difficulties in distinguishing among members of the *P. sphenops* species complex and between *P. sphenops* and *P. mexicana* affect the accuracy of distributional information and information on impacts of introduction of *P. sphenops*. There is disagreement in the literature on the southern limit of the native distribution of *P. sphenops* as well as on the species identity of one of the

nonnative populations established in the United States. More information on impacts of introduction of this species is needed. The certainty of this assessment is low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Poecilia sphenops*, Mexican Molly, is a poeciliid fish native to Mexico and Central America. This species and its hybrids are common in the aquarium trade, including in the United States. *P. sphenops* is currently established outside its native range in the United States, Trinidad, Singapore, Hungary, Italy, Japan, and Brazil; the populations in Italy, Japan, and the U.S. State of Montana occur in thermal springs. Taxonomic confusion is common among *P. sphenops* and closely related species. *P. sphenops* was reported to negatively affect the Moapa dace (*Moapa coriacea*) and the White River springfish (*Crenichthys baileyi*), two endangered species in the United States. However, a later author attributed the effects on *M. coriacea* and *C. baileyi* to *P. mexicana*. Without confirmation that *P. sphenops*, and not a congener, is negatively affecting the endangered species, the history of invasiveness is “none documented.” *P. sphenops* has a high climate match with the contiguous United States, with the areas of highest match in the southeastern and southwestern United States. The certainty of assessment is low because of taxonomic uncertainty and the lack of scientifically defensible evidence of negative impacts of introduction. Overall risk assessment category for *P. sphenops* is “Uncertain.”

### Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

## 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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