

Mexican Dwarf Crayfish (*Cambarellus patzcuarensis*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2014
Revised, October 2016 and July 2017
Web Version, 11/16/2017



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1 Native Range and Status in the United States

Native Range

From Alvarez et al. (2010):

“This species is known from its type locality in Lake Patzcuaro, Michoacán, Mexico (Hobbs 1974). [...] Furthermore, this species is also known to occur in springs in Chapultepec, Opopeo and Tzurumutaro, Mexico (M. López-Mejía., F. Alvarez. and C. Pedraza-Lara pers. comm. 2009).”

Status in the United States

This species has not been reported in the United States.

Means of Introductions in the United States

This species has not been reported in the United States.

Remarks

From Alvarez et al. (2010):

“*Cambarellus patzcuarensis* has been assessed as Endangered under criterion B1ab(iii). This species has an Extent of Occurrence of approximately 200 km² and is only known from 1 - 5 locations based on ongoing water abstraction and pollution incidents. Aquatic systems in which this species is found, have been impacted by a variety of threats though the effects of these on population numbers is not known and therefore warrants further investigation. Should the population be found to be relatively stable, then this species would warrant listing under Near Threatened.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2016):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Protostomia
Superphylum Ecdysozoa
Phylum Arthropoda
Subphylum Crustacea
Class Malacostraca
Subclass Eumalacostraca
Superorder Eucarida
Order Decapoda
Suborder Pleocyemata
Infraorder Astacidea
Superfamily Astacoidea
Family Cambaridae
Subfamily Cambarellinae
Genus *Cambarellus*
Subgenus *Cambarellus* (*Cambarellus*)
Species *Cambarellus patzcuarensis*

“Current Standing: valid”

Size, Weight, and Age Range

From Mrugała et al. (2015):

“... Crayfish obtained from the aquarium trade [...]

Average size (mm): 19.7

Size range (mm): 17-22”

Environment

From Alvarez et al. (2010):

“Freshwater”

“Lower depth limit (metres): 12”

From Papavlasopoulou et al. (2014):

“Lentic (lakes, springs).”

Climate/Range

From Alvarez et al. (2010):

“Lower elevation limit (metres): 2035

Upper elevation limit (metres): 2035”

“It has been estimated that this species occurs in an area of approximately 200 km².”

From Papavlasopoulou et al. (2014):

“tolerance of 10-26°C”

Distribution Outside the United States

Native

From Alvarez et al. (2010):

“This species is known from its type locality in Lake Patzcuaro, Michoacán, Mexico (Hobbs 1974). [...] Furthermore, this species is also known to occur in springs in Chapultepec, Opopeo and Tzurumutaro, Mexico (M. López-Mejía., F. Alvarez. and C. Pedraza-Lara pers. comm. 2009).”

Introduced

This species has not been reported as established outside its native range.

Means of Introduction Outside the United States

From Patoka et al. (2014b):

“... *Cambarellus patzcuarensis* are advertised for garden pond stocking in Germany [Chucholl 2013]”

Short Description

From Faulkes (2015a):

“*Cambarellus patzcuarensis* [...] sold in the pet trade are available in bright coloured morphs that are dramatically different than their normal, relatively drab, wild type colouration. The orange morph of *Cambarellus patzcuarensis* appears to be traceable back to a single hobbyist in the 1990s (Dost, 2013), and completely took over the pet niche for this species: the wild type colour, brown, is virtually never available.”

Biology

From Alvarez et al. (2010):

“This species is known from its type locality in Lake Patzcuaro, Michoacán, Mexico (Hobbs 1974). This lake has a surface area of 130 km² (Torres 1993) and is at an altitude of 2,035 m above sea level (Bradbury 2000). It is a warm polymictic lake, with a mean depth of 4.9 m and a maximum depth of 12 m (Torres 1993). Furthermore, this species is also known to occur in springs in Chapultepec, Opopeo and Tzurumutaro, Mexico (M. López-Mejía., F. Alvarez. and C. Pedraza-Lara pers. comm. 2009). These are usually to be isolated populations (Pedraza-Lara pers. comm. 2010).”

“This species is thought to be abundant; in the 1950s 400 individuals were collected during survey work. Furthermore, survey work conducted surrounding Janitzio Island within Lake Patzcuaro describes this species as abundant (M. López-Mejía., F. Alvarez. and C. Pedraza-Lara pers. comm. 2009).”

From Papavlasopoulou et al. (2014):

“breeding capacity up to 60 eggs”

“omnivorous-polytrophic”

Human Uses

According to Faulkes (2015a), *Cambarellus patzcuarensis* has been reported in the pet trade of the following countries by the following authors: United States (Faulkes 2015b), United Kingdom (Peay et al. 2010), Germany (Chucholl 2013), Greece (Papavlasopoulou et al. 2014), Czech Republic (Patoka et al. 2014a; Patoka et al. 2015), Slovakia (Lipták and Vitázková 2015), and Turkey (Turkmen and Karadal 2012).

From Chucholl and Wendler (2016):

“Here, we provide an update on the ornamental crayfish trade approximately one decade after the ‘crayfish hype’ [...] In July 2015, a total of 31 online shops offered 28 crayfish species, which represents a decline of 24 % in species diversity compared to the late 2000s. The five most commonly available crayfish species in 2015 were *Cambarellus patzcuarensis* ‘Orange’ (commonly referred to as ‘CPO’ [...]) (offered by 97 % of shops) ...”

From Faulkes (2015b):

“As part of risk assessment for the introduction of non-native crayfish in North America, I monitored the sale of crayfish on an auction website that specializes in aquatic pets and aquarium supplies for a year. Three species accounted for the majority of sales: the parthenogenetic crayfish, Marmorkrebs (*Procambarus fallax* f. *virginalis*), the Cajun dwarf crayfish (*Cambarellus shufeldtii*), and the orange morph of the endangered Mexican dwarf crayfish (*Cambarellus patzcuarensis*). [...] More individual *C. patzcuarensis* were put up for auction than any other species. Several auctions listed 100 *C. patzcuarensis* individuals for sale at once, and one auction offered 3001 individuals.”

Diseases

From Mrugała et al. (2015):

“Eight North American and one Australian crayfish species tested positive for *A. astaci* [...] All but two of the infected North American crayfish species (*C. patzcuarensis* and *O. limosus*) belonged to the genus *Procambarus*.”

Crayfish plague (infection with *A. astaci*) is an OIE-reportable disease.

From Longshaw et al. (2012):

“... *Cambarellus patzcuarensis* is listed as a host for 24 ciliate species, no other infections have been reported (Mayén-Estrada & Aladro-Lubel 2001).”

“No histological evidence of infections was detected in 3 *Cambarellus patzcuarensis* obtained from a fish dealer in Northampton. However, the bacteria *Aeromonas sobria*, *Citrobacter freundii* and *Weeksella virosa* were isolated from 3 different individuals [...] A low level infection with an *Epistylis*-like organism was detected on the legs of the crayfish obtained from a dealer in Guildford and on 1 of 5 individuals from a dealer in Colchester. In addition, a single granuloma was noted in the hepatopancreas of a single crayfish from Guildford.”

Threat to Humans

No information available.

3 Impacts of Introductions

From Patoka et al. (2014a):

“... potential invasiveness (FI-ISK [Freshwater Invertebrate Invasiveness Scoring Kit] score) and risk category (FI-ISK category) [...] FI-ISK score: 3 FI-ISK category: Medium”

From Chucholl (2013):

“Assuming that small low-risk species that are as equally abundant in the pet trade as Marmorkrebs, such as *Ca. patzcuarensis* var. ‘Orange,’ were also introduced from aquaria, one could argue that at least one record of an introduced small low-risk species should exist. However, the lack of any record of a small low-risk species from freshwater habitats in Central Europe presumably indicates that these species have not, or at least very rarely, been introduced from aquaria, as suggested here.”

From Faulkes (2015b):

“Based on sales from the main website examined here (Aquabid), and assuming that the rate of release of crayfish is similar to that of fish, about four crayfish buyers per year might be expected to release their purchased Marmorkrebs, and about two people per year might release *C. patzcuarensis* and *C. shufeldtii*. Further, one individual owner could release many individual crayfish. [...] Nevertheless, considering that there are other popular sales websites that sell crayfish, such as eBay, Craig’s List (<http://craigslist.org>), and Kijiji (<http://kijiji.ca>) (Faulkes, 2013), as well as trades and sales through personal contacts (Faulkes, 2010), the propagule pressure for these three species is not negligible. [...] initial risk assessment for *Cambarellus* species suggests they are at relatively low risk of becoming invasive (Chucholl, 2013; Gherardi et al., 2011).”

4 Global Distribution

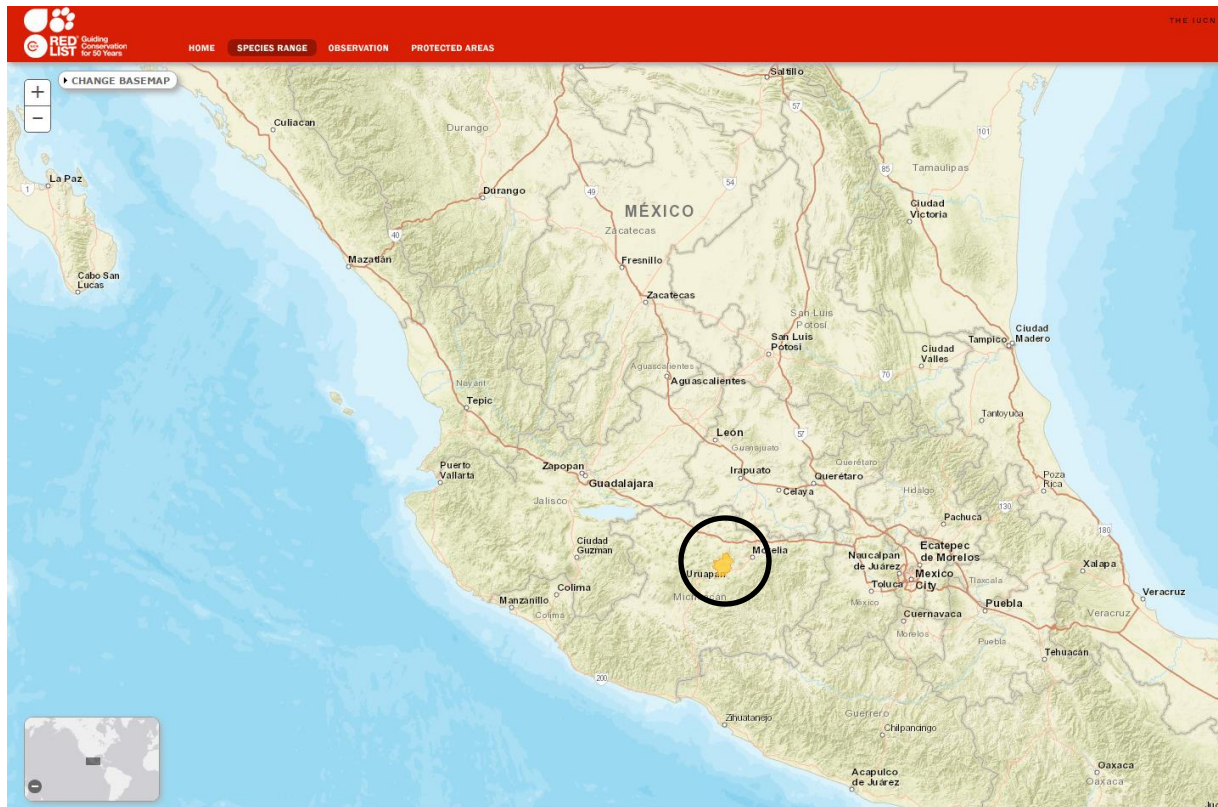


Figure 1. Map of known global distribution of *Cambarellus patzcuarens* (Alvarez et al. 2010). The black circle highlights the distribution in yellow.

5 Distribution Within the United States

This species has not been reported as established in United States waters.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was medium for coastal California and land along the U.S.-Mexico border. The climate match was low for the rest of the United States. Climate 6 score indicated that the contiguous U.S. has a low climate match overall. The range of scores indicating a low climate match is 0.000-0.005; Climate 6 score for *Cambarellus patzcuarens* was 0.000.

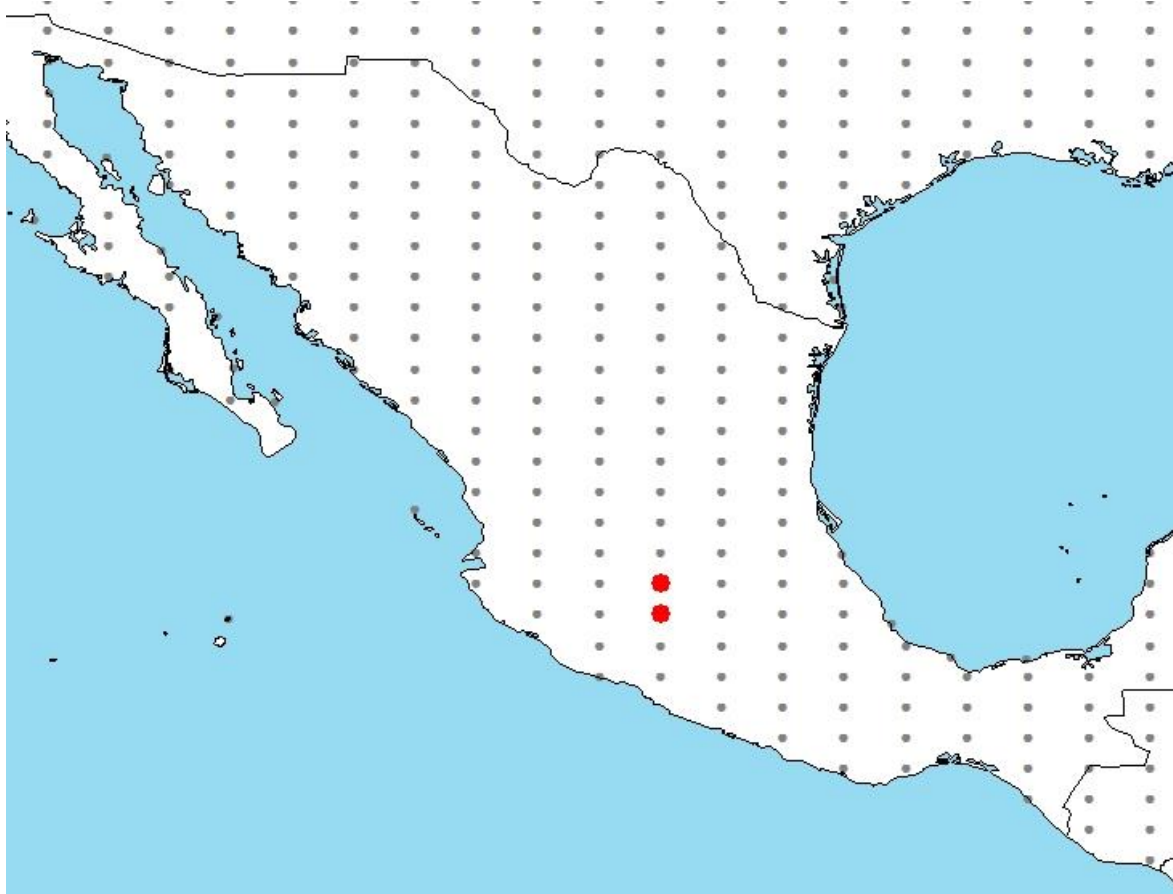


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Cambarellus patzcuarensis* climate matching. Source locations from GBIF (2016); points that lay outside the described range of the species (see “Native Range”, above) were excluded from the set of source locations.

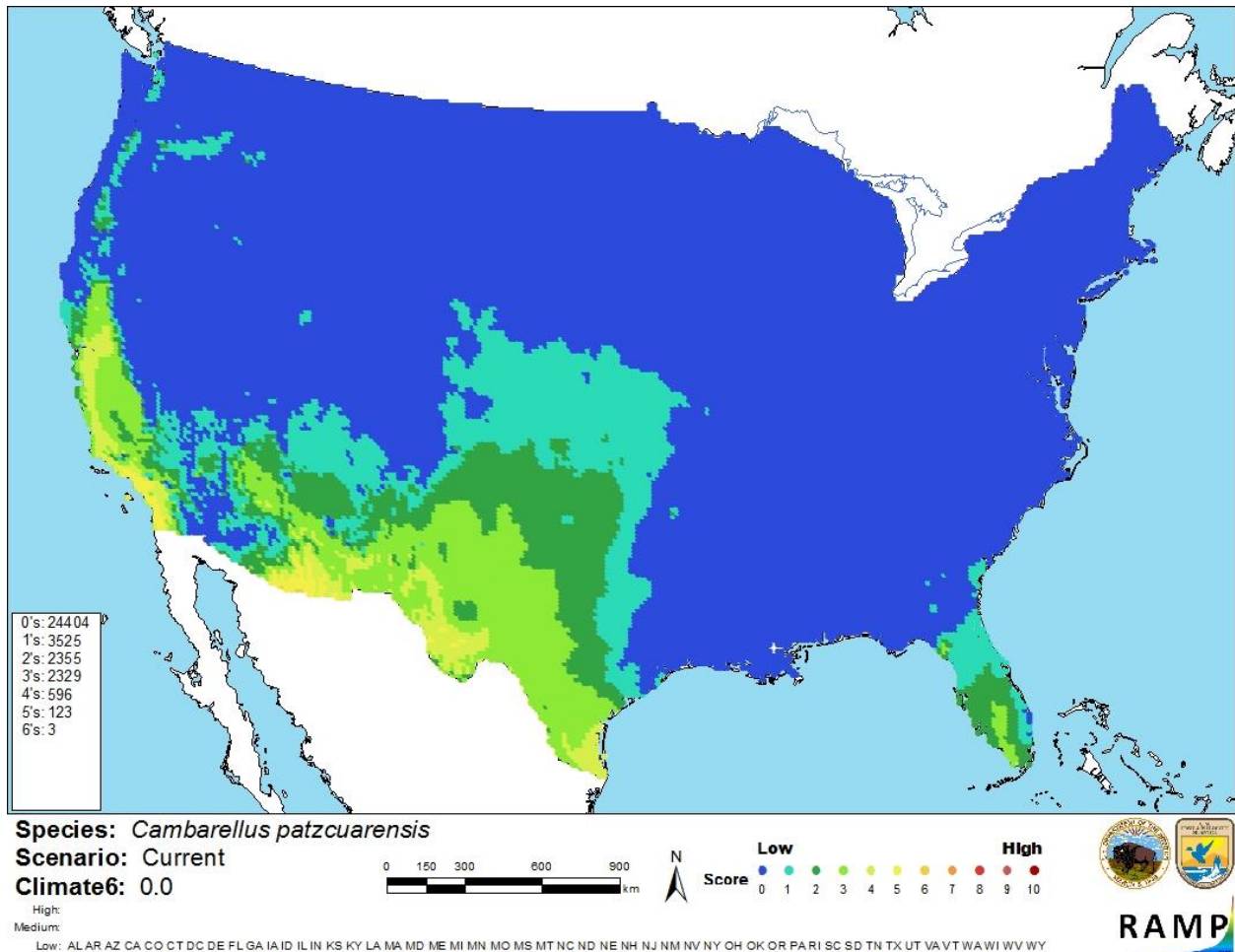


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Cambarellus patzcuarensis* in the contiguous United States based on source locations reported by GBIF (2016). 0=Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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

7 Certainty of Assessment

Limited information is available on *C. patzcuarensis* biology and ecology, but its distribution is clearly described. No introductions of this species have been reported despite its prominence in the aquarium trade and strong interest in the issue of non-indigenous crayfish species in Europe. Certainty of this assessment is medium.

8 Risk Assessment

Summary of Risk to the Contiguous United States

C. patzcuarensis is a freshwater crayfish native to Lake Patzcuaro, Mexico, and to springs in Chapultepec, Opopeo, and Tzurumutaro, Mexico. The species is widely available in the aquarium trade in Europe and North America, and is often one of the most commonly traded species. Authors from the Czech Republic reported a potential invasiveness (FI-ISK score) of 3 and a risk category (FI-ISK Category) of medium. Climate match with the contiguous United States is low, with southern California being the location of highest climate match for this species. Despite reports of extensive trade in recent years with no reports of establishment, the volume and duration of trade in *C. patzcuarensis* is not great enough to justify a low overall risk at present. Overall risk posed by *Cambarellus patzcuarensis* is uncertain.

Assessment Elements

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

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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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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