

# Florida Crayfish (*Procambarus alleni*)

## Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, April 2014  
Revised, November 2016  
Web Version, 12/11/2017



Photo: Thomas Seip. Licensed under CC BY-SA. Available:  
[http://eol.org/data\\_objects/31651955](http://eol.org/data_objects/31651955). (November 2016).

## 1 Native Range and Status in the United States

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### Native Range

From Crandall (2010):

“This species is found in East of St. Johns River, throughout peninsular Florida, in and South of Levy and Marion Counties, as well as on some of the Keys (K. Crandall pers. comm. 2009).”

## Status in the United States

From Crandall (2010):

“This species is found in East of St. Johns River, throughout peninsular Florida, in and South of Levy and Marion Counties, as well as on some of the Keys (K. Crandall pers. comm. 2009).”

From USGS (2016):

“State CA  
County Riverside  
Locality San Juan Creek adjacent to San Juan Hot Springs  
Collection Year 2009  
Status collected  
Record Type Personal communication”

From Faulkes (2015):

“Twenty-four crayfish species [including *Procambarus alleni*], plus one hybrid (of *Procambarus clarkii* and *P. alleni*), were listed for sale in online auctions [in North America].”

## Means of Introductions in the United States

From USGS (2016):

“Pathway unknown”

## Remarks

From USGS (2016):

“Common name: electric blue crayfish”

From NatureServe (2015):

“Everglades Crayfish”

## 2 Biology and Ecology

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### 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 Cambarinae  
Genus *Procambarus*  
Subgenus *Procambarus* (*Leconticambarus*)  
Species *Procambarus alleni* (Faxon, 1884)”

“Current Standing: valid”

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

From Papavlasopoulou et al. (2014):

“Max size up to 7 cm”

### **Environment**

From Hendrix and Loftus (2000):

“In Everglades National Park (ENP), *P. alleni* inhabits ephemeral pools and flooded marshes ranging in salinity from 0 to 18 ppt (Conover and Reid 1972, Loftus et al. 1990).”

From Crandall (2010):

“Freshwater”

“Hobbs (1989) indicates that this species is tolerant of a wide variety of water quality parameters, and also describes this species as 'robust and well-adapted to seasonal habitats'.”

From NatureServe (2015):

“Benthic”

From Papavlasopoulou et al. (2014):

“kept in 20-26°C in aquaria (apparently wider tolerance in nature)”

## **Climate/Range**

From Crandall (2010):

“This species has a distribution of approximately 80000 km<sup>2</sup>.”

## **Distribution Outside the United States**

### **Native**

This species is not native outside the United States.

### **Introduced**

From Jussila et al. (2015):

“The Florida crayfish (*Procambarus alleni*) is freely available through the aquarium trade in Europe, and although individual specimens have been caught at several sites in France and Germany, it is not presently known if there is an established population (Kouba et al., 2014).”

## **Means of Introduction Outside the United States**

This species has not been reported as established outside the United States.

## **Short Description**

From iNaturalist (2016):

“In the wild, this species varies from brown-tan to blue, but the aquarium strain has been selective bred to achieve a brilliant cobalt blue color. [Aquarium Domain 2016]”

## **Biology**

From Crandall (2010):

“This species is found in both permanent lentic and lotic situations such as ditches, marshes and lakes, and is a secondary burrower (Hobbs 1989). Acosta and Perry (2000) suggest that this species is one of the most ubiquitous inhabitants of the seasonally flooded marl prairies wetlands of the eastern Everglades.”

From Acosta and Perry (2002):

“The life cycle of *P. alleni* is timed to coincide with the flood-dry seasonality of the marl marsh [...]. The young of the year hatch in burrows near the end of the dry season (April–May) where they remain with adult females until the next flood, generally in June–July (Rhoads, 1976). At the start of the flood season, the young juveniles disperse from natal burrows, but dispersal distances depend on population density and habitat quality (Acosta & Perry, 2001). Young adults may move up to 1 km during the flood season to colonize flooded marshes and exploit new resources. Crayfish occupying optimal habitats with longer hydroperiods generally have normal population size structures, whereas small adults dominate in shorter hydroperiod habitats, as predicted for burrowing crayfish species under stressful conditions (Taylor, 1983). During

drydowns at the end of the flood season, crayfish move into existing burrows or construct new burrows in peat overlay and in soil-filled solution holes (Acosta & Perry, 2001).”

From Hendrix and Loftus (2000):

“In the Everglades region of southern Florida [...] crayfishes are major prey items in the diet of the striped swamp snake (*Regina alleni* Garman) (Godley 1980), pig frogs (*Rana grylio* Stejneger), fishes such as largemouth bass (*Micropterus salmoides* Lacepede) and warmouth (*Lepomis gulosus* Cuvier), and wading birds such as glossy ibis (*Plegadis falcinellus* Linnaeus) and white ibis (*Eudocimus albus* Linnaeus) (Gunderson and Loftus 1993). Despite its ecological role, the life-history aspects of crayfishes in the Everglades have not been well-studied.”

“In laboratory studies, Bovbjerg (1956, 1959) determined that *P. alleni* aggression was responsible for density-dependent movement and dominance hierarchies.”

From Papavaslopoulou et al. (2014):

“omnivorous-polytrophic”

## Human Uses

From Crandall (2010):

“This species is sold to the aquarium trade (aqua-terra-vita 2009).”

From Faulkes (2015):

“Twenty-four crayfish species [including *Procambarus alleni*], plus one hybrid (of *Procambarus clarkii* and *P. alleni*), were listed for sale in online auctions [in North America].”

## Diseases

From Mrugała et al. (2015):

“Laboratory cultures of *A. astaci* were obtained from all of the three crayfish species (*P. alleni*, *P. clarkii* and Marmorkrebs) ordered for this purpose from the shop DE 3. Culture identification was confirmed for all three host species by the PCR approach, corroborating that these crayfish batches were all infected with a viable crayfish plague pathogen.”

From McMahon et al. (2013):

“[...] 91% of *B. dendrobatidis*-exposed *P. alleni* (n = 44) had detectable *B. dendrobatidis* based on qPCR, whereas no control *P. alleni* were *B. dendrobatidis*+ (n = 21). [...] Overall, our results indicate that crayfish become infected with *B. dendrobatidis* in nature, can maintain these infections for months in the laboratory, and can transmit infections to amphibians.”

**Infection with *A. astaci* (crayfish plague) and infection with *B. dendrobatidis* are OIE-reportable diseases.**

## Threat to Humans

No information reported for this species.

## 3 Impacts of Introductions

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From Patoka et al. (2014):

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

FI-ISK score: 13

FI-ISK category: Medium”

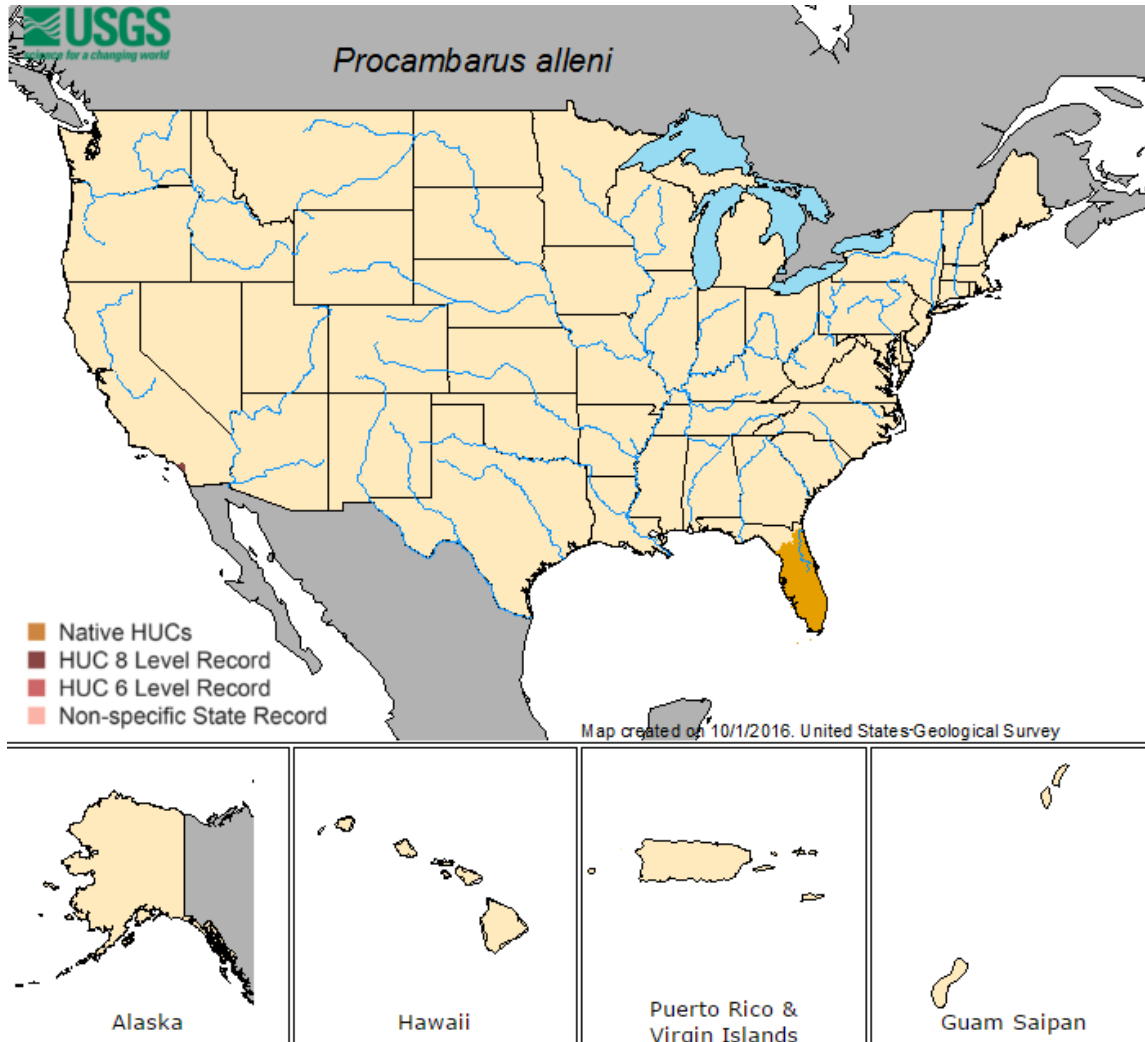
## 4 Global Distribution

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**Figure 1.** Map of known global distribution of *Procambarus alleni*. Map from GBIF (2016).

## 5 Distribution Within the United States

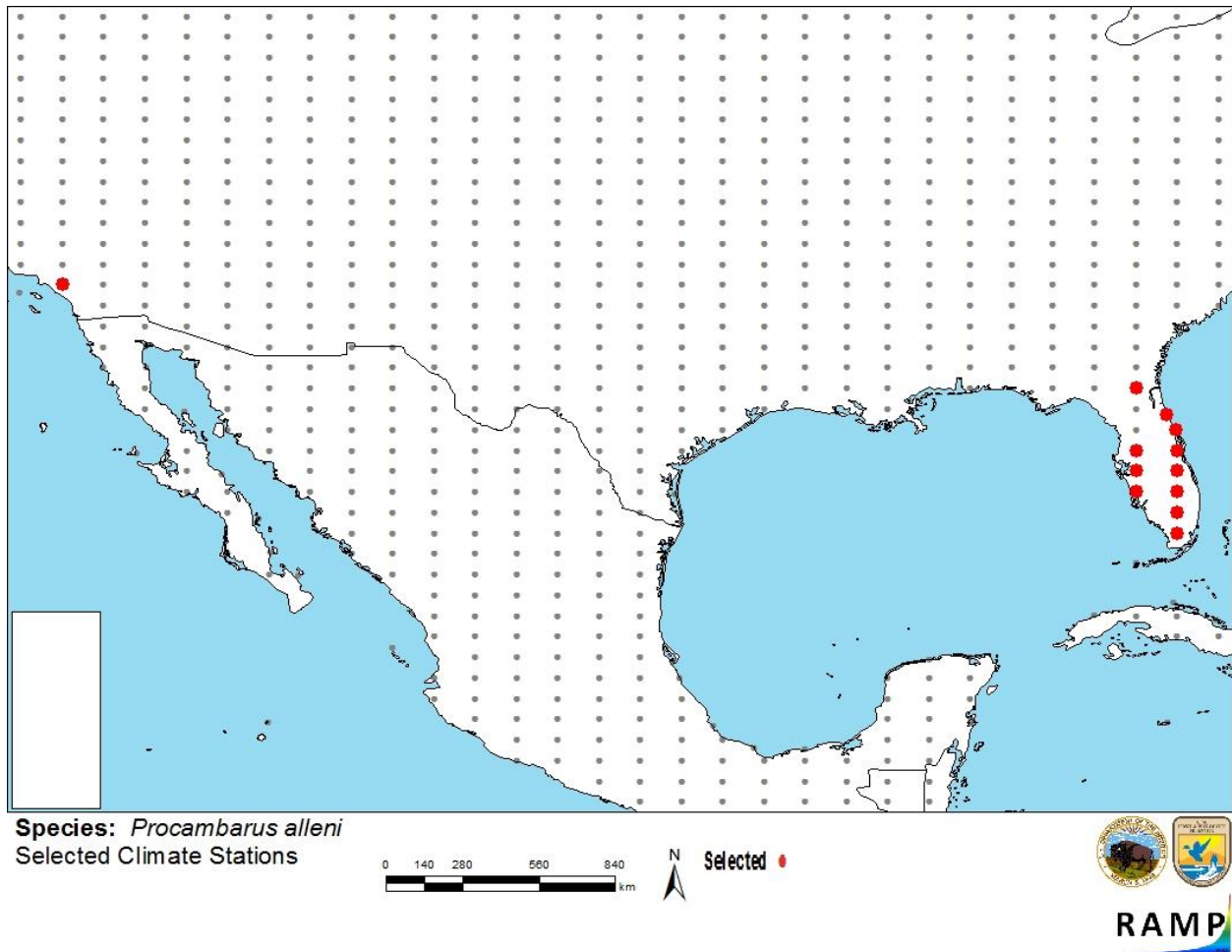


**Figure 2.** Known distribution of *Procambarus alleni* in the United States. Map from USGS (2016).

## 6 Climate Matching

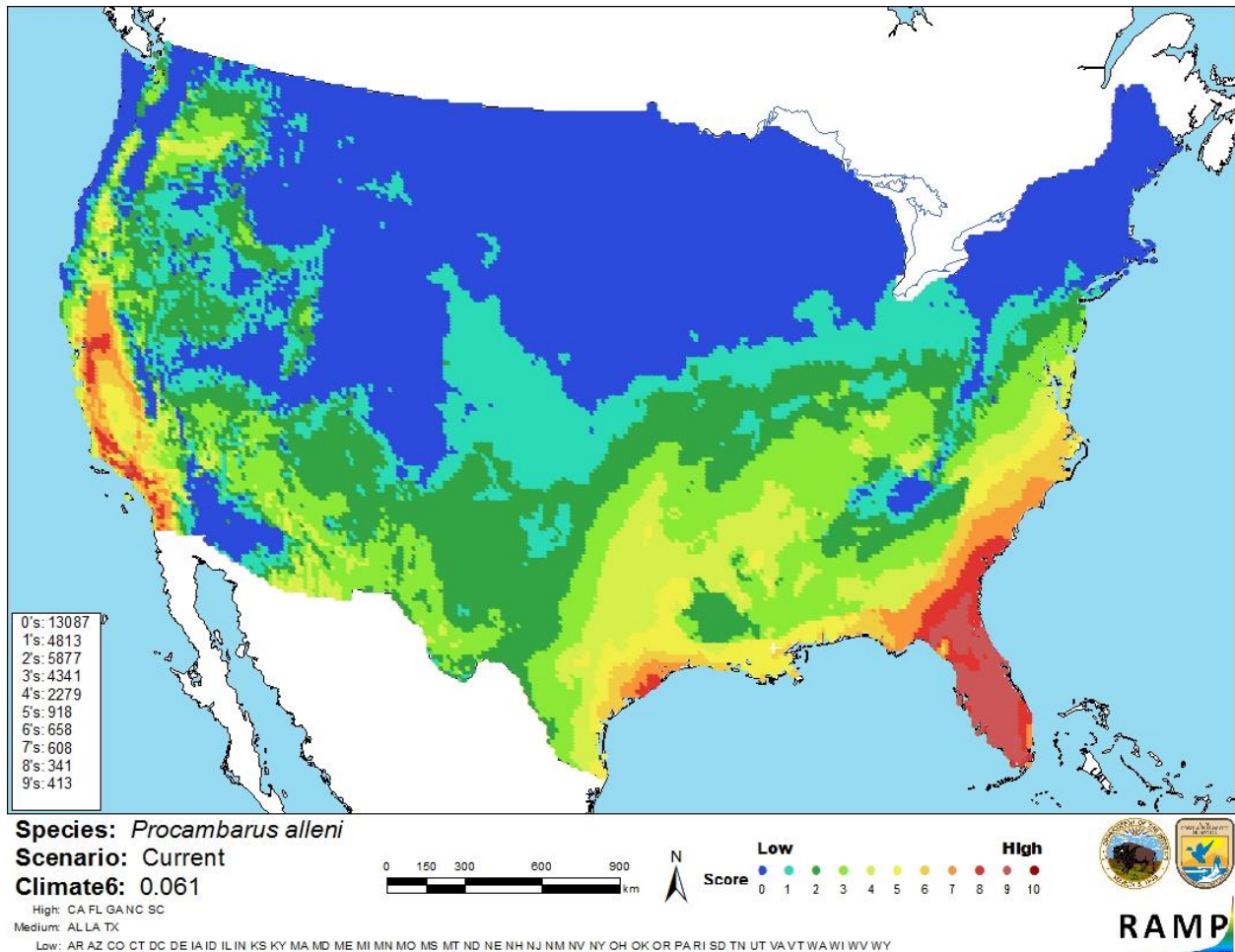
### Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high in Florida, coastal Georgia, parts of California, and in Texas near Houston. Medium match occurred in the Mid-Atlantic, Gulf Coast and throughout much of the rest of California. Low match was recorded for the rest of the United States. Climate6 score indicated that the contiguous U.S. has a medium climate match. The range of scores indicating a medium climate match is 0.005 - 0.103; Climate6 score of *Procambarus alleni* was 0.061.



**Figure 3.** RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Procambarus alleni* climate matching. Source locations from GBIF (2016) and National Museum of Natural History (2016).





**Figure 4.** Map of RAMP (Sanders et al. 2014) climate matches for *Procambarus alleni* in the contiguous United States based on source locations reported by GBIF (2016) and National Museum of Natural History (2016). 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

Information is available on the ecology and distribution of *P. alleni* within its native range. Its establishment outside that range is questionable and no scientific information is available on the impacts of any introductions. Certainty of this assessment is low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*P. alleni* is a freshwater crayfish native to Florida. The species was captured outside its native range in Riverside County, California, and individuals have also been captured in France and Germany. It is unknown whether these captures represent established populations. The species is available in the aquarium trade in North America and Europe, as well as a *P. alleni*-*Procambarus clarkii* hybrid. Climate match with the United States is medium, with California and eastern Texas being the most suitable climate for this species outside its native range in Florida. More research is needed to understand the impacts from introductions of this species. Overall risk posed by this species is uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Low**
- **Important additional information: Carrier of crayfish plague and chytrid fungus.**
- **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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## 10 References Quoted But Not Accessed

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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.**

Acosta, C. A., and S. A. Perry. 2000. Differential growth of crayfish *Procambarus alleni* in relation to hydrological conditions in marl prairie wetlands of Everglades National Park, USA. *Aquatic Ecology* 34:389-395.

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