

## Bee shrimp (*Caridina cantonensis*)

### Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, June 2017

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## 1 Native Range and Status in the United States

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### Native Range

From De Grave et al. (2013):

“The species is known from Guangdong and Guangxi Provinces (China), Hong Kong and possibly northern Vietnam (Liang 2004).”

From Yam and Dudgeon (2006):

“*Caridina cantonensis* (Yu, 1938) is widespread in southern China [...]”

## Status in the United States

This species has not been reported as introduced or established in the U.S. This species is in the aquarium trade in the United States.

From Wenger (2012):

“Since almost all dwarf shrimp find their way to the US from Asian exporters and are fairly new to the hobby, they are still far more readily available on the Pacific Coast than on the Atlantic. The most common bee shrimp to appear in local fish stores are the crystal reds. Procuring more exotic variants is still most easily accomplished through Internet retailers.”

From Aquatic Arts (2017):

“CRYSTAL RED SHRIMP (CARIDINA CANTONENSIS, A-S GRADE) \$ 5.95”

## Means of Introductions in the United States

This species has not been reported as introduced or established in the U.S.

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From GBIF (2016):

“KINGDOM Animalia  
PHYLUM Arthropoda  
CLASS Malacostraca  
ORDER Decapoda  
FAMILY Atyidae  
GENUS *Caridina*  
SPECIES *Caridina cantonensis*”

“TAXONOMIC STATUS accepted species”

### Size, Weight, and Age Range

From Yam and Dudgeon (2006):

“*Caridina cantonensis* (CL [carapace length] = 6.0–8.0 mm) [...]”

“[...] life spans of Hong Kong *Caridina* spp. range from 17 to 22 mo (Yam and Dudgeon [2005]).”

### Environment

From De Grave et al. (2013):

“The species is known to live in mountain streams and rivulets.”

“Freshwater”

From Wenger (2012):

“[...] bee shrimp also like their water soft and just slightly acidic, with a pH of 6.5 or so.”

## **Climate/Range**

From Wenger (2012):

“There is a general consensus among shrimp breeders that bee shrimp need cooler waters that do not exceed approximately 74°F. This is more or less true. Bee shrimp do thrive in cooler temperatures, but their failure to thrive in warmer environments most likely has just as much to do with oxygen saturation as the heat itself.”

## **Distribution Outside the United States**

Native

From De Grave et al. (2013):

“The species is known from Guangdong and Guangxi Provinces (China), Hong Kong and possibly northern Vietnam (Liang 2004).”

From Yam and Dudgeon (2006):

“*Caridina cantonensis* (Yu, 1938) is widespread in southern China [...]”

Introduced

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

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

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

## **Short Description**

From Wenger (2012):

“The wild bee shrimp, native to China and Japan, has a rough pattern of broad, brown-black and white stripes on a clear body. A variant wild shrimp with a transparent body and thin dark bands, known as the tiger shrimp, also exists. All of the other strains of bee shrimp were derived from these two shrimp populations.”

“In the mid-1990s, a bee shrimp breeder in Japan by the name of Hisayasu Suzuki noticed that a handful of specimens in his wild-type population displayed slightly reddish coloration. Over the course of several years, selective breeding produced the first crystal red shrimp. Once these

crystal red shrimp hit the market, other breeders refined the strain to improve the brightness of their color, delineation of their pattern, and overall coverage of the white stripes on the shrimp.”

“A very recent addition to the hobby is the crystal white shrimp, which has thin, white stripes on a clear body. The most notable features of this shrimp are the eggs and ovaries of the females, which are an unusual minty, blue-green color. Crystal white shrimp have only started making their way to the United States in the past year or so. These new shrimp are not to be confused with the solid-white to yellow-white bee shrimp variety known as the golden bee, which has been around for several years now and a likely source of the increasing white coverage in higher-grade crystal red shrimp and crystal black shrimp.”

From Cai and Ng (1999):

“*Caridina cantonensis* has a relatively longer rostrum, reaching to the middle of the second segment of the antennular peduncle, or to the end of the third segment [...] The finger of the male first pereiopod is longer than the palm in *C. cantonensis* [...] The second pereiopod of *C. cantonensis* never reaches beyond the scaphocerite [...] and the carpus of this leg is only slightly longer than the chela in *C. cantonensis* [...]”

## **Biology**

From Mantel et al. (2004):

“Guts of *Caridina cantonensis* shrimps were dominated by unicellular algae (91%) with fungi and FPOM [fine particulate organic matter] comprising a small proportion of the diet.”

“Cyanobacteria and CPOM [course particulate organic matter] were significant contributors to the biomass of *Caridina cantonensis* [...]”

From Yam and Dudgeon (2006):

“*Caridina cantonensis* and *C. serrata* are fully freshwater species with direct development into benthic hatchlings that resemble miniature adults (Dudgeon 1985, 1987). Reproduction takes place during the summer monsoon season in both species, but the frequency of recruitment (1-3x/y) and growth and development rates vary among populations of *C. cantonensis*; [...]”

From Wenger (2012):

“Assuming both sexes of shrimp are present, when the female has just molted and is fertile, she produces pheromones that cause the male shrimp to swim in frenzied circuits around the tank, seeking her out. After their eggs are laid and fertilized, the females carefully stick them to their pleopods (swimmerets), located on the underside of the tail. A female with fertile eggs is referred to as “berried” due to the berry-like appearance of the egg clusters. The female proceeds to carry the eggs for the next month, diligently fanning her swimmerets to ensure a flow of oxygenated water, until they hatch.”

## **Human Uses**

From De Grave et al. (2013):

“The species is infrequently available in the aquarium trade, in low numbers.”

From Wenger (2012):

“Freshwater dwarf shrimp of the order Atyidae have exploded onto the hobby scene in recent years. Starting in the early 2000s with the global introduction of the red cherry shrimp (*Neocaridina heteropoda* var. “red”), breeders and importers all over the world have been bringing new and exciting species and color morphs to the market, with new strains now appearing on a near-monthly basis. Of the many available species of shrimp, the bee shrimp (*Caridina* cf. *cantonensis*) is currently one of the most diversified, with over a dozen variants on the market today.”

## **Diseases**

No information available. No OIE-reportable diseases have been documented for this species.

## **Threat to Humans**

No information available.

## **3 Impacts of Introductions**

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

## 4 Global Distribution

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**Figure 1.** Known global distribution of *Caridina cantonensis*. Map from GBIF (2016). A point in Taiwan is not displayed and was not used in the climate matching analysis because it does not represent an established population.

## 5 Distribution Within the United States

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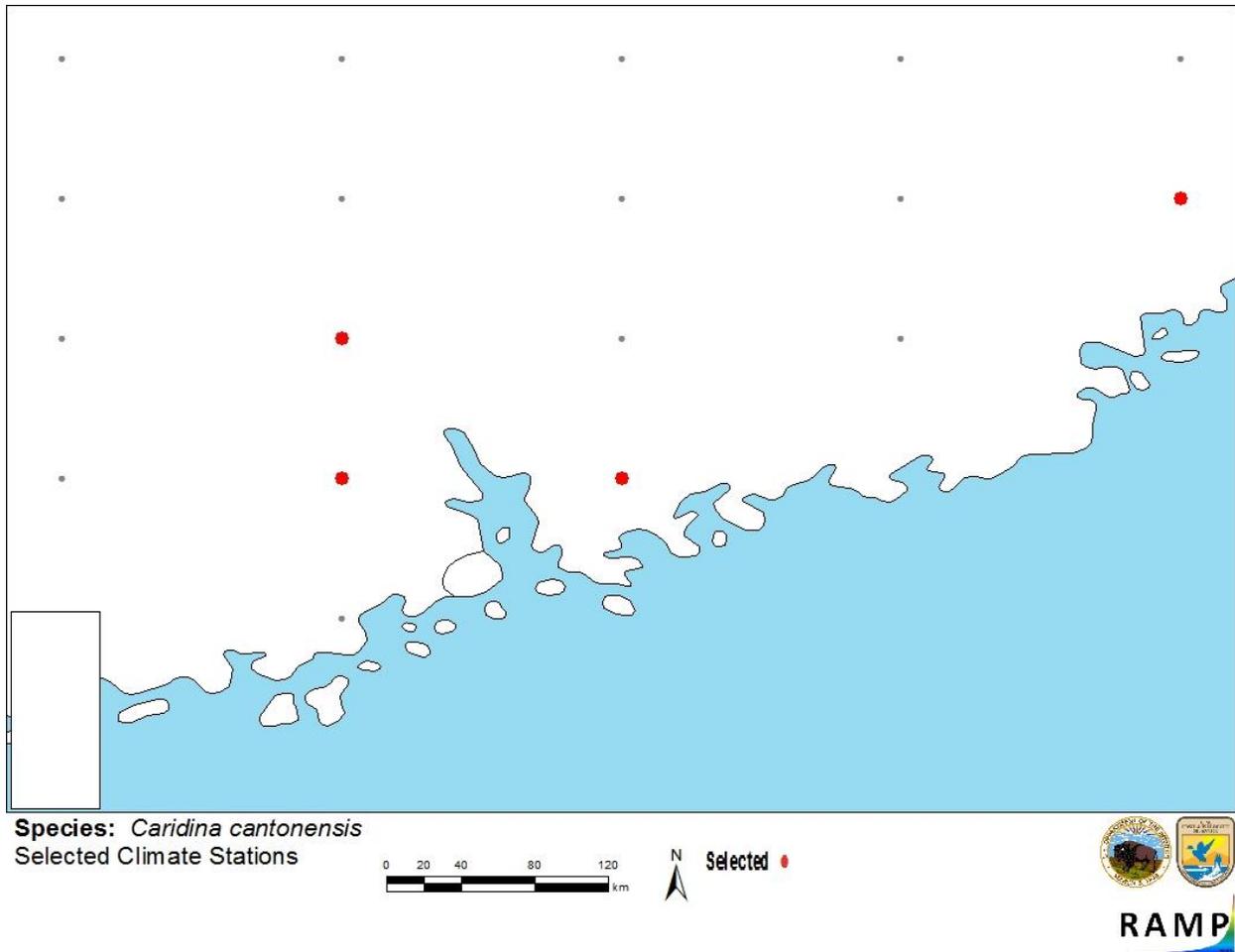
This species has not been reported as introduced or established in the U.S.

## 6 Climate Matching

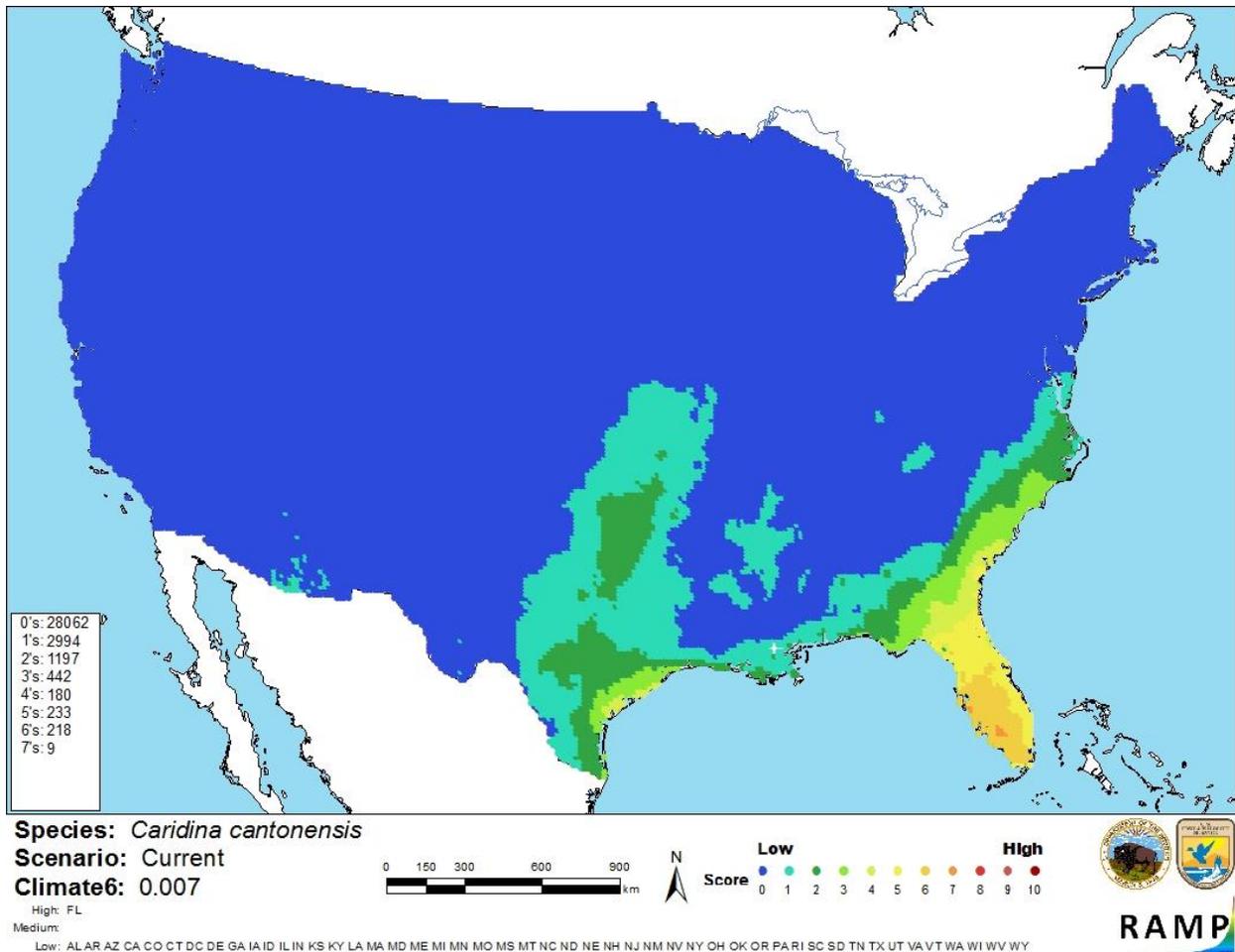
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### Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean distance) was medium to medium-high in Florida, coastal Georgia, and coastal Texas near Galveston. The climate match for the remainder of the contiguous U.S. was low. Climate 6 score indicated a medium match overall for the contiguous U.S. Scores between 0.005 and 0.103 are classified as medium match; the Climate 6 score for *C. cantonensis* was 0.007.



**Figure 2.** RAMP (Sanders et al. 2014) source map showing weather stations in Guangdong Province, China selected as source locations (red) and non-source locations (gray) for *Caridina cantonensis* climate matching. Source locations from Cai and Ng (1999) and GBIF (2016).



**Figure 3.** Map of RAMP (Sanders et al. 2014) climate matches for *Caridina cantonensis* in the contiguous United States based on source locations reported by Cai and Ng (1999) and 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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

There is information available on the captive care of *Caridina cantonensis* due to its popularity in the aquarium trade, but comparatively little information available on this species in its native habitat. No introductions of this species have been reported outside its native range, so potential impacts of introduction remain unknown. Certainty of this assessment is low.

## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

*Caridina cantonensis* is a species of small freshwater shrimp native to southern China. This species is popular in the aquarium trade, and many different colored varieties have been selectively bred from the wild type shrimp. Despite its presence in the aquarium trade in the United States and elsewhere, it has never been documented as introduced outside of its native range. Further research is required to determine potential impacts of introduction in the U.S. Climate match to the contiguous U.S. is medium. Certainty of this assessment is low and overall risk assessment category is uncertain.

### Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): Medium**
- **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.**

- Aquatic Arts. 2017. Crystal red shrimp (A-S grade). Available: <https://aquaticarts.com/collections/freshwater-shrimp/products/crystal-red-shrimp>. (June 2017).
- Cai, Y., and N. K. Ng. 1999. A revision of the *Caridina serrata* species group, with descriptions of five new species (Crustacea: Decapoda: Caridea: Atyidae). *Journal of Natural History* 33:1603-1638.
- De Grave, S., W. Klotz, and X. Cai. 2013. *Caridina cantonensis*. The IUCN Red List of Threatened Species 2013: e.T197666A2495262. Available: <http://www.iucnredlist.org/details/full/197666/0>. (May 2017).
- GBIF (Global Biodiversity Information Facility). 2016. GBIF backbone taxonomy: *Caridina cantonensis* Yü, 1938. Global Biodiversity Information Facility, Copenhagen. Available: <http://www.gbif.org/species/5863061>. (May 2017, July 2017).
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- Sanders, S., C. Castiglione, and M. H. Hoff. 2014. Risk Assessment Mapping Program: RAMP. U.S. Fish and Wildlife Service.

Wenger, A. 2012. The latest buzz: freshwater bee shrimp. *Tropical Fish Hobbyist* (June). Available: <http://www.tfhmagazine.com/details/articles/the-latest-buzz-freshwater-bee-shrimp-full-article.htm>. (June 2017).

Yam, R. S., and D. Dudgeon. 2006. Production dynamics and growth of atyid shrimps (Decapoda: *Caridina* spp.) in 4 Hong Kong streams: the effects of site, season, and species. *Journal of the North American Benthological Society* 25(2):406-416.

## 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.**

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Liang, X. 2004. *Fauna Sinica. Invertebrata volume 36. Crustacea Decapoda Atyidae*. Science Press, Beijing.

Yam, R. S. W., and D. Dudgeon. 2005. Inter- and intraspecific differences in the life history and growth of *Caridina* spp. (Decapoda: Atyidae) in Hong Kong streams. *Freshwater Biology* 50:2114-2128.