

Cajun Dwarf Crayfish (*Cambarellus shufeldtii*)

Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Alvarez et al. (2010):

“This species is known to occur in the Gulf Coastal Plain of the USA, which includes the states of Alabama, Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, Tennessee and Texas [Taylor 2005].”

Status in the United States

From Crandall et al. (2001):

“Introduced into Rapides, St. Bernard, and St. Tammany parishes, Louisiana (Penn, [1950]:422), and into Harris County, Georgia (Penn, personal communication). It has not been collected subsequently in the last-mentioned area.”

Means of Introductions in the United States

From Penn (1942):

“It may be well to note here also that about 18,000 mixed *C. shufeldtii* and *O. clypeata* from Pearl River, La. were planted in a private fish-cultural project, the Peg Factory Lake near Hamilton, Georgia on March 15, 1937.”

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* (*Dirigicambarus*)
Species *Cambarellus shufeldtii* (Faxon, 1884)”

“Current Standing: valid”

Size, Weight, and Age Range

From Adams (2012):

“Females are larger than males (Page 1985) and reach about 33 mm total body length (Pflieger 1996). In Louisiana, females mature at a carapace length of about 8.5 mm (total length about 17

mm) (Penn 1942, Penn 1950, Lowe 1961), possibly larger (>11.5 mm) in Illinois (Page 1985). Form I male *C. shufeldtii* generally range between 15 and 30 mm total body length (Pflieger 1996), first maturing at a carapace length of 6.9 – 7.5 mm (Black 1966). However, Black (1966) noted that the smallest form I males frequently did not have mature sperm.”

“Females live about one year during which they may have two broods (Lowe 1961). Males live 15-18 months, with reproduction beginning in the first spawning season after hatching (Penn 1942, Black 1966).”

Environment

From Adams (2012):

“Their habitat use appears to be largely restricted to shallow (<38 cm), clear, permanent water exposed to sunlight (Penn 1950). [...] They tolerate a pH range of at least 5.4 – 7.4 (Penn 1950). [...] Compared to *C. diminutus*, *C. shufeldtii* used habitats that were less acidic, had less emergent aquatic vegetation, and had patchier submerged aquatic vegetation (Peterson et al. 1996).”

Climate/Range

From NatureServe (2015):

“[...] tolerant of elevated temperatures [...]”

Distribution Outside the United States

Native

This species is not native outside the United States.

Introduced

No introductions of this species have been reported outside the United States.

Means of Introduction Outside the United States

No introductions of this species have been reported outside the United States.

Short Description

From Adams (2012):

“The small size of mature individuals and hooks on the 2nd and 3rd pairs of pereopods (legs) in form I males are the most distinguishing characteristics of the genus *Cambarellus*. The rostrum is flat, the areola open, and the chelae narrow and smooth with fingers shorter than palm. Males have three straight terminal elements on the gonopods.”

“The species has dimorphic color patterns. Background color is tan to brown, and some individuals have longitudinal dark stripes on carapace and abdomen, whereas others have rows of spots. The color difference is due to a single gene (reviewed in Pflieger 1996).”

Biology

From Adams (2012):

“*Cambarellus shufeldtii* uses a variety of habitats with standing to slow-moving shallow water, including swamps, lakes, ponds, ditches, and slow streams (Bouchard 1972, Burr and Hobbs 1984, Hobbs 1989, Pflieger 1996, Taylor and Schuster 2004). Their habitat use appears to be largely restricted to shallow (<38 cm), clear, permanent water exposed to sunlight (Penn 1950). They are typically in areas with mud substrate where they reside in the fine woody debris and leaves near the shoreline, around large woody debris, roots or bald cypress knees, or in dense aquatic vegetation (Hobbs and Marchand 1943, Penn 1950, Burr and Hobbs 1984, Taylor and Schuster 2004). [...] Along the Mississippi Gulf coast, the species occurs more frequently in oxbow side-ponds than in habitats adjacent to river channels (Peterson et al. 1996).”

“*Cambarellus shufeldtii* does not burrow down to the water table but creates and occupies sealed chambers in mud as water recedes (Penn 1950).”

“In Louisiana, *C. shufeldtii* breed year round, but reproductive peaks occur in late winter and early spring with a smaller peak in early to midsummer.”

“In western Tennessee, form I males are reported from April, June, and July and ovigerous females from July (Hobbs and Marchand 1943, Bouchard 1972). In Missouri, ovigerous females were collected from February to July, and form I males were abundant in February, July, October and November (Pflieger 1996). In Illinois, females with eggs were collected from February to May, those with young in April, June and July (Page 1985), and form I males in all months except January, August and September (Page 1985). In Kentucky, ovigerous females were collected in April and form I males in April, June, and September - November (Taylor and Schuster 2004). Eggs remain attached to the female for about three weeks (Lowe 1961), and after hatching, young remain with the female for about 7 - 10 days (Lowe 1956).”

“Number of eggs per female averaged 34 (range 18 – 70; N = 100) in Louisiana (Penn 1942), 64 (maximum = 109; N = 8) in Missouri (Pflieger 1996), 80 (47 - 99; N = 9) in Illinois (Page 1985), and 148 (81 – 116; N = 2) in Kentucky (Taylor and Schuster 2004). Average egg diameter was 1.1 mm in Illinois (Page 1985) and 1.0 mm in Louisiana and Kentucky (Penn 1942, Taylor and Schuster 2004). Four females collected in Illinois in April carried 15 – 74 (average = 45) young, suggesting 44 % mortality in egg and early juvenile stages (Page 1985).”

“Although *C. shufeldtii* and *C. diminutus* are sometimes sympatric in a drainage, the two did not occur syntopically at any of the 97 sites in Mississippi sampled by Peterson et al. (1996). Similarly, despite overlapping ranges, *C. shufeldtii* and *C. puer* are rarely syntopic, with the former appearing to displace the latter where the two co-occur in Louisiana (Penn 1950, Penn and Fitzpatrick 1963, Pflieger 1996). Possible mechanisms of displacement include behavioral dominance of *C. shufeldtii* over *C. puer*, as displayed in laboratory trials (Penn and Fitzpatrick 1963), and possible earlier maturity and year-round reproduction, at least in southern portions of the range, by *C. shufeldtii* (Black 1966).”

“*Cambarellus shufeldtii* has also been collected with the following Mississippi species: *Cambarus diogenes*, *Cambarus ludovicianus*, *Faxonella clypeata*, *Orconectes lancifer*, *O. p. palmeri*, *Procambarus acutus*, *P. clarkii*, and *P. viaeviridis* (Hobbs and Marchand 1943, Lowe 1961, Bouchard 1972, Burr and Hobbs 1984, Taylor and Schuster 2004). In Missouri, *C. shufeldtii* is most closely associated with *P. clarkii* (Pflieger 1996), and in the floodplain of the Coldwater River, Mississippi, the two species were collected in the same dip net (unpublished data.)”

From NatureServe (2015):

“Adult Food Habits: Detritivore

Immature Food Habits: Detritivore

Food Comments: No data; probably opportunistic [*sic*], mostly detritus.”

Human uses

From Faulkes (2015a):

“Crayfish species found in the pet trade of more than one country. [...]

<i>Cambarellus shufeldtii</i>	United States (Faulkes, 2015b)	Yes
[...]	Germany (Chucholl, [2013])	Yes
[...]	Greece (Papavlasopoulou <i>et al.</i> , 2014)	Yes
[...]	Czech Republic (Patoka <i>et al.</i> , [2014]; Patoka <i>et al.</i> , [2015])	Yes”

From Faulkes (2015b):

“Three species account for most (83.7%) of the online crayfish trade in North America: Marmorcrebs (*Procambarus fallax* f. *virginalis*), the Cajun dwarf crayfish (*Cambarellus shufeldtii*), and the Mexican dwarf crayfish (*Cambarellus patzcuarensis*).”

From NatureServe (2015):

“No known economic value to humans; commonly used as experimental subject by experimental biologists.”

Diseases

From Richardson and Font (2006):

“*Southwellina dimorpha* Schmidt, 1973 (Polymorphidae: Acanthocephala) was originally described from juveniles and adults from the white ibis (*Eudocimus albus*) in Florida and cystacanths from cultured red crawfish, *Procambrus clarki*, from Pecan Island, Vermilion Parish, Louisiana (Schmidt (1973). [...] *Southwellina dimorpha* is known only from the 2 species of birds the white ibis and the whooping crane, *Grus americana* (United States National Parasite Collection USNPC 090666), from Florida. Although infrequently reported, *S. dimorpha* may occur in high enough prevalence in crawfish intermediate hosts to have a commercial impact. [...] On 3 March 2005, cystacanths of *S. dimorpha* were collected from hemocoels of 2 of 44 (4.5%) Cajun dwarf crawfish, *Cambarellus shufeldtii*, collected at Head of Island, Ascension

Parish, Louisiana (30°15.769'N 90°43.325'W). One specimen, a 24 mm long male, was infected with 2 cystacanths, and another specimen, a 23 mm long male, was infected with 1 cystacanth.”

From Longshaw (2011):

“Two genera within the family Macroderoididae have been reported from crayfish, *Macroderoides* and *Alloglossidium*, most species occurring in the latter genus. [...]. *A. greeri* found unencysted in the antennary gland of *Cambarellus shufeldtii* has been described by Font (1994); its full life cycle has not yet been elucidated.”

“Sogandares-Bernal (1965) reported *Maritrema (Atriospinosum) obstipum* in the central shaft of the gill filaments and hepatopancreas of *C. shufeldtii* and *P. clarkii*. Although Etges (1953) suggested that this parasite utilised the gastropod *Ammicola pilsbryi*, the isopod *Asellus communis* and various bird and mammalian hosts in its life cycle, it is possible that *M. obstipum* represents a group of cryptic species.”

“The progenetic digenean *Sogandaritrema progeneticum* (= *M. progeneticus*) was originally described from the cephalothoracic cavity in *C. puer* by Sogandares-Bernal ([1962]) and has also been noted in *C. shufeldtii* and *P. clarkii*. Its life cycle was elucidated by Lotz and Corkum (1983) who showed that the parasite produced infective cercariae in the gastropod *Ammicola peracuta*.”

Threat to Humans

No information available.

3 Impacts of Introductions

From Patoka et al. (2014):

“... 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 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 Marmorcrebs, and about two people per year might release *C. patzcuarensis* and *C. shufeldtii*. Further, one individual owner could release many individual crayfish. [...] 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. Known global distribution of *Cambarellus shufeldtii* (USGS 2016).

5 Distribution Within the United States

Same as global distribution (see Section 4).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high along the Gulf Coast from Galveston, Texas to Tampa, Florida, and north along the Mississippi River to southern Illinois. The states of Alabama and Georgia north of the Gulf Coast were also included in the high match area. Medium match occurred in the Ohio River Valley and from the Carolinas to coastal New England. Low match was recorded for the western United States. Highest match was found in the Gulf Coast states. Climate 6 score indicated that the contiguous U.S. has a high climate match. The range of scores indicating a high climate match is 0.103 and greater; Climate 6 score of *Cambarellus shufeldtii* is 0.197.

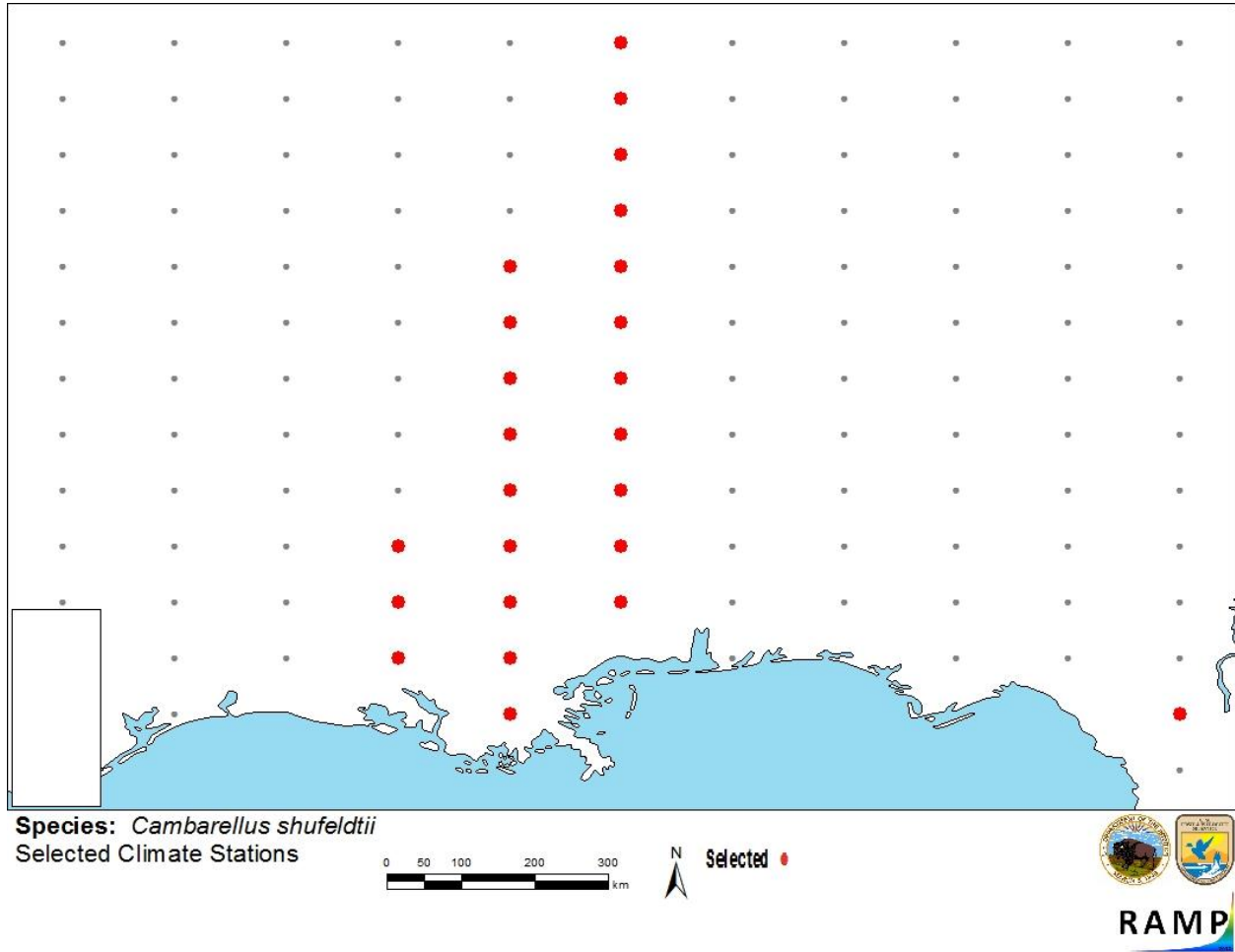


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Cambarellus shufeldtii* climate matching. Source locations from GBIF (2016) and National Museum of Natural History (2016). Three locations (in Georgia, southwestern Arkansas, and east of Dallas, Texas) in the latter source were omitted during climate matching because they weren't corroborated by other sources as being established populations (NatureServe 2015, USGS 2016). Note that three points in Texas are obscured by the white box in the lower left corner of the figure.

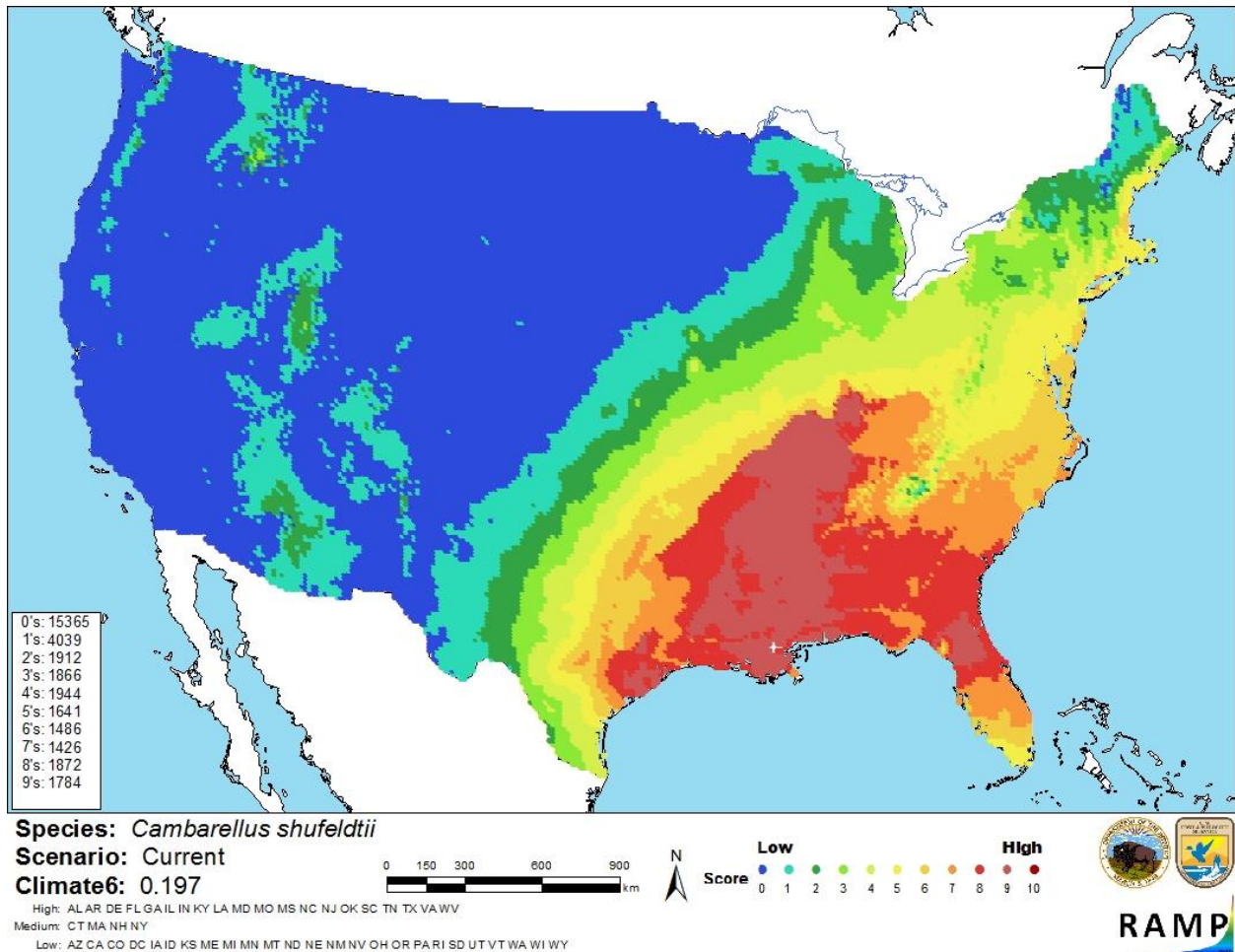


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Cambarellus shufeldtii* in the contiguous United States based on source locations reported by GBIF (2016) and National Museum of Natural History (2016). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on 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
≥ 0.103	High

7 Certainty of Assessment

Information on the biology and distribution of *C. shufeldtii* is available but not abundant. It is reported to have been introduced outside of its native range in Louisiana and Georgia, but there is no information available on impacts of these introductions. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Cambarellus shufeldtii is a freshwater crayfish native to the Gulf Coastal Plain of the United States. In addition to its use in experimental biology, the species is prominent among crayfishes in the North American aquarium trade and is also present in the European aquarium trade. Climate match with the contiguous United States is high, with highest match in the Gulf Coastal Plain. No impacts of *C. shufeldtii* introductions to new locations in Louisiana and Georgia have been identified, but there is some evidence of competitive dominance over other dwarf crayfishes where their ranges overlap. More research is needed to understand the impacts from introductions for this species. Overall risk posed by this species is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec.6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **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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