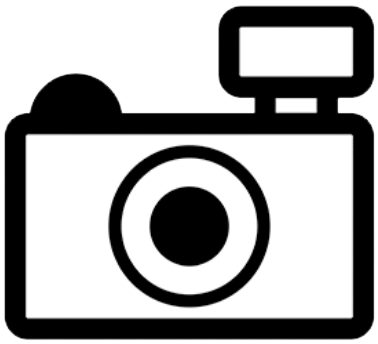
Setose Yabby (*Cherax setosus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, November 2011
Revised, September 2012 and April 2018
Web Version, 5/23/2018



No Photo Available

1 Native Range and Status in the United States

Native Range

From McCormack and Coughran (2011):

"*Cherax setosus* is a medium-sized crayfish with a lowland, coastal distribution extending from just south of Taree to just north of Morisset in eastern New South Wales [Australia], a northeast-southwest distance of approximately 150km."

Status in the United States

This species has not been reported as introduced or established in the United States.

From Washington Department of Fish and Wildlife (2018):

"These species are considered by the commission to have a high risk of becoming an invasive species and may not be possessed, imported, purchased, sold, propagated, transported, or released into state waters except as provided in RCW 77.15.253. […] The following species are classified as prohibited animal species: […] Family Parastacidae: Crayfish: All genera except *Engaeus*, and except the species *Cherax quadricarninatus* [*sic*], *Cherax papuanus*, and *Cherax tenuimanus*."

Means of Introduction into the United States

This species has not been reported as introduced or established in the United States.

Remarks

From Austin et al. (2003):

"*Cherax setosus* was first described as *C. rotundus setosus* by Riek (1951) […] Riek later changed his mind on the status of this subspecies and listed it as a synonym of *C. rotundus* (Riek 1969). Austin (1996), in a study utilising allozyme and morphological data, considered *C. setosus* to be taxonomically distinct, but with close affinities to *C. destructor*, and as a result recommended recognition at the subspecific level."

"Finding in this study that *C. setosus*, *C. destructor* and *C. rotundus* differ from each other by similar amounts justifies the recognition of *C. setosus* at the species level. Recent cross-breeding studies between *C. setosus* and *C. destructor* by Lawrence *et al.* (1998) and Lawrence and Morrissy (2000) indicate that, while successful matings can be achieved between *C. destructor* and *C. setosus*, brood sizes are low and aberrant sex ratios are generated, indicating a degree of genetic incompatibility and additional support for the recognition of *C. setosus* at the species level."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From WoRMS (2018):

"Biota > Animalia (Kingdom) > Arthropoda (Phylum) > Crustacea (Subphylum) > Multicrustacea (Superclass) > Malacostraca (Class) > Eumalacostraca (Subclass) > Eucarida (Superorder) > Decapoda (Order) > Pleocyemata (Suborder) > Astacidea (Infraorder) > Parastacoidea (Superfamily) > Parastacidae (Family) > *Cherax* (Genus) > *Cherax setosus* (Species)"

"Status accepted"

Size, Weight, and Age Range

From McCormack and Coughran (2011):

"The largest specimens in the ACP [Australian Crayfish Project] collection reach a maximum weight of 64g, and a maximum length of 46.58mm OCL [ocular carapace length] (ACP 938 and 2157). However, during surveys for this species by the senior author in the 1980s, larger specimens were recorded, with a maximum weight of up to 95g for males and just below 80g for females. Females above 20g are generally reproductively mature."

Environment
From McCormack and Coughran (2011):

"The species is rarely found in permanent aquatic habitats in the area, but builds extensive burrow networks in minor, ephemeral habitats such as gullies, roadside ditches, stump holes, swamps and pastures."

Climate/Range
From McCormack and Coughran (2011):

"Rainfall is relatively high in this coastal area [central coast of New South Wales, Australia]"

"[…] lowland (<200m a.s.l.) […]"

Distribution Outside the United States
Native
From McCormack and Coughran (2011):

"*Cherax setosus* is a medium-sized crayfish with a lowland, coastal distribution extending from just south of Taree to just north of Morisset in eastern New South Wales [Australia], a northeast-southwest distance of approximately 150km."

Introduced
No introductions of this species have been reported.

Means of Introduction Outside the United States
No introductions of this species have been reported.

Short Description
From McCormack and Coughran (2011):

"Rostrum broad and short […], reaching to base or middle of 3rd antennal segment, apex with small blunt acumen spine. Rostral carinae raised and smooth, lacking marginal spines and terminating in a rounded boss. Dorsal surface of cephalon smooth, lacking any development of a median carina. Post-orbital ridges distinct, with or without a small spine at anterior end. Antennal squame inflated distal to midlength. Suborbital spine small to tiny. Interantennal spine broader than long. Areola narrow, approximately 13.5 times as long as wide at narrowest point, positioned towards anterior end. Dactylus lacking any development of marginal spines at base. Lateral and dorsal surface of propodus punctuated, lateral margin curved and fully calcified. 6-11 mesial propodal spines, only extending anteriorly to around 80% of propodal palm length. Distinct patch of setation extending across much of ventral propodal surface. 1 large, broad and hooked mesial carpal spine. Sternal keel deeply excavated between lateral processes to the first and second pereopods, resulting in a spine-like projection at the first pereopods. Lateral

processes to the 5th pereopods fused directly together, with no development of any additional calcified plate or spine."

"Colour varies greatly with populations. There are two common colours, green or brown with a blue tinge, and two less common colours, a bright blue and a very deep blue that is almost black. On most specimens there is an orange tinge to the tip of the claws and the ventral edge of the chelae, and an orange to red colouration in the joints. Ventrally, crayfish are light cream in colour. These crayfish do not have a prominent mottling pattern on their claws like *Cherax destructor*. The mottling pattern that is present is very subtle and hard to see on most specimens, depending on the colour variety."

Biology

From McCormack and Coughran (2011):

"Although we have not recorded quantitative reproductive data, our general field observations suggest that *C. setosus* is a relatively prolific species that breeds in summer, commencing around the start of September and continuing until April. It would also appear that a large proportion of all adult females breed, at least once per year (some observations suggest a small proportion breed more than once per year). Clutch size for breeding females usually ranges from approximately 70 to 300 eggs. Interestingly, no intersex specimens have yet been recorded for this species."

"The species constructs extensive burrows along the water's edge, with multiple entrance holes and multiple corridors and chambers. Burrows were often capped with clay in dry conditions, presumably to limit moisture loss."

"However, crayfish were occasionally found taking up temporary residence (i.e., without burrows) under debris along the banks of permanent streams following storm events. […] More commonly, specimens were found in isolated puddles after the water had receded from temporarily flooded land areas. It is conceivable that the species takes advantage of flood conditions to disperse along drainage lines and overland. Sampling indicated that eels were common in habitats with permanent water, and the presence of a large predator such as this may influence the distribution of *C. setosus*. Crayfish were not captured from any sites at which eels were observed."

"Our trapping data indicate that *C. setosus* are nocturnally active, and we also observed animals actively wandering in aquatic habitats searching for food. Animals were occasionally active during the day at sites with deeper water (~200mm), or where the water was turbid or contained dense weed habitats."

"This species actively hunts live food, and during spotlight surveys crayfish were observed feeding on tadpoles, frogs, earth worms, shrimp and fish. *Cherax setosus* co-occurs with several other crayfish species, including *Euastacus reductus* Riek, 1969, *E. spinifer* (Heller, 1865), a currently undescribed species of *Gramastacus*, and a translocated pest species, *C. destructor*."

Human Uses
No information available.

Diseases
From McCormack and Coughran (2011):

"White tail disease, burn spot disease and ectocommensals were commonly observed."

White tail disease is OIE-reportable.

Threat to Humans
No information available.

3 Impacts of Introductions
No information available. No introductions of this species have been reported.

From Washington Department of Fish and Wildlife (2018):

"These species are considered by the commission to have a high risk of becoming an invasive species and may not be possessed, imported, purchased, sold, propagated, transported, or released into state waters except as provided in RCW 77.15.253. […] The following species are classified as prohibited animal species: […] Family Parastacidae: Crayfish: All genera except *Engaeus*, and except the species *Cherax quadricarninatus* [*sic*], *Cherax papuanus*, and *Cherax tenuimanus*."

4 Global Distribution

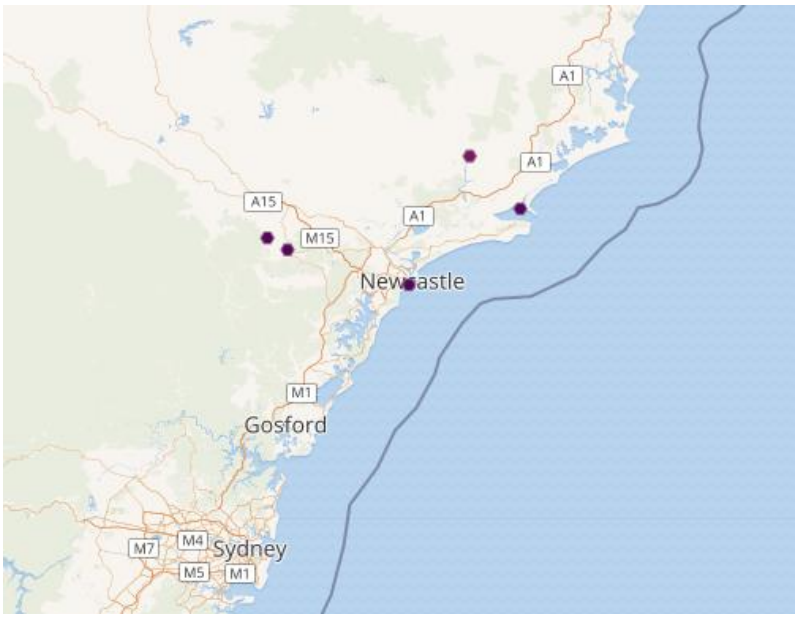


Figure 1. Reported occurrences of *Cherax rotundus setosus* (now *C. setosus*) along the central New South Wales coast, southeastern Australia. Map from GBIF Secretariat (2017). No georeferenced occurrences were reported under the name *C. setosus*.

5 Distribution within the United States

This species has not been recorded in the U.S.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) for *Cherax setosus* is medium to high in the southern and southeastern U.S. from Virginia to Arizona, particularly in the states of Florida and Texas, and less so in the lower Mississippi River basin and southern Appalachian Mountains. Low climate matches were found in the northern and western U.S., stretching down into Nebraska, Colorado, and Utah in the interior. Climate 6 score indicated that the contiguous U.S. has a medium climate match overall. Scores between 0.005 and 0.103 are classified as medium match; Climate 6 score for *C. setosus* was 0.028.

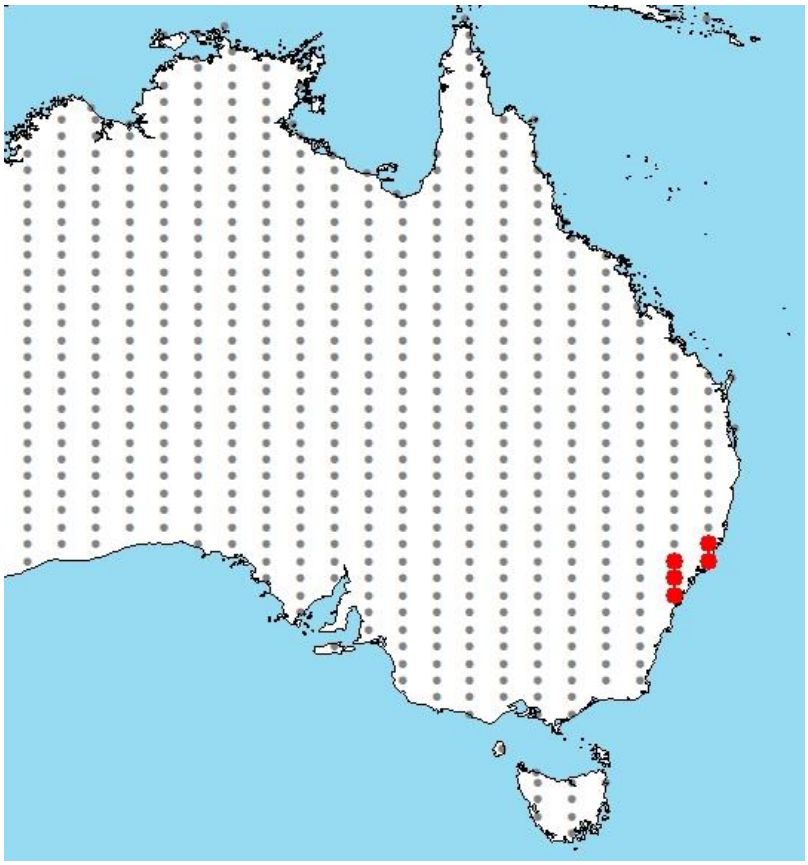


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations in eastern Australia selected as source locations (red) and non-source locations (gray) for *Cherax setosus* climate matching. Source locations from GBIF Secretariat (2017) and McCormack and Coughran (2011).

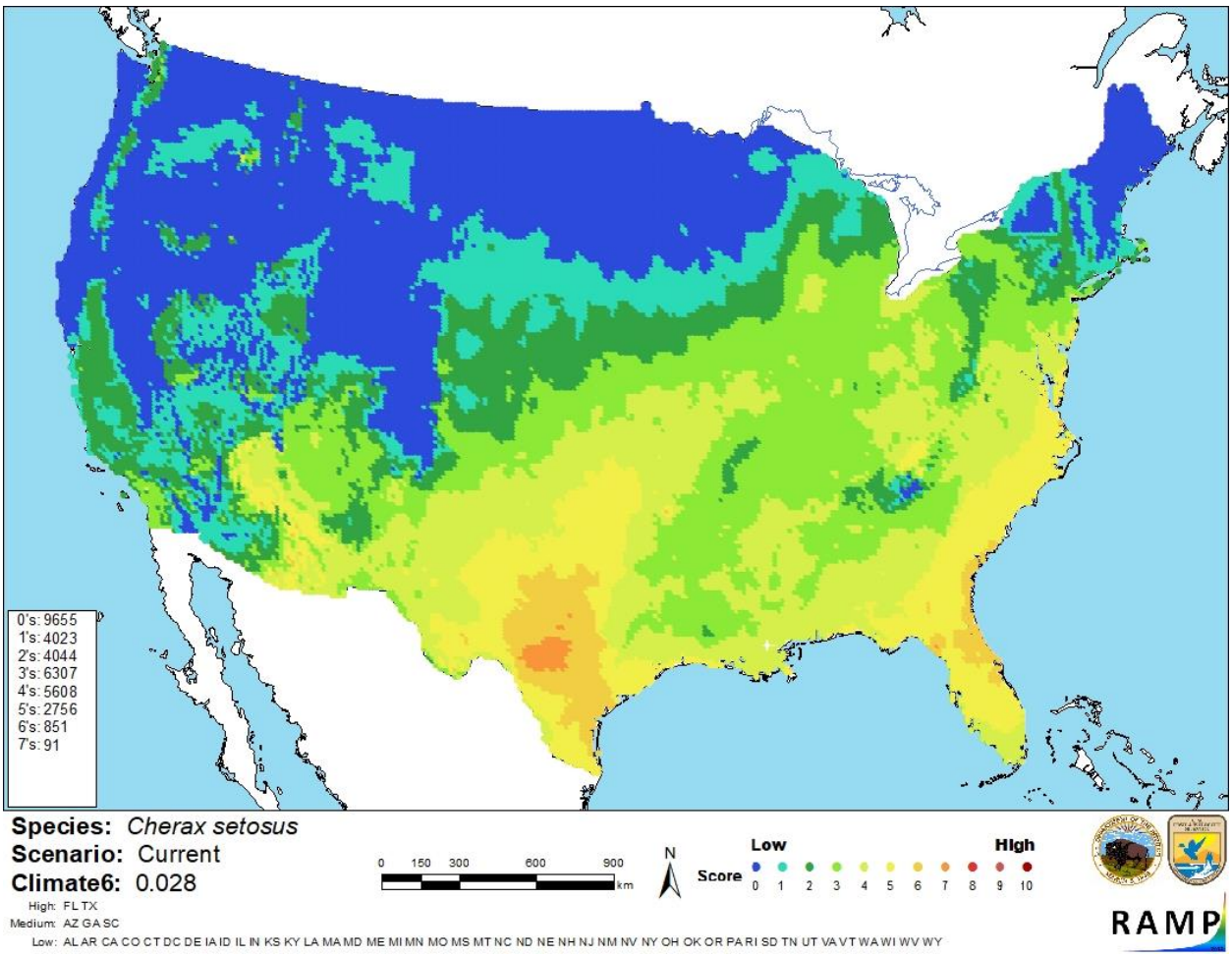


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Cherax setosus* in the contiguous United States based on source locations reported by GBIF Secretariat (2017) and McCormack and Coughran (2011). 0=Lowest match, 10=Highest match.

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

Limited information is available on the ecology, biology, and distribution of *Cherax setosus*, with most information coming from a single publication. No introductions of this species have been reported, so no impacts of introductions are known. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Cherax setosus is a crayfish native to the central coast of New South Wales, Australia. It was only recently defined as a unique species, previously having been considered a subspecies of *C. rotundus* or *C. destructor*. As a result, little information is available on *C. setosus*. No introductions of this species are known, so there is no known history of invasiveness. Along with nearly all other *Cherax* crayfish species, the State of Washington prohibits possession, sale, and transport of *C. setosus* because of perceived risk that the species could become invasive if introduced. Climate match to the contiguous U.S. for *C. setosus* showed the most suitable climates occurring in Florida and Texas, with a medium match overall. Because of the lack of introduction history, overall risk posed by *C. setosus* is uncertain.

Assessment Elements

- **History of Invasiveness: Uncertain**
- **Climate Match: Medium**
- **Certainty of Assessment: Low**
- **Remarks/Important additional information: Susceptible to white spot disease, which is OIE-reportable.**
- **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.

Austin, C. M., T. T. T. Nguyen, M. M. Meewan, and D. R. Jerry. 2003. The taxonomy and phylogeny of the '*Cherax destructor*' complex (Decapoda : Parastacidae) examined using mitochondrial 16S sequences. Australian Journal of Zoology 51:99-110.

GBIF Secretariat. 2017. GBIF backbone taxonomy: *Cherax rotundus* Clark, 1941. Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/4648611. (April 2018).

McCormack, R. B., and J. Coughran. 2011. Taxonomy, distribution and ecology of the Setose Yabby, *Cherax setosus* (Riek, 1951). Crustacean Research 40:1-11.

Sanders, S., C. Castiglione, and M. Hoff. 2014. Risk Assessment Mapping Program: RAMP. U.S. Fish and Wildlife Service.

Washington Department of Fish and Wildlife. 2018. WAC 220-12-090 classification - nonnative aquatic animal species. Washington Department of Fish and Wildlife, Olympia, Washington. Available: https://wdfw.wa.gov/ais/wac.html. (April 2018).

WoRMS. 2018. *Cherax setosus* Riek, 1951. *In* World Register of Marine Species. Available: http://www.marinespecies.org/aphia.php?p=taxdetails&id=885578. (April 2018).

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.

Austin, C. M. 1996. Systematics of the freshwater crayfish genus *Cherax* Erichson (Decapoda: Parastacidae) in northern and eastern Australia: electrophoretic and morphological variation. Australian Journal of Zoology 44:259-296.

Lawrence, C., and N. M. Morrissy. 2000. Genetic improvement of marron, *Cherax tenuimanus* Smith and yabbies *Cherax* spp. in Western Australia. Aquaculture Research 31:69-82.

Lawrence, C., N. M. Morrissy, J. Bellanger, and Y. W. Cheng. 1998. Enhancement of yabby production from Western Australian farm dams. Fisheries Western Australia Fisheries Research Report no. 112.

Riek, E. F. 1951. The freshwater crayfish (Family Parastacidae) of Queensland. With an appendix describing other Australian species. Records of the Australian Museum 22:368-388.

Riek, E. F. 1969. The Australian freshwater crayfish (Crustacea: Decapoda: Parastacidae). Australian Journal of Zoology 15:103-121.