

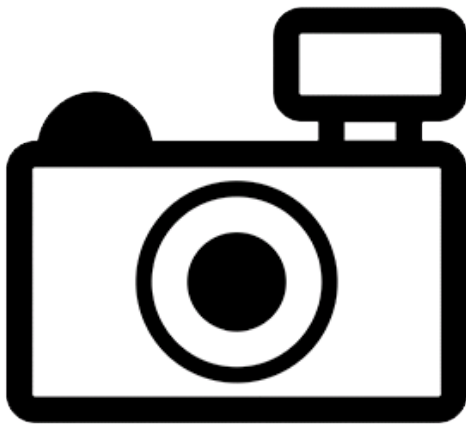
***Corbicula sandai* (a clam, no common name)**

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, September 2011

Revised, November 2018, December 2018

Web Version, 4/3/2019



No Photo Available

1 Native Range and Status in the United States

Native Range

From Kasai et al. (2016):

“*Corbicula sandai* is an endemic bivalve which inhabits Lake Biwa and the Yodo River, Japan.”

Status in the United States

Corbicula sandai has not been reported as introduced or established in the wild or in trade in the United States.

Means of Introductions in the United States

Corbicula sandai has not been reported as introduced or established in the wild or in trade in the United States.

Remarks

Do (2012) considers *Corbicula sandai* is a synonym of *Corbicula bocourti* with a native range in Cambodia, Laos, Thailand, and Vietnam. However, Cahn (1951), Okawa et al. (2015), and Kasai et al. (2016) consider *C. sandai* a separate species with a native range in Japan. The U.S. Fish and Wildlife Service has chosen to evaluate *C. sandai* as a separate, valid species with the native range in Japan.

From Do (2012):

“There is much confusion about what is a valid species in the genus *Corbicula*. A high degree of local variation, apparently due to environmental factors, has led to a significant degree of over-description of taxa, and a modern revision is required before the conservation status of the species can be evaluated.”

From Okawa et al. (2015):

“The populations of both these native species [*Corbicula leana* and *C. sandai*] have been decreasing, and they are now treated as threatened species (VU) in the Red List of the Japan Ministry of the Environment (Japan Ministry of the Environment 2012). One of the causes of native clam population decline is the introduction of the alien clam *Corbicula fluminea* (O.F. Müller, 1774).”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

Cahn (1951), Okawa et al. (2015), and Kasai et al. (2016) consider *Corbicula sandai* a valid species with a native range in Japan.

From Encyclopedia of Life (2018):

“[Kingdom] Animalia”
“[Phylum] Mollusca”
“[Class] Bivalvia”
“[Order] Veneroida”
“[Family] Corbiculidae”
“[Genus] *Corbicula*”
“[Species] *Corbicula sandei*”

Size, Weight, and Age Range

No information on size, weight or age range was found.

Environment

From Cahn (1951):

“The genus *Corbicula* is a group of small fresh-water clams [...]

“This *Corbicula* inhabits bottoms composed of sand having an admixture of pebbles and shows a marked distaste for muddy areas. A weak current is also a requirement.”

Climate/Range

No information on climate or range was found for *Corbicula sandai*.

Distribution Outside the United States

Native

From Kasai et al. (2016):

“*Corbicula sandai* is an endemic bivalve which inhabits Lake Biwa and the Yodo River, Japan.”

Introduced

From Cahn (1951):

“*Corbicula sandai* originally was found only in Biwa-ko [Lake Biwa], but now it is found also in the waters of Kyoto City and in other nearby districts which belong to the system of this lake.”

“This *Corbicula* had been transplanted from Biwa-ko to Suwa-ko in Nagano Prefecture. [...] The clams did not propagate in spite of the success in transplantation, [...]

Means of Introduction Outside the United States

Cahn (1951) implies that *Corbicula sandai* was transplanted in Japan for aquaculture.

Short Description

From Cahn (1951):

“*C. sandai* is a peculiar form of *Corbicula* inasmuch as the umbones are unusually high and prominent [...]. The young shell has the shape of an isosceles triangle but this gradually becomes wedge-shaped as the clam approaches the adult stage, as a result of the extension of the posterior region. The concentric rings on the shell are very rough and quite regular in arrangement. The outer surface of the shell is orange yellow during juvenile stages but becomes lustrous black with age and maturity. The area outside of the pallial line on the inner surface of the shell is dark purple, the area within the pallial line suffused with light purple. The hinge line is thick and strong and three main teeth are prominent. The angle of both groups of lateral teeth is less than 90° and the posterior lateral teeth are long.”

Biology

From Glaubrecht et al. (2006):

“[...] only *C. sandai*, [...] has some other unusual features (e.g. being diploid, dioecious with uniflagellate sperm), was found in an earlier study (Hurukawa & Mizumoto 1953) to be nonbrooding with its larvae being nonswimming, transforming into benthic juveniles immediately after leaving the egg capsules at a size of 0.18 mm [...].”

From Kasai et al. (2016):

“*C. sandai* has a unique early life ecology as it does not have a larval stage but rather settles to the bottom as a plantigrade just after the hatching.”

From Cahn (1951):

“The clam buries itself from two to six centimeters deep during the winter, reappearing at the surface in late March or early April.”

“The life history and development is unknown, but Miyazaki (1936) reports *C. sandai* to be dioecious. According to Kawabata (1931), this corbicula reaches its maximum fatness during April and May "when the wisteria flowers open" and suddenly decreased in meat weight in June "when the wisteria blossoms fall". He states that spawning occurs during these months. During the period June to September the weight is light and the flavor poor. [...] Kawabata also pointed out that the quality varies with the habitat. Clams inhabiting muddy places are poor in quality and taste, while clams from sandy or sandy-pebbled areas where the water is clear and fast flowing are superior in quality.”

Human Uses

From Kasai et al. (2016):

“Until the middle of the last century it was a dominant member of the benthic community of Lake Biwa, playing a major role in the aquatic ecosystem and water purification. It was also one of the most important fisheries resources in the lake, with annual peak landings of approximately 6000 tons in the 1950s. However, *C. sandai* landings began to decline in the 1960s and have become less than 100 tons annually (only 1 % of its peak) in recent years.”

From Cahn (1951):

“The genus *Corbicula* is a group of small fresh-water clams represented in Japan Proper by four species [...], three species of which are used as food by the Japanese.”

“One person is able to gather from 53 to 95 liters of clams per day.”

“The shelled clams are sold fresh in the Kyoto and Otsu markets under the name of Kawashijimi.”

Diseases

No information on diseases was found. No OIE-reportable diseases were found to be associated with *Corbicula sandai*.

Threat to Humans

No information on threats to humans was found.

3 Impacts of Introductions

From Cahn (1951):

“Kuroda (1936) reported that the form changed from the original triangular to round, owing to the influence of the environment. The clams did not propagate in spite of the success in transplantation, and their flavor was inferior to that of original Biwa-ko *Corbicula*.”

No negative impacts were found reported other than change in taste due to the introduction of *Corbicula sandai* into non-native waters.

4 Global Distribution

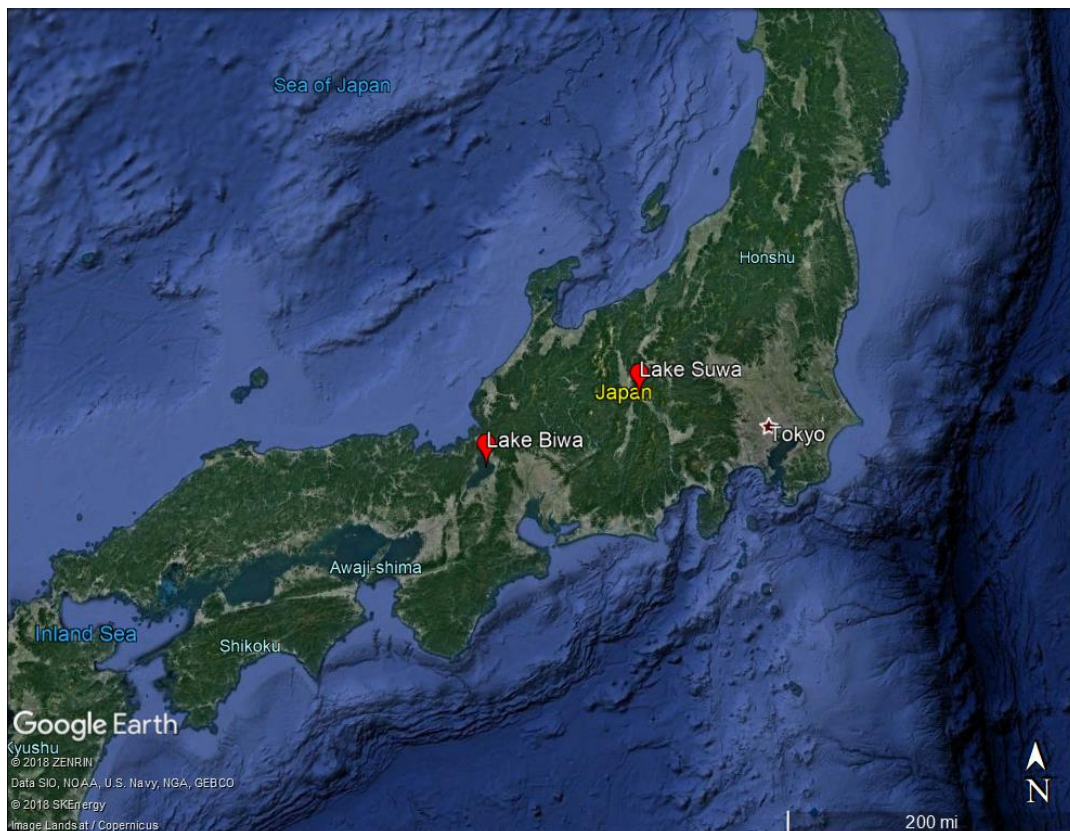


Figure 1. Known global distribution of *Corbicula sandai*. Source locations from Cahn (1951) and Kasai et al. (2016). Map created in Google Earth Pro.

5 Distribution Within the United States

Corbicula sandai has not been documented within the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.069, a medium score. The range for a medium climate score is between 0.005 and 0.103. The contiguous United States is nearly split in half by this climate match. The eastern half of the United States has mostly medium and high climate matches while the western half of the United States is mostly very low. However, the area around the Great Lakes, New England, southern Florida and much of the inland areas of the Southeastern United States also had low matches. Florida, Illinois, Indiana, Maryland, Missouri, North Carolina, New Jersey, Ohio, Pennsylvania, South Carolina, Virginia and West Virginia all had high individual climate scores. Alabama, Arkansas, Delaware, Kentucky, Mississippi, New York and Oklahoma all had medium individual climate scores. The remainder of the states had low individual climate scores.

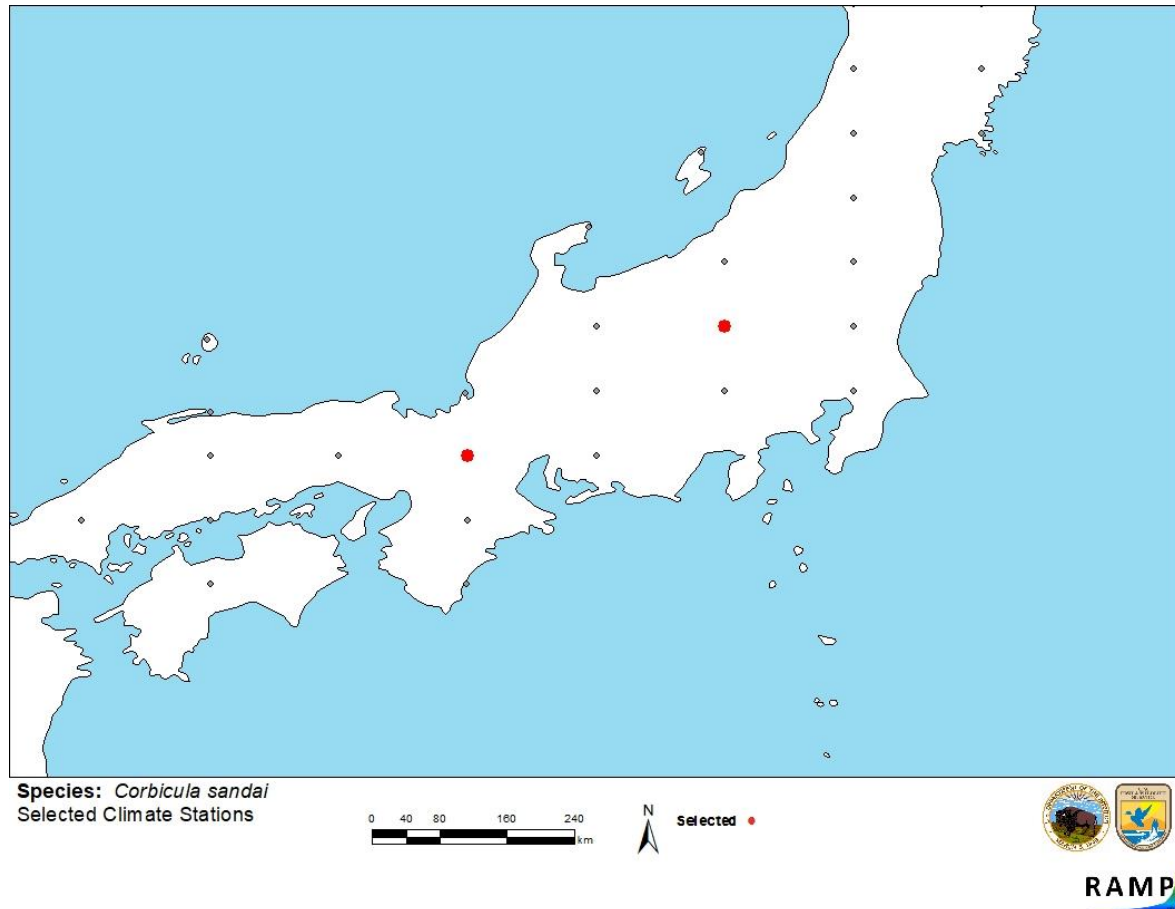


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Japan selected as source locations (red) and non-source locations (gray) for *Corbicula sandai* climate matching. Source locations from Cahn (1951) and Kasai et al. (2016).

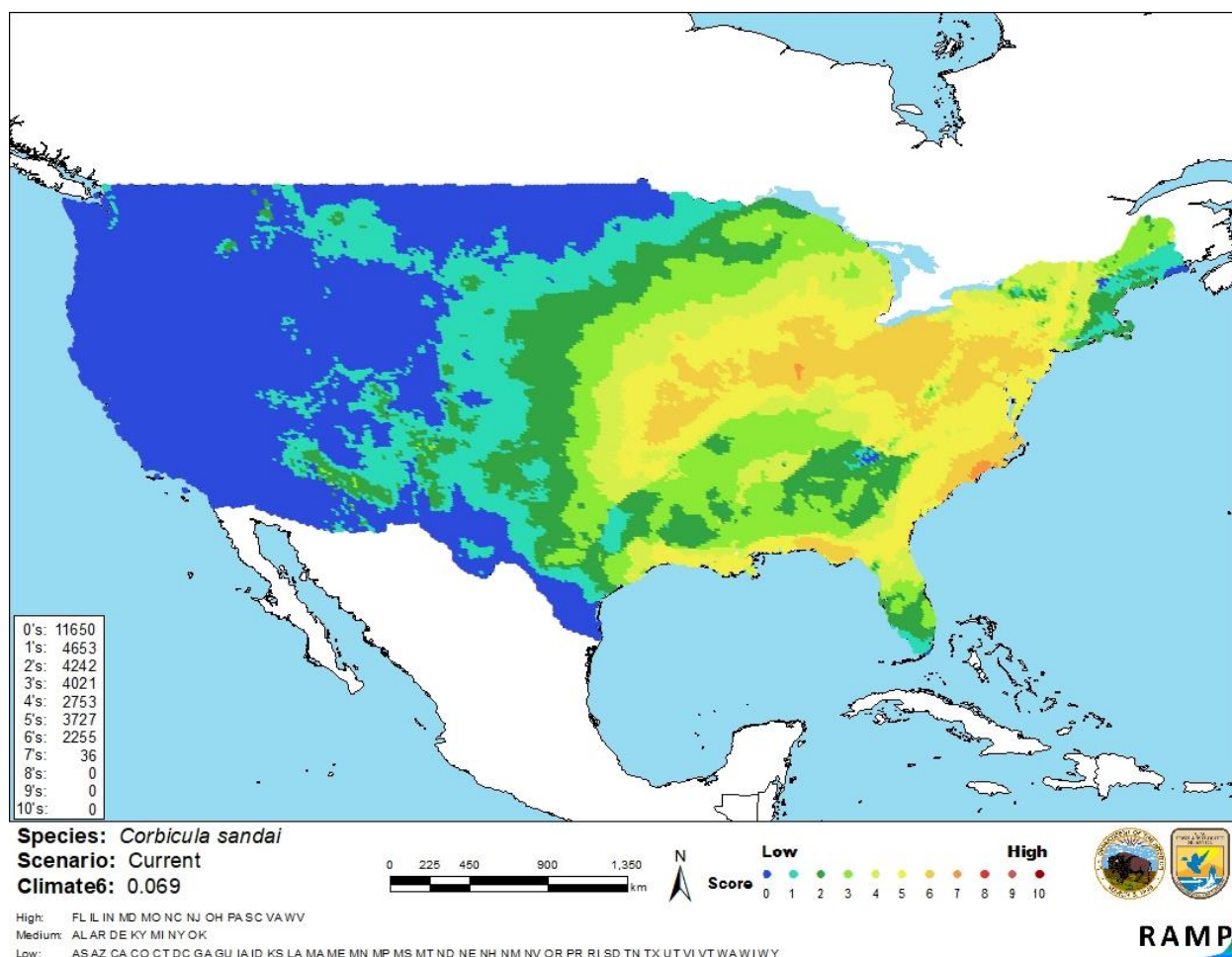


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Corbicula sandai* in the contiguous United States based on source locations reported by Cahn (1951) and Kasai et al. (2016). 0 = Lowest match, 10 = Highest match.

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

7 Certainty of Assessment

Limited information is available on *Corbicula sandai*. The species in the *Corbicula* genus are often confused with each other and there is little known about their life histories. Cahn (1951) states that *C. sandai* has become established in new waterways adjacent to the native range but no information has been recorded about negative impacts caused by these new populations. The certainty of assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Corbicula sandai, is a freshwater clam native to Lake Biwa and the Yodo River in Japan. *C. sandai* is a popular food resource in Japan, which has led to a decline in the population size. The history of invasiveness is not documented. This species has been transplanted to Suwa-ko in Nagano Prefecture, Japan. No negative impacts have been documented in this location. Records of new established populations in waterways in Japan were found, but there was no information on impacts from those populations. The climate match for the contiguous United States was medium. In general, the Eastern States had higher climate matches than the Western States. The certainty of assessment is low due to a lack of information and taxonomic uncertainty. The overall risk assessment category for *Corbicula sandai* is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Low**
- **Remarks/Important additional information: No additional information**
- **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.

Cahn, A. H. 1951. Clam culture in Japan. Reprinted as U.S. Fish and Wildlife Service Fishery Leaflet Number 399:75–79.

Do, V. 2012. *Corbicula bocourti*. The IUCN Red List of Threatened Species 2012: e.T201428A2706152. Available: <https://www.iucnredlist.org/species/201428/2706152>. (November 2018).

EOL (Encyclopedia of Life). 2018. *Corbicula sandei*. Available: <https://eol.org/pages/35216035/names>. (November 2018).

Glaubrecht, M., Z. Feher, and T. von Rintelen. 2006. Brooding in *Corbicula madagascariensis* (Bivalvia, Coriculidae) and the repeated evolution of viviparity in corbiculids. *Zoologica Scripta* 35(6):641–654.

Kasai, A., D. Ishizaki, and T. Isoda. 2016. Isotopic trophic-step fractionation of freshwater clam *Corbicula sandai*. *Fish Science* 82:491–498.

Okawa, T., Y. Kurita, K. Kanno, A. Koyama, and N. Onikura. 2016. Molecular analysis of the distributions of the invasive Asian clam, *Corbicula fluminea* (O. F. Muller, 1774), and the threatened native clam, *C. leana* Prime, 1867, on Kyushu Island Japan. *BioInvasions Records* 5(1):25–29.

Sanders, S., C. Castiglione, and M. Hoff. 2018. Risk assessment mapping program: RAMP, version 3.1. U.S. Fish and Wildlife Service.

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.

Hurukawa, M., and S. Mizumoto. 1953. An ecological study on the bivalve ‘Seta-shijimi’, *Corbicula sandai* Reinhardt on the Lake Biwa. II. On the development. *Bulletin of the Japanese Society of Scientific Fisheries* 19:91–94.

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Miyazaki, I. 1936. On the Development of some marine bivalves with special reference to the shelled larvae (II). *Journal of Imperial Fisheries Institute* 3(2):25–41.

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