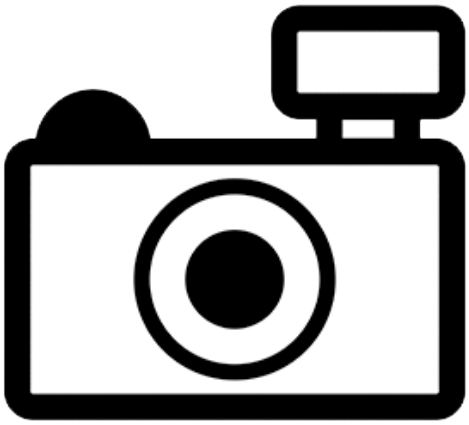
Japanese Corbicula (*Corbicula japonica*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, September 2011
Revised, March 2019
Web Version, 7/11/2019



No Photo Available

1 Native Range and Status in the United States

Native Range

From Palomares and Pauly (2019):

"Northwest Pacific: from south of Japan to the south of Sakhalin [island of Russia]."

From Glaubrecht et al. (2006):

"[…] *Corbicula japonica* in Japan, Korea and China […]."

Status in the United States

No records of *C. japonica* in the wild or in trade were found in the United States.

Means of Introductions in the United States

No introductions have been recorded outside of their native range.

Remarks
According to Korniushin (2004), the distribution of *Corbicula japonica* does not extend into China. The species there is closely related and referred to as *Corbicula cf. japonica*. Due to this no records from China were considered in the distribution for this species.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing
From Fofonoff et al. (2019):

"This Japanese diecious brackish-water species was synonymized with the hermaphroditic Middle Eastern *C. fluminalis* (Morton 1986), but is now regarded as a distinct species."

From GBIF Secretariat (2019):

"Kingdom Animalia
Phylum Mollusca
Class Bivalvia
Order Venerida
Family Cyrenidae
Genus *Corbicula*
Species *Corbicula japonica* Prime"

Size, Weight, and Age Range
According to Harada and Nishino (1995), they observed *C. japonica* shell lengths ranged from 5mm to 29mm.

According to Korniushin (2004) the largest specimen they observed through a study was 31.4mm in length, 30.5mm in height.

Environment
From Palomares and Pauly (2019):

"Benthic; brackish; depth range 0 - 6 m [Baba et al. 2004]."

From Baba et al. (1999):

"*C. japonica* is distributed in brackish water lakes and tidal flats of rivers […]."

Climate/Range
From Palomares and Pauly (2019):

"Subtropical"

From Baba et al. (1999):

"[…] (about 35º N) to […] (about 50º N) (Kafanov 1991)."

Distribution Outside the United States

Native

From Palomares and Pauly (2019):

"Northwest Pacific: from south of Japan to the south of Sakhalin [island of Russia]."

From Glaubrecht et al. (2006):

"[…] *Corbicula japonica* in Japan, Korea and China […]."

Introduced

C. japonica has not been reported anywhere outside of its native range.

Means of Introduction Outside the United States

C. japonica has not been reported anywhere outside of its native range.

Short Description

From Harada and Nishino (1995):

"The outer surface of the siphons and surrounding mantle groove are dark, or almost black in *C. japonica*, […]."

"The innermost papillae are distinctly coloured with a dark band in *C. japoncia*, […]."

From Korniushin (2004):

"Representative specimens of *Corbicula japonica* […] included in this study were characterised by compressed shells with anteriorly shifted umbo, broad, unevenly spaced ribs, and bright glossy periostracum. External colouration was dark brown, internal white with darker area at posterior end."

"*Corbicula japonica* and the conchologically similar Chinese form differed from the above described taxa in having broader siphons with slitlike apertures […]. The siphonal papillae were distinctly more numerous: not less than 80 around inhalant siphon (organised in three rows), and about 30 around exhalant siphon (one complete row). Siphons were poorly pigmented internally, having only a narrow dark stripe at the base of each inhalant siphon papilla, another dark spot is seen in the middle of each large papilla […]; small papillae of inhalant siphon and papillae of exhalant siphon were pale yellowish, without any spots or stripes. External surface of siphons and internal surface of mantle edge around siphons were dark brown. Papillae of the fused mantle lobes were numerous and arranged in several rows. Marginal mantle papillae were similar to those of the other studied taxa."

"In contrast, radial muscles of *C. japonica* were weaker, and their arrangement is loose, individual bundles being separated […]."

Biology

From Palomares and Pauly (2019):

"Found in subtidal areas of estuaries in mud [Bernard et al. 1993]. Infaunal suspension-feeder […]. Members of the class Bivalvia are mostly gonochoric, some are protandric hermaphrodites. Life cycle: Embryos develop into free-swimming trocophore larvae, succeeded by the bivalve veliger, resembling a miniature clam [Ruppert et al. 2004]."

From Oshima et al. (2004):

"Both specimens did not grow in winter when the water temperature was below 11°C, but grew rapidly from spring to early summer when the water temperature rose from 15°C to 30°C, before further growing slowly from summer to autumn after the main breeding period."

From Glaubrecht et al. (2006):

"Corbicula japonica which is dioecious, nonbrooding and characterized by the development of free-swimming veligers (see details in Morton 1986; Byun & Chung 2001), […]."

From Baba et al. (1999):

"Maru (1981) reported the spawning season of *Corbicula japonica* to be July to September."

"It takes about 1 d [day] to reach the veliger stage after fertilization, and the planktonic phase is about 6 to 10 d [days] in *Corbicula japonica* (Tanaka 1984)."

"[…] spawning began at temperatures above 22ºC, and inhibition of spawning by high temperature was not observed […]."

"In the spawning induction experiment, some groups spawned at salinities of 1.2 or 2.3 psu […], but these salinities were insufficient for larval development […]. In our experiment, the salinity that guaranteed embryonic and larval development to the D-shaped veliger stage was 3.1 psu, and the value at which half of the swimming larvae reached the veliger stage was 2.7 psu […]."

"[…] larvae of *C. japonica* may be capable of salinity-related movement."

"Reproduction appears to succeed less frequently in northern than in southern populations of *Corbicula japonica*, because the necessary environmental conditions for spawning depend heavily on temperature."

From Goshima et al. (1999):

"[…] in cold months, the clams burrowed up to 12cm into the sand sediment, but in warm months, they occurred exclusively within 3cm of the sediment surface. "

Human Uses

From Palomares and Pauly (2019):

"Fisheries: commercial"

From Yamada et al. (2014):

"Artificial stocking of *C. japonica* for commercial fishing has been actively carried out in Japan (Nakamura, 2000)."

From Baba et al. (1999):

"*Corbicula* spp. are harvested commercially in Japan. The annual catch ranged from 24 000 to 27 000 t in 1994 to 1996 (Ministry of Agriculture, Forestry and Fisheries 1996-1997), among which *Corbicula japonica* was the main species."

Diseases

No OIE-reportable diseases (OIE 2019) were found to be associated with *Corbicula japonica*.

Poelen et al. (2104), states *C. japonica* is a host of the Norwalk virus.

Threat to Humans

No information on threats to humans was found.

3 Impacts of Introductions

No introductions of *Corbicula japonica* have been recorded.

4 Global Distribution

Figure 1. Map of southern Asia, showing known locations in Japan and South Korea where *Corbicula japonica* is established.

The location in Taiwan (Figure 1) was not used to selected source points in the climate match because no reports for an established population in the country were found in the literature.

5 Distribution Within the United States

No records of *Corbicula japonica* were found in the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match varies greatly for the contiguous United States. The areas surrounding the Great Lakes had a high climate match. Moving west, the Central United States had a medium to low climate match throughout, and the Pacific Coast had a consistently low climate match. There were additional areas of low climate match in the coastal areas of New England and Florida. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for contiguous United States was 0.174, indicating a high overall climate match (scores of 0.103 and greater are considered high). About half of 48 contiguous States had high individual Climate 6 scores. Alabama, Arkansas, Connecticut, Iowa, Massachusetts, Minnesota, Montana, New Mexico, and Texas had medium individual Climate 6 scores. Arizona, California, Colorado, Idaho, Louisiana, Mississippi, North Dakota, Nebraska, Nevada, Oregon, Rhode Island, South Dakota, Utah, Washington, and Wyoming had low individual Climate 6 scores.

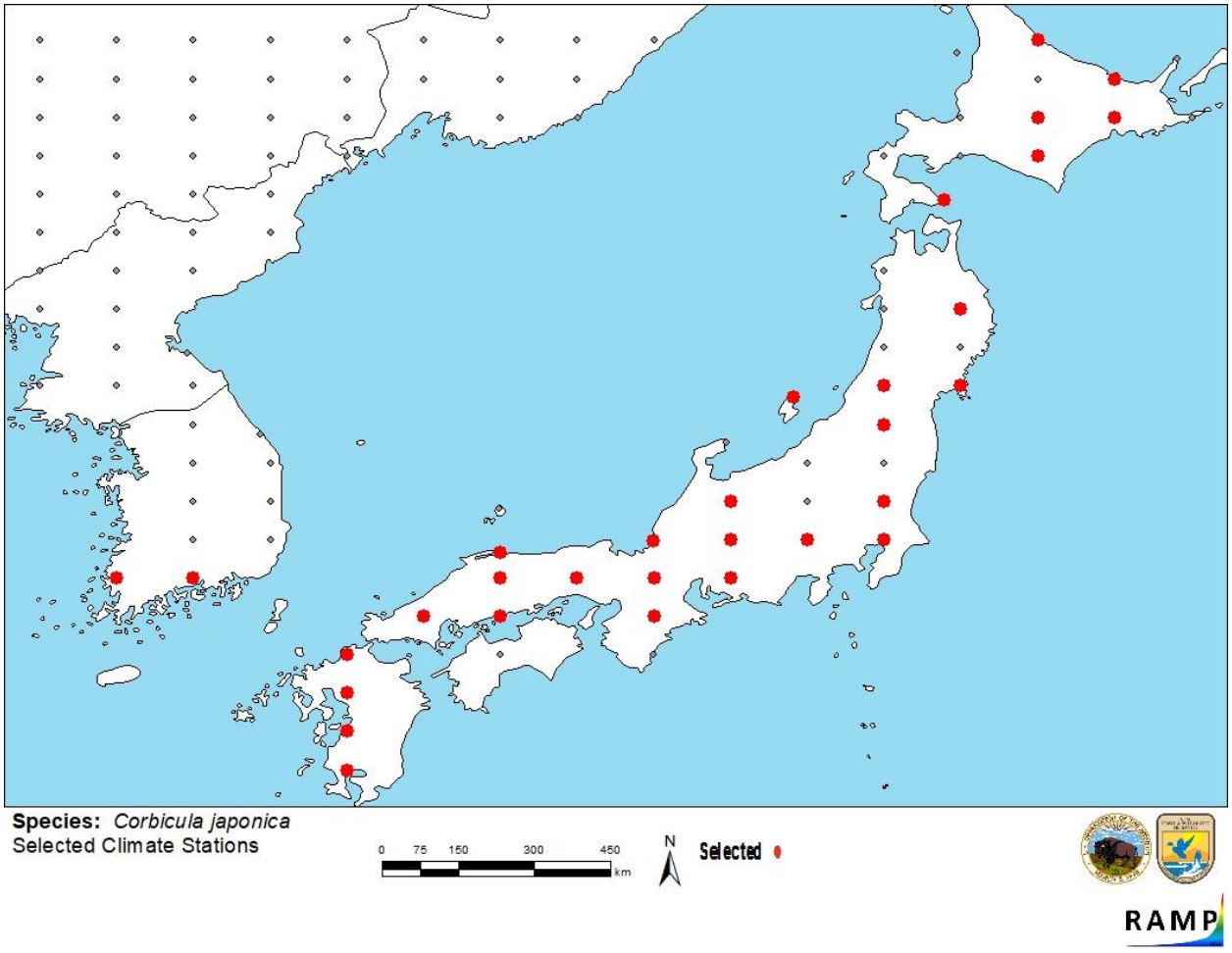


Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Japan and South Korea selected as source locations (red) and non-source locations (gray) for *Corbicula japonica* climate matching. Source locations from GBIF Secretariat (2019).

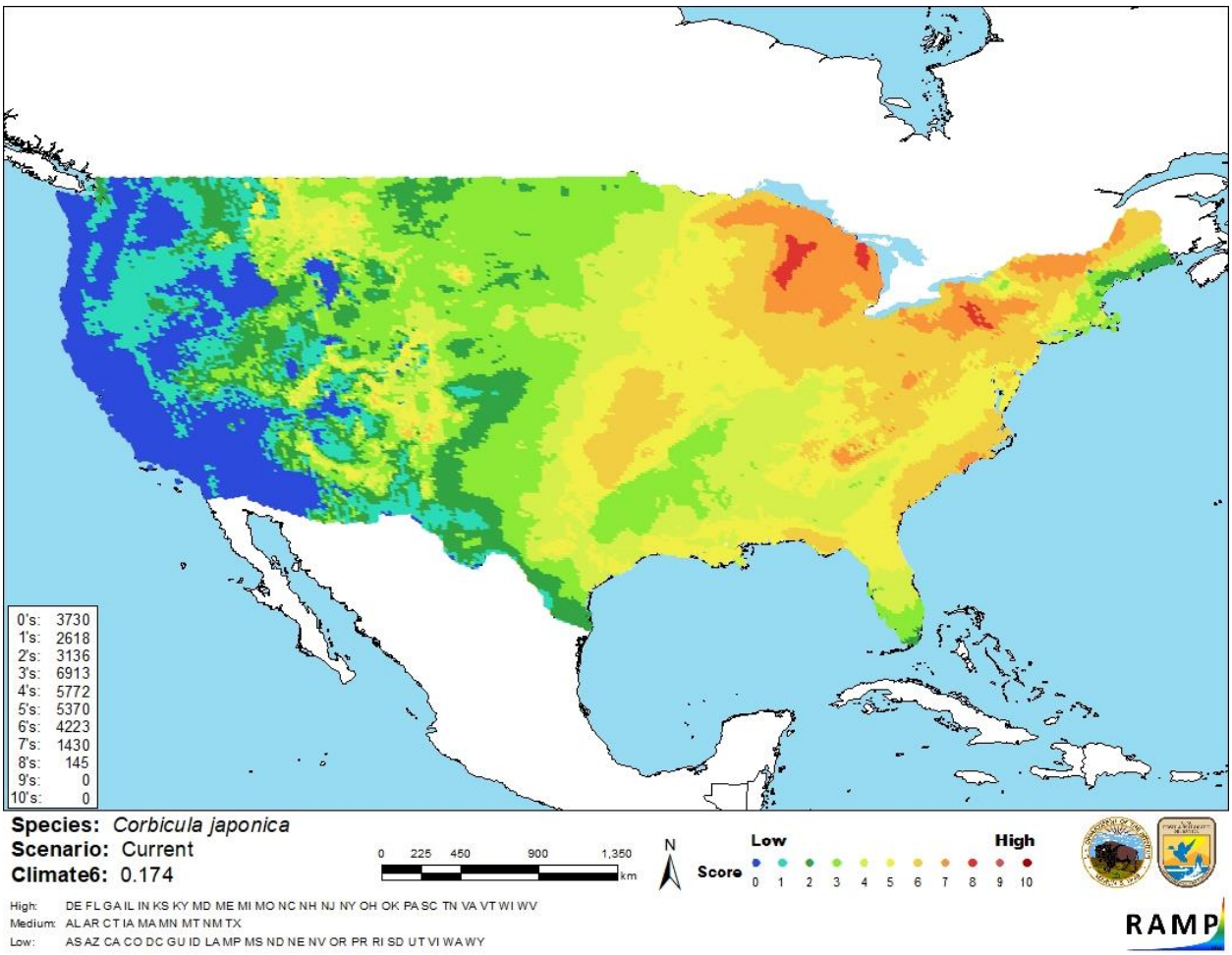


Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Corbicula japonica* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

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

The certainty of assessment is low. Information is available on the biology and environment of *C. japonica*, but there are no records of introduction. Therefore, impacts of introduction cannot be determined.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Corbicula japonica is a brackish water clam found in Japan and South Korea. *C. japonica* is commercially harvested in Japan for a food source. The history of invasiveness is uncertain. No introductions have been reported for *C. japonica* anywhere outside of their native range. The overall climate match for the contiguous United States is high with areas of high climate match concentrated in the Great Lakes region and the Northeast. The certainty of assessment is low due to lack of information. The overall risk assessment category for *Corbicula japonica* is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **Remarks/Important additional information:** No additional remarks.
- **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.

Baba, K., T. Kawajiri, Y. Kuwahara, and S. Nakao. 2004. An environmentally based growth model that uses finite difference calculus with maximum likelihood method: its application to the brackish water bivalve *Corbicula japonica* in Lake Abashiri, Japan. Fisheries Bulletin 102:14–24.

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