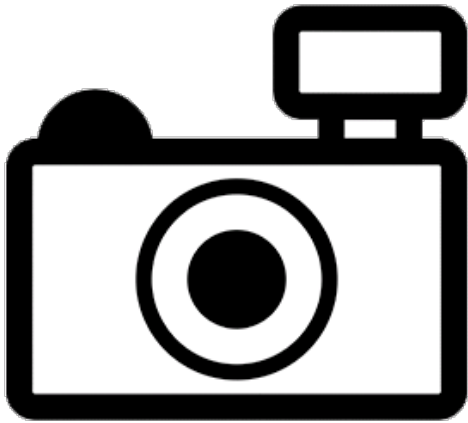


Sinanodonta tumens (a bivalve, no common name)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, December 2021
Revised, March 2022
Web Version, 4/10/2023

Organism Type: Mollusk
Overall Risk Assessment Category: Uncertain



No Photo Available

1 Native Range and Status in the United States

Native Range

From Lopes-Lima et al. (2020):

“*Sinanodonta tumens* is endemic to Lake Biwa and effluents in central Honshu in Japan.”

Status in the United States

No records of *Sinanodonta tumens* in trade or in the wild in the United States were found.

Means of Introductions in the United States

No records of *Sinanodonta tumens* in the wild in the United States were found.

Remarks

Inconsistent treatment of *Sinanodonta tumens* exists in published literature with recent sources indicating *S. ogurae* is also a junior synonym of *S. tumens*. This assessment follows the World Register of Marine Species (MolluscaBase 2022a) in treating *S. tumens* as a valid species but does not include information found for *S. ogurae*, which was also treated as a valid species at the time of this assessment (MolluscaBase 2022b). The taxonomic authorities used in this ERSS are defined in the SOP for the ERSS process and can be found online (<https://fws.gov/node/415801>). In cases where no information was available for *S. tumens*, additional information may be available in the ERSS for *S. ogurae* (USFWS 2022).

Both the valid name *S. tumens* and the original name *Anodontites lautus tumens* were used when conducting literature searches in preparation of this ERSS. Information from recent sources using *S. tumens* for information originally attributed to *S. ogurae*, or its synonyms, was excluded from this assessment.

From Mabuchi et al. (2021):

“[...] the scientific name ‘*Sinanodonta ogurae*’ was synonymized under *S. tumens* in Lopes-Lima et al. (2020).”

From Graf and Cummings (2021):

“*S. tumens* (Haas, 1910) [= *S. woodiana* s.l. in part + *S. ogurae* (Kuroda & Habe, 1987)]”

Additional information for *S. tumens* was found during this assessment in languages other than English.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From MolluscaBase (2022a):

“Animalia (Kingdom) Mollusca (Phylum) Bivalvia (Class) Autobranchia (Subclass) Heteroconchia (Infraclass) Palaeoheterodonta (Subterclass) Unionida (Order) Unionoidea (Superfamily) Unionidae (Family) Unioninae (Subfamily) Cristariini (Tribe) *Sinanodonta* (Genus) *Sinanodonta tumens* (Species)”

“Status accepted
Rank Species”

Size, Weight, and Age Range

No information on size, weight and age range was found for *Sinanodonta tumens*.

Environment

From MolluscaBase (2022a):

“Environment [...] fresh [...]”

From Aijoka et al. (2014):

“The measured pH value in the surface water of Lake Biwa has an annual average of 8.1 and is lowest (~ 7.6) in winter and highest (~ 8.8) in summer, whereas the pH of the bottom water at a depth of 59 m ranges from 7.2 to 7.7 with an average value of ~ 7.5 (off Minami-Hira: 35°1103900 N, 135°5903900 E; data from the Lake Biwa Environmental Research Institute, <http://www.pref.shiga.lg.jp/biwako/koai/hakusyo/index.html>).”

“The modern measured temperature of surface water in Lake Biwa has an annual average of 16.9°C and is lowest (~ 7.6°C) in winter and highest (~ 27.9°C) in summer, whereas the temperature of bottom water at a depth of 59 m ranges from 7.2 to 8.2°C with an annual average of ~ 7.7°C (off Minami-Hira; data from the Lake Biwa Environmental Research Institute, <http://www.pref.shiga.lg.jp/biwako/koai/hakusyo/index.html>).”

Climate

From Aijoka et al. (2014):

“The climate of the [Lake Biwa] area is affected by the East Asian monsoon (Yoshino, 1965): summer monsoon brings warm and humid conditions and winter monsoon brings snowfall to the northern part of the area and dryness to the southern part.”

Distribution Outside the United States

Native

From Lopes-Lima et al. (2020):

“*Sinanodonta tumens* is endemic to Lake Biwa and effluents in central Honshu in Japan.”

Introduced

No records of introductions were found for *Sinanodonta tumens*.

Means of Introduction Outside the United States

No records of introductions were found for *Sinanodonta tumens*.

Short Description

No information on a short description was found for *Sinanodonta tumens*.

Biology

No information on biology was found for *Sinanodonta tumens*.

Human Uses

No information on human uses was found for *Sinanodonta tumens*.

Diseases

No records of OIE-reportable diseases (OIE 2022) were found for *Sinanodonta tumens*.

No information available on diseases associated with *Sinanodonta tumens*.

Threat to Humans

No information on threat to humans was found for *Sinanodonta tumens*.

3 Impacts of Introductions

No records of introductions were found for *Sinanodonta tumens*; therefore, there is no information on impacts of introduction.

4 History of Invasiveness

No evidence was found for *Sinanodonta tumens* having ever been transported (through trade or other mechanisms) outside its native range. Therefore, the history of invasiveness is classified as No Known Nonnative Population.

5 Global Distribution

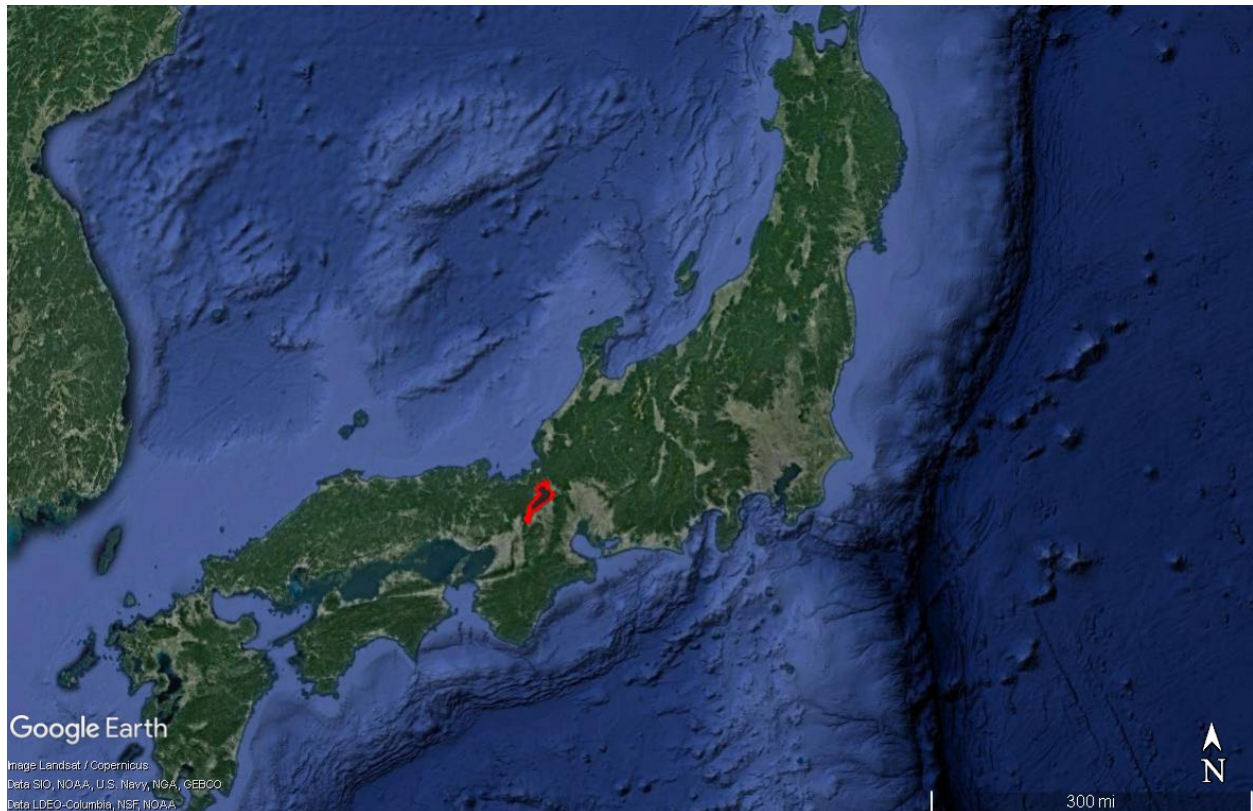


Figure 1. Known global distribution of *Sinanodonta tumens*. *S. tumens* has been reported from the Lake Biwa area on Honshu Island, Japan (outlined in red); georeferenced occurrences have not been reported. Map from Google Earth (2022) based on the native range described by Lopes-Lima et al. (2020).

6 Distribution Within the United States

No records of *Sinanodonta tumens* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Sinanodonta tumens* was generally medium to high in the eastern portion of the contiguous United States and low from the Great Plains westward. High matches were primarily found along the Atlantic Coast from New Jersey to northern Florida with smaller isolated areas also in northern Appalachia, southeastern Texas, and eastern Oklahoma. In addition to the nearly continuous area of low match from the Great Plains westward; other low matches were found in the northern Northeast region, upper Great Lakes Basin, and southern tip of Florida. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.173, High (scores greater than 0.103, inclusive, are classified as high). The following States had high individual Climate 6 scores: Alabama,

Arkansas, District of Columbia, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Missouri, Mississippi, North Carolina, New Jersey, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Connecticut, New York, Kansas, and Texas had medium individual scores. All other States had low scores. The climate match for *S. tumens* was based on the native range described by Lopes-Lima et al. (2020) because no georeferenced occurrences were available.

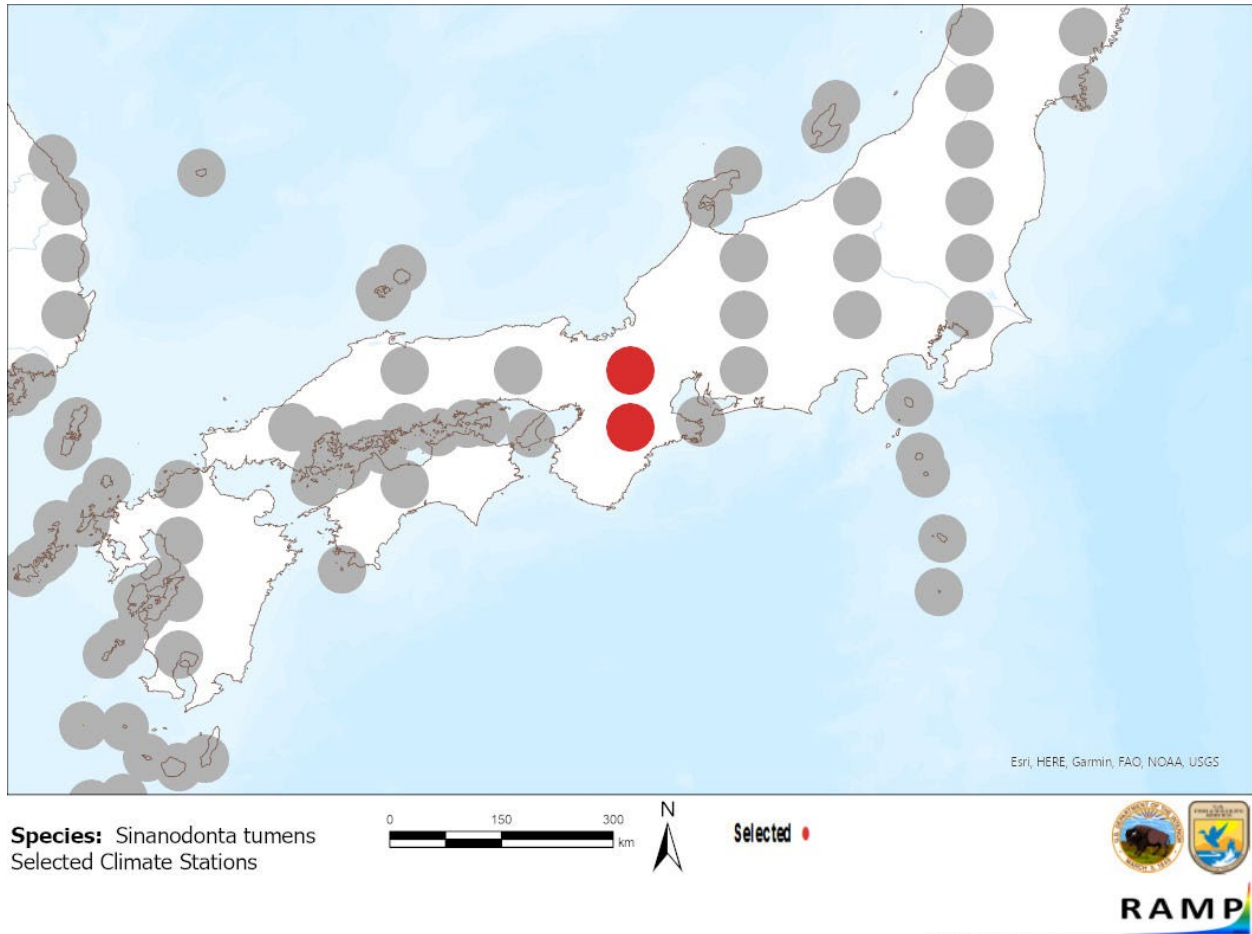


Figure 2. RAMP (Sanders et al. 2021) source map showing weather stations on Honshu Island, Japan selected as source locations (red) and non-source locations (gray) for *Sinanodonta tumens* climate matching. Source locations are based on the native range described by Lopes-Lima et al. (2020).

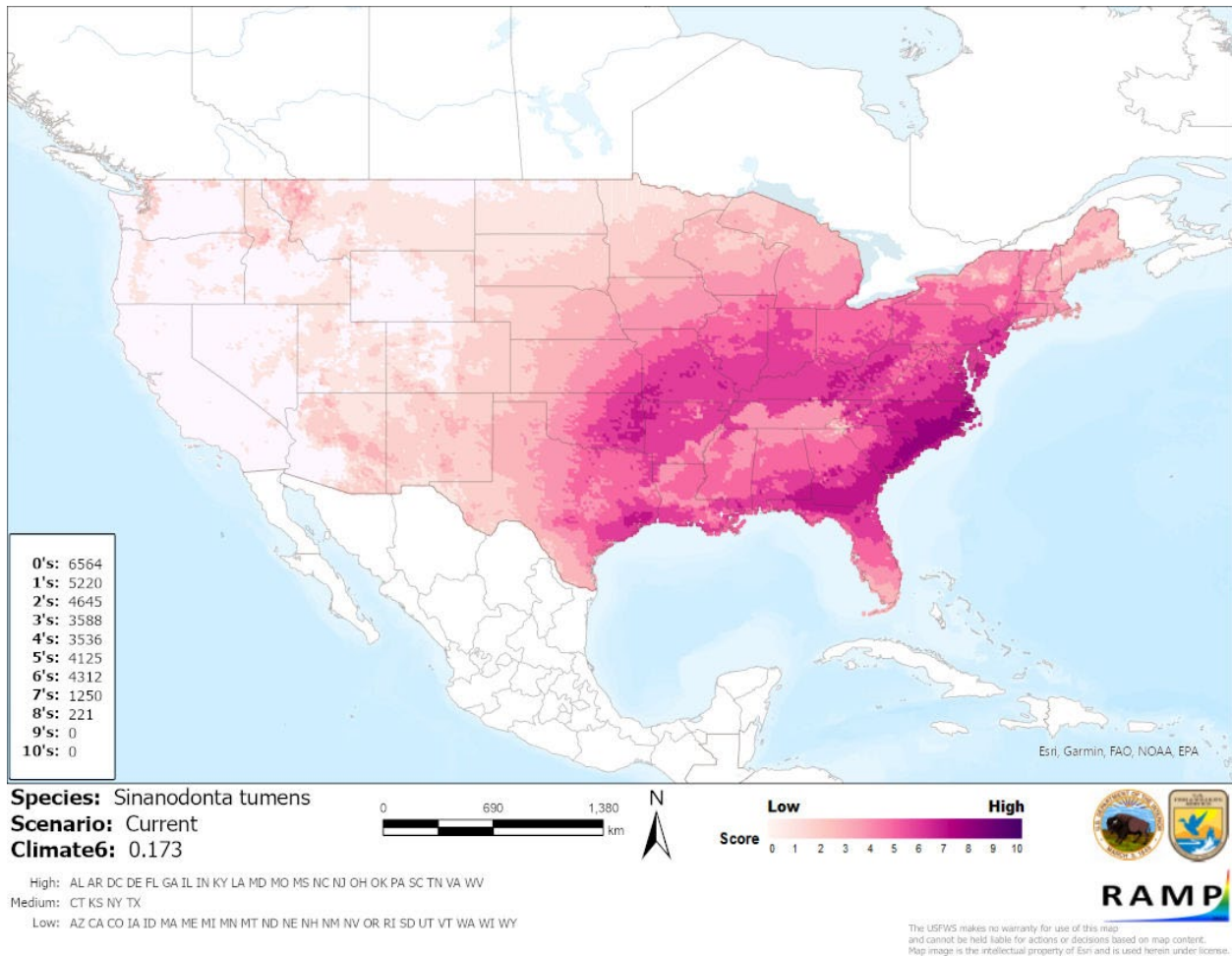


Figure 3 Map of RAMP (Sanders et al. 2021) climate matches for *Sinanodonta tumens* in the contiguous United States based on source locations derived from the native range described by Lopes-Lima et al. (2020). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

Sinanodonta tumens has not been recorded anywhere in the world outside of its native range. With no information on history of invasiveness or impacts of introduction, the certainty of assessment is Low. Additionally, when excluding information attributed to *S. ogurae* (a potential

synonym; see Remarks), biological information for *S. tumens* was limited and no georeferenced occurrences were available.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Sinanodonta tumens is a freshwater bivalve endemic to Lake Biwa, Japan. This species has not been reported anywhere outside of its native range, resulting in a history of invasiveness of No Known Nonnative Population. The overall climate match with the contiguous United States was High, especially in the southern and eastern regions. The climate match was based on the written description of the species range as no georeferenced observations were available. The certainty of assessment is Low due to lack of information, particularly when excluding information attributed to *S. ogurae* which several recent sources consider to be synonym of *S. tumens*. The overall risk assessment category for *S. tumens* is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population.**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information: Recent sources treat *Sinanodonta ogurae* as a synonym of *S. tumens*.**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

Ajioka T, Yamamoto M, Takemura K, Hayashida A, Hayashida A, Kitagawa H. 2014. Water pH and temperature in Lake Biwa from MBT0 /CBT indices during the last 280 000 years. *Climate of the Past* 10:1843–1855.

Google. 2022. Google Earth desktop. Map data from Landsat/Copernicus, SIO, NOAA, U.S. Navy, NGA, GEBCO, LDEO-Columbia, NSF.

Graf DL, Cummings KS. 2021. A ‘big data’ approach to global freshwater mussel diversity (Bivalvia: Unionoida), with an updated checklist of genera and species. *Journal of Molluscan Studies* 87:eyaa034.

Lopes-Lima M, Hattori A, Kondo T, Lee JH, Kim SK, Shirai A, Hayashi H, Usui T, Sakuma K, Toriya T, Sunamura Y, Ishikawa H, Hoshino N, Kusano Y, Kumaki H, Utsugi Y, Yabe S, Yoshinari Y, Hiruma H, Tanaka A, Sao K, Ueda T, Sano I, Miyazaki JI, Gonçalves DV, Klishko OK, Konopleva ES, Vikhrev IV, Kondakov AV, Gofarov MY, Bolotov IN, Sayenko EM, Soroka M, Zieritz A, Bogan AE, Froufe E. 2020. Freshwater mussels

(Bivalvia: Unionidae) from the rising sun (Far East Asia): phylogeny, systematics, and distribution. *Molecular Phylogenetics and Evolution* 146:106755.

Mabuchi K, Nishida K, Nakajima N. 2021. Complete F mitochondrial genomes of two freshwater mussels from the Lake Biwa system in Japan: *Beringiana fukuharai* and *Sinanodonta tumens*. *Mitochondrial DNA Part B* 6(9):2491–2493.

MolluscaBase. 2022a. *Sinanodonta tumens* (Haas, 1910). World Register of Marine Species. Available: <https://www.marinespecies.org/aphia.php?p=taxdetails&id=1461382> (March 2022).

MolluscaBase. 2022b. *Sinanodonta ogurae* (Kuroda & Habe, 1987). World Register of Marine Species. Available: <https://www.marinespecies.org/aphia.php?p=taxdetails&id=1384731> (March 2022).

[OIE] World Organisation for Animal Health. 2022. Animal diseases. Available: <https://www.oie.int/en/what-we-do/animal-health-and-welfare/animal-diseases/> (January 2022).

Sanders S, Castiglione C, Hoff M. 2021. Risk Assessment Mapping Program: RAMP. Version 4.0. U.S. Fish and Wildlife Service.

[USFWS] U.S. Fish & Wildlife Service. 2022. *Sinanodonta ogurae*. Ecological Risk Screening Summary. U.S. Fish & Wildlife Service. In preparation.

11 Literature Cited in Quoted Material

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.

Kuroda T, Habe T. 1987. Description of *Oguranodonta ogurae* gen. et sp. nov. *Venus, Japanese Journal of Malacology* 45:215–218.

Yoshino MM. 1965. Four stages of the rainy season in early summer over East Asia (part I), *Journal of the Meteorological Society of Japan* 43:231–245.