

Common River Snail (*Viviparus viviparus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2022
Revised, May 2022
Web Version, 8/22/2022

Organism Type: Snail
Overall Risk Assessment Category: High



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https://commons.wikimedia.org/wiki/File:Viviparus_viviparus_-_Orne_Caen_France_-_P1010084.jpg (February 23, 2022).

1 Native Range and Status in the United States

Native Range

From Van Damme et al. (2014):

“This large freshwater gastropod is found mainly in Europe to 62°N (Kerney 1999). It has a Palearctic range, occurring principally in the lowlands of northern, central and eastern Europe plus southern Scandinavia. It is generally rare in southern Europe. In northern and central Europe it has been recorded from the UK and Ireland in the west; Norway, Sweden, Latvia, Estonia and Denmark in North; Portugal in the south; and Germany, Switzerland, Italy, Slovenia to Greece and Bulgaria in the east. Fauna Europea (Bank et al. 2006) list the range as Norway, Sweden, Denmark (mainland), Estonia, Latvia, Lithuania, Kalingrad region (Russia), Poland, Republic of

Ireland (Eire), Great Britain (UK), Netherlands, Belgium, Luxembourg, France (mainland), Germany, Czech Republic, Bulgaria, Romania, Portugal (mainland), Albania, Macedonia, Slovenia, Croatia, Bosnia & Herzegovina, Montenegro, and Ukraine.”

“Kantor *et al.* (2009) report the species from Transcaucasia, suggesting a possible presence in the countries of Armenia, Azerbaijan, and Georgia.”

From Cotton (1996):

“This is the first record of this species [*Viviparus viviparus*] having been found living in Ireland, [...]”

“Given the history of old shells having been found in three major and one minor Irish catchment, spanning the extremities of the country, it is likely that the species is native to Ireland.”

Status in the United States

No known current populations in the United States. *Viviparus viviparus* was not found to be in trade in the United States.

According to USGS (2022), *Viviparus viviparus* has been reported as non-native in the following States (years of reports and watersheds given after State name):

- Washington D.C. (1974; Middle Potomac-Anacostia-Occoquan)
- Maryland (1974-1977; Conococheague-Opeguon, Middle Potomac-Catoctin, Nanticoke, Patuxent)

GBIF-US (2022) contains records of *Viviparus viviparus* observed in California, Florida, Oregon, and Illinois.

Means of Introductions in the United States

From USGS (2022):

“Potential Pathway: released aquarium (Dundee 1974)”

Remarks

There is conflicting evidence on introduced populations of *Viviparus viviparus*. GBIF Secretariat (2022) and CABI (2019) state that it is introduced into Norway, Germany, and Ukraine. CABI (2019) also states that it was introduced into Ireland and the United States. Van Damme et al. (2014) noted Norway, Germany, Ireland, and Ukraine as native range. *V. viviparus* was previously observed in the 1970s in the United States (USGS 2022) but no recent records of this species exist.

From Van Damme et al. (2014):

“Yildirim *et al.* (2006) report the presence in Turkey, although it is listed under the subspecies *V. viviparus costae* which is sometimes treated separately as a distinct species. The type locality for *V. costae* is the region around Istanbul.”

“In most countries in western Europe this species is considered to be Least Concern, however it is declining throughout the range. In Germany, it is placed as category 2 (Endangered), and in Poland category 3 (Rare). In Great Britain, it was listed as Least Concern, since although the species is currently declining, it is still widespread (Seddon and Killeen pers. comm. 2010). In the Netherlands, it is considered as Least Concern (Bruyne *et al.* 2003). In the Republic of Ireland, it is considered Not Applicable (Byrne *et al.* 2009). In Slovakia, it is listed as Vulnerable (Beran *et al.* 2005). In Switzerland, it is considered to be category 2 (Turner *et al.* 1994).”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From MolluscaBase (2022):

“Biota Animalia (Kingdom) > Mollusca (Phylum) > Gastropoda (Class) > Caenogastropoda (Subclass) > Architaenioglossa (Order) > Viviparoidea (Superfamily) > Viviparidae (Family) > Viviparinae (Subfamily) > *Viviparus* (Genus) > *Viviparus viviparus* (Species)”

“Status accepted”

Size, Weight, and Age Range

From MolluscaBase (2022):

“usually 26-30 mm high (though recorded up to 40), 23-28 mm broad”

From Van Damme et al. (2014):

“This species can live to 10 years (occasionally more).”

Environment

From Van Damme et al. (2014):

“This species is found in a relatively large range of freshwater habitats, particularly large slow-flowing water bodies and it avoids places with seasonal dessication (Kerney 1999). It lives in a relatively narrow range of deep, clean, calcareous habitats. In some parts of Europe, it is virtually restricted to canals and large, slow-flowing rivers.”

From Yanygina (2012):

“*V. viviparus* mollusks were recorded in all types of bottom sediments studied (silted and sandy grounds and silted sands) and preferred the littoral part of the reservoir at a depth of up to 10 m. The water transparency at sites inhabited by mollusks was mainly 0.5–0.7 m.”

Climate

From Van Damme et al. (2014):

“This large freshwater gastropod is found mainly in Europe to 62°N (Kerney 1999).”

Distribution Outside the United States

Native

From Van Damme et al. (2014):

“This large freshwater gastropod is found mainly in Europe to 62°N (Kerney 1999). It has a Palaearctic range, occurring principally in the lowlands of northern, central and eastern Europe plus southern Scandinavia. It is generally rare in southern Europe. In northern and central Europe it has been recorded from the UK and Ireland in the west; Norway, Sweden, Latvia, Estonia and Denmark in North; Portugal in the south; and Germany, Switzerland, Italy, Slovenia to Greece and Bulgaria in the east. Fauna Europea (Bank et al. 2006) list the range as Norway, Sweden, Denmark (mainland), Estonia, Latvia, Lithuania, Kalingrad region (Russia), Poland, Republic of Ireland (Eire), Great Britain (UK), Netherlands, Belgium, Luxembourg, France (mainland), Germany, Czech Republic, Bulgaria, Romania, Portugal (mainland), Albania, Macedonia, Slovenia, Croatia, Bosnia & Herzegovina, Montenegro, and Ukraine.”

“Kantor *et al.* (2009) report the species from Transcaucasia, suggesting a possible presence in the countries of Armenia, Azerbaijan, and Georgia.”

From Cotton (1996):

“This is the first record of this species [*Viviparus viviparus*] having been found living in Ireland, [...]”

“Given the history of old shells having been found in three major and one minor Irish catchment, spanning the extremities of the country, it is likely that the species is native to Ireland.”

Introduced

There is conflicting evidence on some populations of *Viviparus viviparus* within Europe. CABI (2019) lists *Viviparus viviparus* as introduced and present in Germany, Ireland, Norway, and Ukraine. Van Damme et al. (2014) noted Norway, Germany, Ireland, and Ukraine as native range. NOBANIS (2022) lists *Viviparus viviparus* as introduced to Germany and Norway. *V. viviparus* is listed as established in Norway and status unknown in Germany.

From Minchin (2016):

“All indications are that the snail is a recent arrival. Indeed it is possible this snail was introduced via a number of means to, and within, Ireland and is polyvectic [...]. However, there is no direct evidence of an arrival. [...] For this reason *V. viviparus* should be considered to be a cryptogen until further evidence becomes available.”

From Yanygina (2012):

“The gastropod *Viviparus viviparus* (L.) is one of the adventive species in the Ob River basin. This species was first recorded in the middle part of the Novosibirsk Reservoir [Russia] at the beginning of the 1990s.”

“Like the Novosibirsk Reservoir, *V. viviparus* mollusks appeared in the Bukhtarminsk Reservoir [Kazakhstan] at the beginning of the 1990s and started their spreading from the middle lake-river part of the reservoir.”

From Yanygina (2020):

“In 1949, *V. viviparus* was introduced into water bodies of the Crimean Peninsula.”

From Vinarski et al. (2015):

“In roughly the same years, *V. viviparus* penetrated into the Bukhtarma reservoir [Kazakhstan] (Yanygina, 2012), which is located in the upper reaches of the Irtysh River but is not geographically related to Western Siberia. In August 2009, we found live individuals of *V. viviparus* in an entirely different type of water body—a small almost dry oxbow connected to the Irtysh River and located north of the city of Tobolsk [Russia], in the area of the Tobolsk River Port [...].”

Abdel-Gawad and Khateeb (2010) collected *Viviparus viviparus* in small water bodies near the River Nile in Egypt. No further comment was given regarding the status of the potential population.

Means of Introduction Outside the United States

NOBANIS (2022) lists the introduction of *Viviparus viviparus* in Norway as ‘intentional’ but provides no further information.

From Yanygina (2012):

“Probably, this species [*Viviparus viviparus*] was occasionally introduced into the Novosibirsk Reservoir with fish introduction from water bodies of European Russia (Andreev et al., 2008).”

From Yanygina (2020):

“A major pathway of rapid dispersal of *V. viviparus* in the Novosibirsk reservoir was the use of untreated fishing nets.”

Short Description

No information found.

Biology

From Van Damme et al. (2014):

“It is a bottom-dwelling, suspension feeder that is usually found on a muddy substrate.”

“Mouthon (1996) showed that this species was moderately sensitive to biodegradable pollution.”

From Minchin et al. (1998):

“*Viviparus viviparus*, as its name would suggest, has no free-swimming larval stage.”

Human Uses

From Van Damme et al. (2014):

“This species is taken in Europe to supply the aquarium trade (van Damme pers. comm. 2012).”

Diseases

No records of OIE-reportable diseases (OIE 2022) were found for *Viviparus viviparus*.

MolluscaBase (2022) lists the following as parasites of *V. viviparus*: *Echinostoma bolschewense*, *E. echiniferum*, *E. jurini*, *E. laticauda*, *Neoacanthoparyphium echinatoides*, *N. petrowi*, *Cotylurus cornutus*, *Linstowiella viviparae*, and *Paracoenogonimus ovatus*.

Poelen et al. (2014) lists the following as additional parasites of *V. viviparus*: *Amblosoma exile*, *Diorchis inflata*, *Diploposthe laevis*, *Echinocotyle rosseteri*, *Fimbriaria fasciolaris*, *Leucochloridiomorpha lutea*, *Microsomacanthus compressa*, *M. paracompressa*, *M. paramicrosoma*, *M. spiralibursata*, and *Sobolevicanthus gracilis*

Threat to Humans

From Yanygina et al. (2020):

“It is known that common river snails can be intermediate hosts of trematodes pathogenic to humans.”

3 Impacts of Introductions

From Yanygina (2012):

“Mollusks [*Viviparus viviparus*] quickly colonized different types of grounds, and in 2007 they composed the main part of the zoobenthos biomass at the site, reaching 6300 g/m² on silts with an admixture of broken stone and pebbles (Andreev et al., 2008).”

“The comparison of the taxonomic composition and structure of benthic communities in parts with different development of *V. viviparus* shows that the dispersal of *V. viviparus* in some parts of the reservoir [Novosibirsk Reservoir] has resulted in reorganization of the zoobenthos structure. In parts with the mass development of *V. viviparus*, an insignificant decrease in the number of species and species diversity (according to the Shannon index of diversity) of benthic communities and an increase in the biomass of zoobenthos as compared with parts that are not occupied by *V. viviparus* (Table 2 [in source material]) were observed.”

“If at sites where *V. viviparus* mollusks are absent mainly chironomids and oligochaetes dominate by abundance and biomass, then at sites with the mass development *V. viviparus* the complex of species dominating by abundance includes larvae and pupae of blackflies (*Byssodon maculatus* (Meigen)) unusual for the middle part of the reservoir. Spreading of larvae and pupae of blackflies in soft grounds of the middle part of the Novosibirsk Reservoir, which prefer firm substrates for attachment of their individuals, is associated with colonies of *V. viviparus*, whose shells are used by blackflies as a substrate [...]. Mass colonies of bryozoans are found on shells of *V. viviparus*. In addition, at sites of Viviparidae spreading, other filter feeders common to the middle and lower parts of the reservoir such as small bivalved mollusks of families Euglesidae and Sphaeridae were not recorded.”

From Yanygina (2020):

“Invasion by *V. viviparus* caused profound transformation of benthic communities of the Novosibirsk reservoir. The large size and high density of this species have induced a significant increase in total biomass of the zoobenthos. High abundance of *V. viviparus* in some parts of the reservoir creates special conditions for native zoobenthos that results in a local decrease in species diversity and evenness of benthic communities and an increase in abundance and biomass of native macroinvertebrates.”

“The invasion by *V. viviparus* has led to a significant increase in the biomass of zoobenthos in the Novosibirsk reservoir, amounting to 1.8–8.4 g/m² in previous years (Yanygina 2011).”

“[...], invasion of the Novosibirsk reservoir by *V. viviparus* led to an increase in the density and biomass of benthic communities and a decrease in their homogeneity [...]. The increase in the density and biomass of native zoobenthos in areas with most abundant *V. viviparus* was, probably, associated with the use of mollusk pellets as a trophic resource. This hypothesis was confirmed by the transformed structure of bottom communities where *V. viviparus* aggregates were present. The discriminant analysis showed that the proportion of chironomids and oligochaetes increased in areas where *V. viviparus* was most abundant.”

“In contrast, this present study revealed no effect of *V. viviparus* invasion either on species richness or the density of indigenous gastropods in the Novosibirsk reservoir. There were few native species of gastropods in studied areas inhabited by *V. viviparus* and in those lacking *V. viviparus*.”

From Yanygina et al. (2020):

“The introduction of *V. viviparus* influenced the infrastructure of the Novosibirsk Reservoir: the huge emissions of empty shells on the banks of the reservoir limit access to its beaches, which impairs recreational usage. According to ichthyologists, the introduction of common river snails has led to a deterioration in the feeding conditions for the fish of the reservoir and a reduction in their feeding territory (Vizer and Dorogin, 2015). Many mollusks can interfere with the operation of hydraulic structures. With a high number of common river snails, clog-proof devices are clogged, and they also settle inside water pipes, creating difficulties in operation. Such settlements of common river snails are noted in the water supply system of thermal power plants on the Ob River channel (Vizer, A.M. and Vizer, L.S., 2016).”

From Vinarski et al. (2015):

“For the prevailing benthophage, bream, as well as for other fish of the Novosibirsk reservoir, this mollusk is available as a food only during a short period after hatching of juveniles with the shell height of about 5 mm and width of 5.6 mm. Our collections at the stations with high biomass of *V. viviparus* are dominated mainly by individuals with the shell height of more than 12 mm; therefore, a majority of mollusks in the population are not available to fish and are a dead end in terms of the output of fishing industry production.”

From NOBANIS (2022):

“Moderate invasion potential and minor ecological effect [in Norway]”

4 History of Invasiveness

There is conflicting evidence of introductions of *Viviparus viviparus* in Europe (Norway, Germany, Ireland, Ukraine). There are records of *V. viviparus* within the United States, but none have been observed or collected since 1977. It has also been collected in Egypt. Introductions of *V. viviparus* to western Siberia have resulted in established populations. Those introductions altered the structure of the macrobenthos community, altered fish foraging impacting fisheries, impeded recreational use of the waterbody, and negatively impacted infrastructure. There is evidence of this species in the aquarium trade. The history of invasiveness is classified as High.

5 Global Distribution

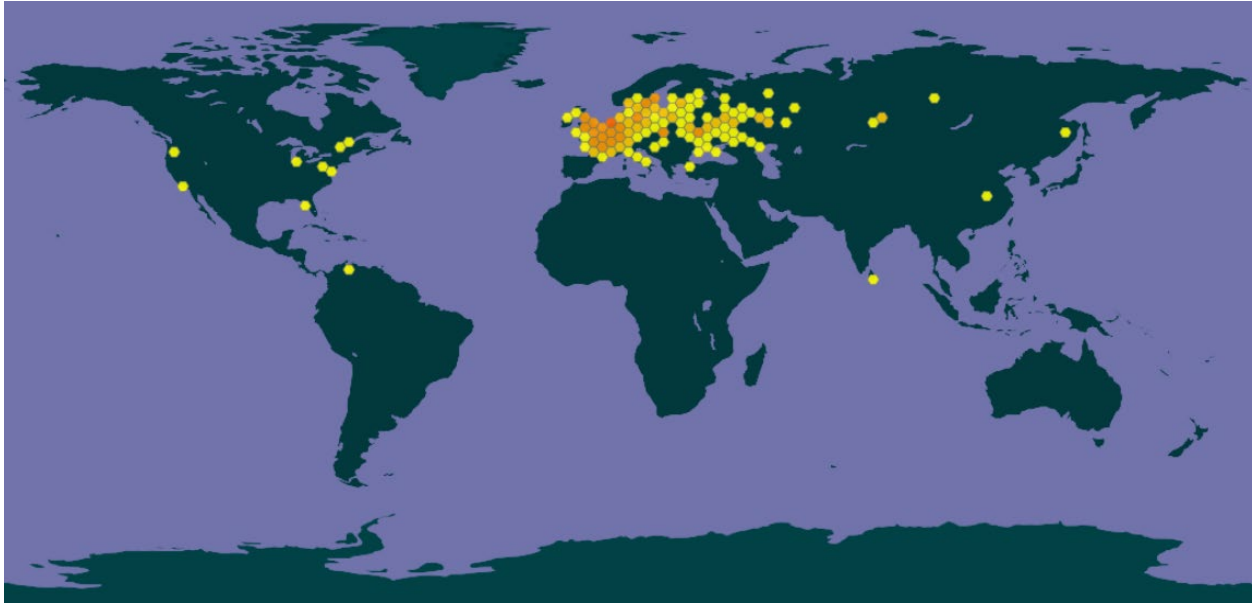


Figure 1. Known global distribution of *Viviparus viviparus*. Observations are reported from across Europe and into Russia, China, Sri Lanka, Venezuela, United States of America, and Canada. Map from GBIF Secretariat (2022). The points in the United States, Canada, Venezuela, Sri Lanka, China, and eastern Russia were not used in the climate match as they did not represent established populations.

Viviparus viviparus was reportedly collected in Egypt (Abdel-Gawad and Khateeb 2010) but there was no indication that it had an established population at that location and therefore, was not used in the climate match.

6 Distribution Within the United States

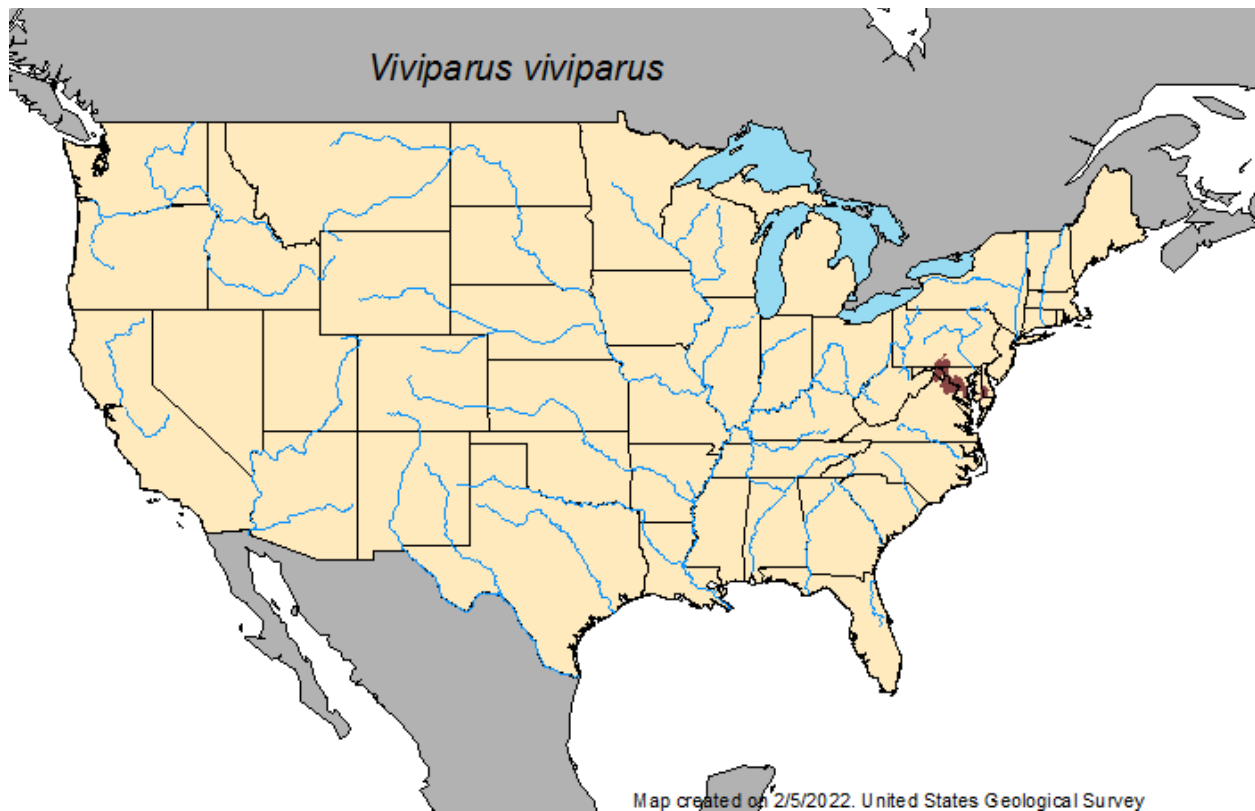


Figure 2. Known watersheds with records of *Viviparus viviparus* in the United States. Map from USGS (2022). These observations are historic observations (between 1974 and 1977) and no recent observations have been found. No points from within the United States were used for climate matching.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Viviparus viviparus* to the contiguous United States was generally medium to high. Areas of high match were found around the Great Lakes and in patches of the Rocky and Appalachian Mountains. The area around the Puget Sound also had a high match. Areas of low match were found along the Pacific Coast, the desert southwest, and small parts of the Gulf Coast and southern Florida. Everywhere else had a medium match. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.826, High (scores greater than or equal to 0.103 are classified as high). Every State recorded a high individual Climate 6 score except Florida, which recorded a medium score.

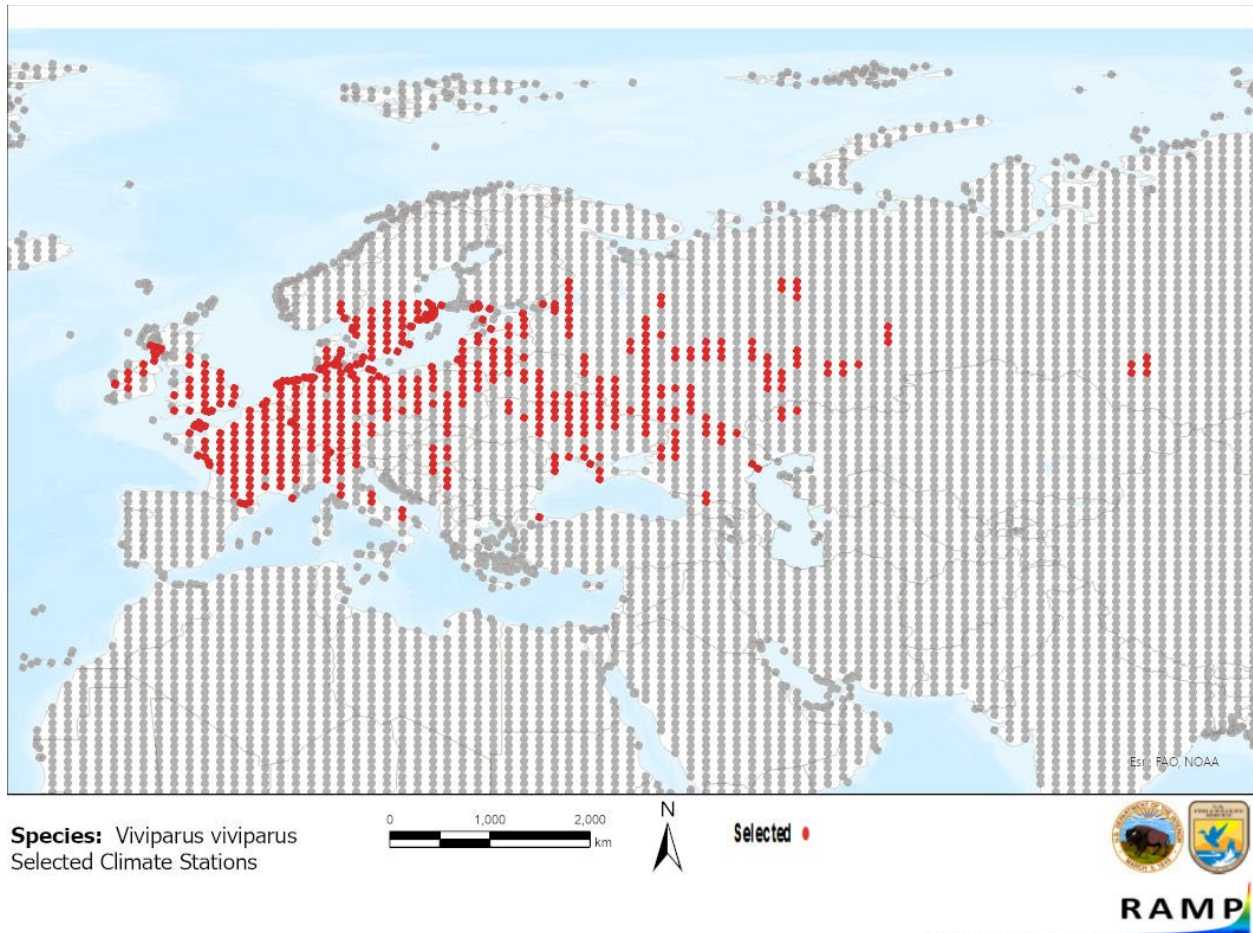


Figure 3. RAMP (Sanders et al. 2021) source map showing weather stations in Europe selected as source locations (red; Belarus, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Kazakhsan, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldova, Netherlands, Norway, Poland, Serbia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom) and non-source locations (gray) for *Viviparus viviparus* climate matching. Source locations from GBIF Secretariat (2022). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

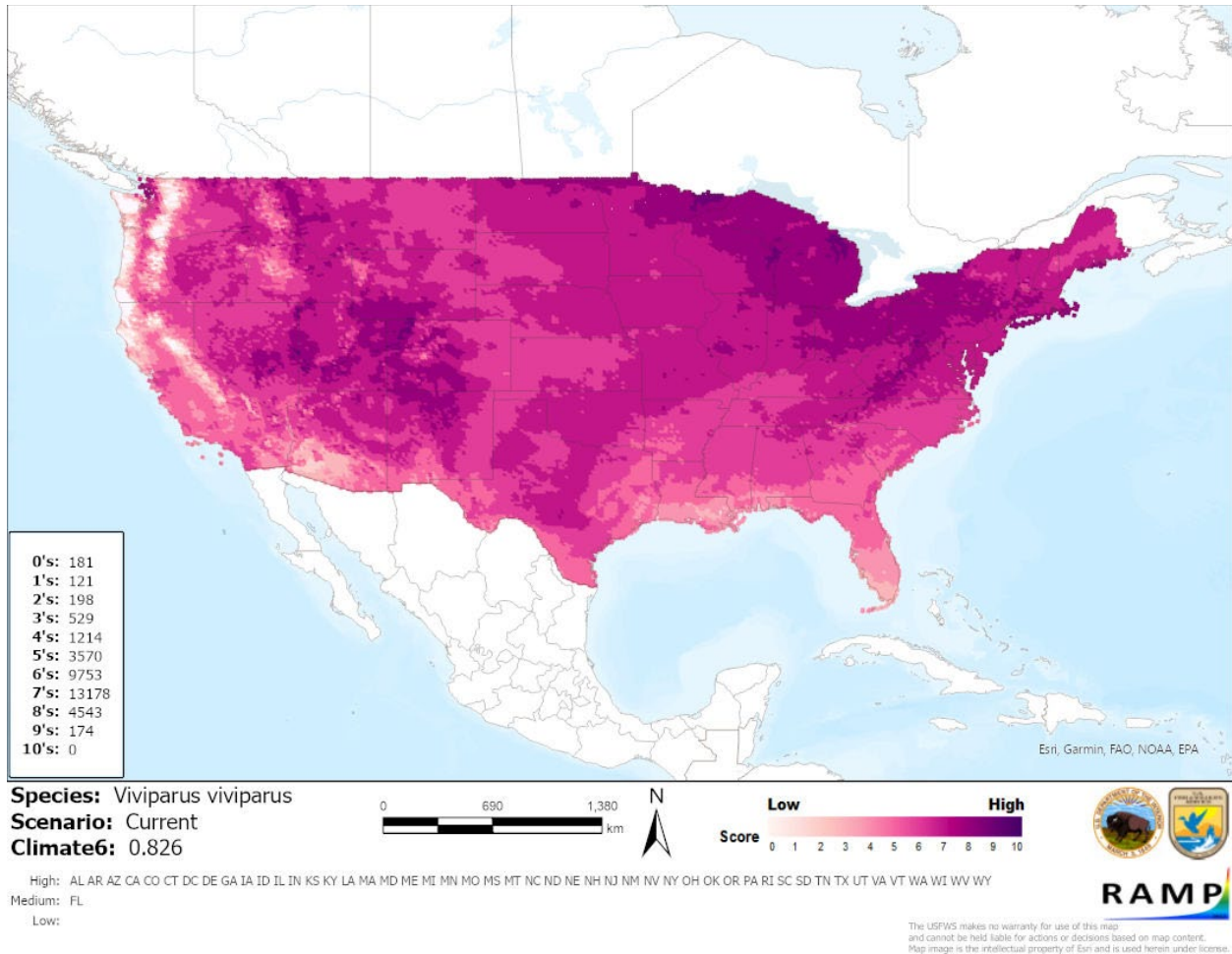


Figure 4. Map of RAMP (Sanders et al. 2021) climate matches for *Viviparus viviparus* in the contiguous United States based on source locations reported by GBIF Secretariat (2022). Counts of climate match scores are tabulated on the left. 0/Light Pink = Lowest match, 10/Dark Purple = Highest match.

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

There is information available on *Viviparus viviparus*. It is native throughout Europe with conflicting information about possible introductions within Europe. Information regarding an unambiguous introduction in Russia is available, including impact information. Due to some

level of uncertainty regarding the native range of the species and potential additional introductions, the certainty of assessment is classified as medium.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Viviparus viviparus, the common river snail, is a freshwater snail that is native throughout Europe and into Eastern Russia. This species is used within the aquarium trade in Europe but no evidence of trade within the United States was found. There is conflicting evidence about where this species has been introduced within Europe. It was recorded in the United States in the 1970's but has not been observed since then. *Viviparus viviparus* has been introduced and has established populations in Russia. Those populations have altered the structure of the microbenthic community, affected fisheries, and impacted recreation and infrastructure. The history of invasiveness is classified as High. Climate match with the contiguous United States resulted in a High match. Areas of high match were around the Great Lakes and in the Rocky and Appalachian Mountains. The certainty of assessment is classified as Medium due to the conflicting information regarding the native range of the species. The overall risk assessment category is High.

Assessment Elements

- **History of Invasiveness (Sec. 4): High**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Medium**
- **Remarks, Important additional information:** No additional remarks.
- **Overall Risk Assessment Category: High**

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.

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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.

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