

Dikerogammarus caspius (an amphipod, no common name)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, January 2022

Revised, January 2022

Web Version, 10/6/2022

Organism Type: Crustacean

Overall Risk Assessment Category: Uncertain

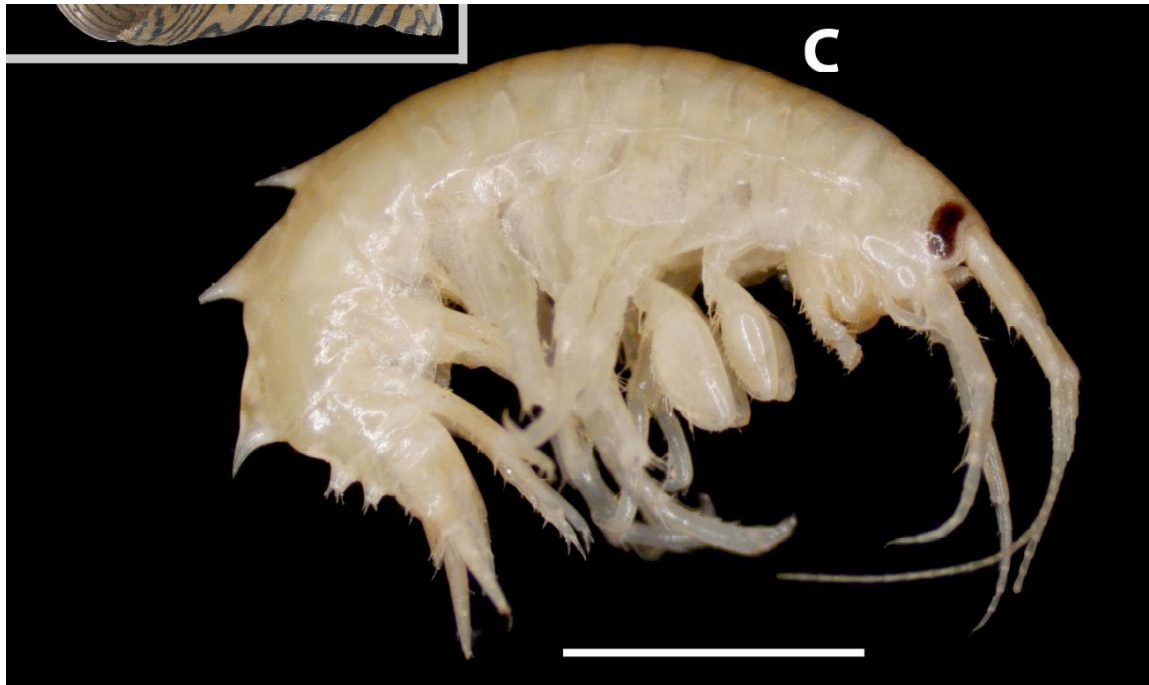


Photo: Alexander A. Prokin [in Son MO et al. 2020]. Licensed under CC BY-SA 4.0. Cropped from original. Available: https://www.reabic.net/journals/mbi/2020/2/MBI_2020_Son_etal.pdf (December 2021).

1 Native Range and Status in the United States

Native Range

From Sonina and Filinova (2011):

“The first detailed description of the species *Dikerogammarus caspius* (Pallas, 1771) was provided by Sars (1894). Making a critical analysis of the few studies on Caspian Crustacea by

Grimm, Eichwald, and Warpachowski available at the time, he noted the repeated redescrptions of this species (*Gammarus caspius* Ball., *G. semicarinatus* Bate, *G. dybowskyi* Grimm). Findings of *D. caspius* [...] were made by these authors in the northern part of the Caspian Sea [Russia, Kazakhstan]. In the southern part, as well as beyond the Caspian Sea, the species was not encountered.”

Status in the United States

No records of *Dikerogammarus caspius* in trade or in the wild in the United States were found.

Means of Introductions in the United States

No records of *Dikerogammarus caspius* in the wild in the United States were found.

Remarks

Additional information for *Dikerogammarus caspius* was found during this assessment in languages other than English.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Horton et al. (2021):

“Animalia (Kingdom) > Arthropoda (Phylum) > Crustacea (Subphylum) > Multicrustacea (Superclass) > Malacostraca (Class) > Eumalacostraca (Subclass) > Peracarida (Superorder) > Amphipoda (Order) > Senticaudata (Suborder) > Gammarida (Infraorder) > Gammaridira (Parvorder) > Gammaroidea (Superfamily) > Gammaridae (Family) > *Dikerogammarus* (Genus) > *Dikerogammarus caspius* (Species)”

“Status accepted
Rank Species”

Size, Weight, and Age Range

From Kurina (2017):

“Sexually mature males of *D. caspius* in the Saratov Reservoir had a body length of 8.0–18.0 mm; individuals of the size group of 9.0–12.0 mm predominated during the growing season; overwintered large males with a length of more than 16.0 mm were recorded exclusively in April.”

“Females in the Saratov Reservoir are smaller than males; their maximum size in our samplings did not exceed 13.0 mm. Females reach sexual maturity at a body length of 7.0–7.5 mm.”

From Sonina and Filinova (2011):

“The average specific weight of one individual over the growing season was 8.4 ± 5.2 mg in zoobenthic samples and 5.18 ± 1.05 mg (mature individuals) and 0.32 ± 0.1 mg (juveniles) in

HAP [higher aquatic plant] beds. Mature individuals reached their maximum weight (8.64 mg) in July; juveniles reached their maximum weight in August (0.48 mg).”

Environment

From Horton et al. (2021):

“Environment [...] brackish,”

From Sonina and Filinova (2011):

“Birshtein and Romanova (1968), characterizing this species as euryhaline, emphasized also its preference for beds of the red alga *Laurencia*.”

Climate

No information on climate requirements was found for *Dikerogammarus caspius*.

Distribution Outside the United States

Native

From Sonina and Filinova (2011):

“The first detailed description of the species *Dikerogammarus caspius* (Pallas, 1771) was provided by Sars (1894). Making a critical analysis of the few studies on Caspian Crustacea by Grimm, Eichwald, and Warpachowski available at the time, he noted the repeated redescrptions of this species (*Gammarus caspius* Ball., *G. semicarinatus* Bate, *G. dybowskyi* Grimm). Findings of *D. caspius* [...] were made by these authors in the northern part of the Caspian Sea [Russia, Kazakhstan]. In the southern part, as well as beyond the Caspian Sea, the species was not encountered.”

Introduced

From Son et al. (2020):

“The Caspian amphipod, *D. caspius*, is the most widespread macroinvertebrate invader in the Lower Don basin. This species is reported from the Volga Delta and from the Damchik “ilmen” [Russia] (a lagoon in the Caspian Sea basin) (Benning 1924). This species was initially reported in the Don River basin at the beginning of the 2000s, being found to be common in the delta and riverbed of the Don [Russia], while being scarce in the Taganrog Gulf of Asov Sea [Russia, Ukraine] and in the Veselovskoye Reservoir [Russia]. In an upstream section of the Don, it was registered near Romanovskaya village [Russia], 9 km below the dam of the Tsimlyansk HPP (Lubina and Sayapin 2008). In the Middle Don, the species was recorded in 2009 from the mouth of the Tolucheevka River [Russia] in the Voronezh Oblast (Krylov et al. 2010), although it had previously reached this point in 2003, but those specimens (from a Don River tributary, the Kolodyezhny stream) were erroneously identified as *Gmelinopsis tuberculata* G.O. Sars, 1986 (Silina 2005). In the Volga Basin, decades after it had been first reported in the Damchik “ilmen” and the river delta (Benning 1924), its range expansion had progressed to the Volgograd Reservoir [Russia] and the Saratov Reservoir [Russia] (Sonina and Filinova 2011).”

From Copilaş-Ciocianu and Arbačiauskas (2018):

“[...] *D. caspius*, a native Caspian species, has spread into the Black Sea basin in recent times (Sayapin 2003).”

From Sonina and Filinova (2011):

“*D. caspius* was not recorded in studies on the zoobenthos and zooperiphyton of macrophytes in the Volgograd Reservoir [Russia] in 1960–1980 (Konstantinov, 1953, 1971, 1972; Belyavskaya, 1965, 1975; Belyavskaya and V'yushkova, 1971; Gudkova and Ivashechkina, 1976; Nechvalenko, 1976, 1980; [Konstantinov 1977]; Kashirskaya et al., 1986). This species was found in the reservoir for the first time at the bottom of overgrown shallow areas of the reservoir's lower reaches in the early 1980s (Nechvalenko and Filinova, 1983).”

Means of Introduction Outside the United States

From Sonina and Filinova (2011):

“The routes of migration of Caspian amphipods species via rivers of the Ponto-Caspian Basin have provoked arguments and interest among researchers since the start of studies on this aspect of the bottom fauna of the Volga River (Belkemishev, 1923; Derzhavin, 1923; Mordukhai-Boltovskoi, 1967).”

“Prior to the construction of reservoirs on the Volga, *D. caspius* was not recorded in any checklist of the bottom fauna even in the lower reaches of the river (Lyakhov, 1961a, 1961b) and its delta (Zhadin, 1950; Lyakhov, 1958).”

No information on the means of introduction of *Dikerogammarus caspius* to the Don River basin was found.

Short Description

No description was found for *Dikerogammarus caspius*.

Biology

From Kurina (2017):

“Mass alien species of amphipods (*D. haemobaphes*, *D. caspius*, *P. robustoides*, etc.) by characteristics (eurybiontcity, euryphagy, generation development time, high fecundity, rapid growth and early maturation, predominance of females during breeding) are close to r-strategists; that is, they can significantly increase their numbers in a short period of time, becoming dominant in recipient water bodies (reservoirs).”

From Sonina and Filinova (2011):

“Adults of this species actively colonized shoots of *Myriophyllum* with its pinnately divided blades, as well as beds of *Ceratophyllum*, which also has strongly divided whorled leaves. Sporadically, *D. caspius* individuals were found among plants with undivided blades: *Potamogeton crispus* and *P. perfoliatus*. The lowest values of biomass were recorded on littoral plants: *Typha* and *Sparganium*.”

“Juvenile *D. caspius* lived in beds of aquatic plants, probably finding there more food and more opportunities to shelter from predators, and accounted for up to 70% of the total abundance of this species; adults, on the other hand, lived on the bottom of the waterbody [Volgograd Reservoir, Russia].”

Human Uses

No information on human uses was found for *Dikerogammarus caspius*.

Diseases

No records of OIE-reportable diseases (OIE 2021) were found for *Dikerogammarus caspius*.

Poelen et al. (2014) lists *Amphilina foliacea* as a parasite of *Dikerogammarus caspius* (Benesh et al. 2017).

Threat to Humans

No information on threats to humans was found for *Dikerogammarus caspius*.

3 Impacts of Introductions

From Son et al. (2020):

“The amphipod *D. caspius* is little studied compared to other species in the genus, several of which have been identified as aggressive invaders (Rewicz et al. 2015). Despite this, some evidence of its impact on benthic communities have been reported: especially displacement of resident amphipod species in littoral habitats of the Voronezh Reservoir (Kurina et al. 2018) and alteration of the structure of malacostracan assemblages in the littoral vegetation of the Volgograd Reservoir (Sonina and Filinova 2011).”

4 History of Invasiveness

Dikerogammarus caspius has been documented as established outside of its native range, the northern Caspian Sea. It appears to have naturally dispersed up the Volga River following the construction of reservoirs. No information is available on active anthropogenic means of spread for this species. There is no information available on the means of introduction to the Sea of Azov and Don River basin. In general, little information is available about the invasive history of *D. caspius*, but at least one source (Kurina et al. 2018; not accessible during this assessment) indicates *D. caspius* may displace native amphipods where introduced. Since the impact

information was not available to assess, the history of invasiveness for this species is classified as Data Deficient.

5 Global Distribution

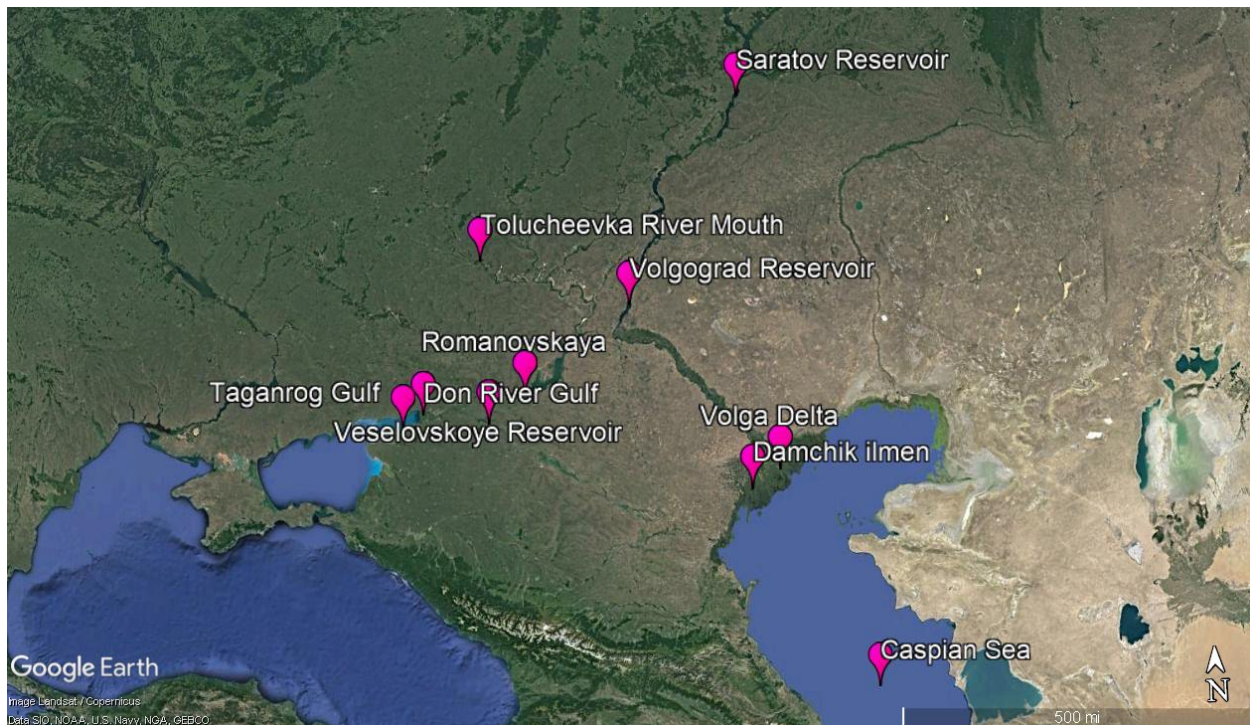


Figure 1. Known global distribution of *Dikerogammarus caspius* as reported by Son et al. (2020) and Sonina and Filinova (2011). All points are approximate locations of nonnative occurrences described by Son et al. (2020), except the Caspian Sea. The northern Caspian Sea is the native range of *D. caspius* as described by Sonina and Filinova (2011). Georeferenced observations were not available for *D. caspius*.

6 Distribution Within the United States

No records of *Dikerogammarus caspius* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Dikerogammarus caspius* in the contiguous United States was generally highest in the Great Lakes basin, and isolated areas of the interior West and Appalachia. The climate match was lowest along coastal areas of southeastern and western States. Much of the remaining contiguous United States had a medium to medium-high climate match. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States 0.607, High (scores greater than or equal to 0.103 are classified as high). The climate match was high in many states and the District of Columbia except for the following, where the climate match was medium: Arkansas, Connecticut, Massachusetts, North Carolina,

New Hampshire, and Tennessee. The climate match was low in Alabama, Florida, Georgia, Louisiana, Mississippi, Rhode Island, and South Carolina. Georeferenced occurrences were unavailable for the species' native range, the northern Caspian Sea, thus reducing the certainty of the climate match.

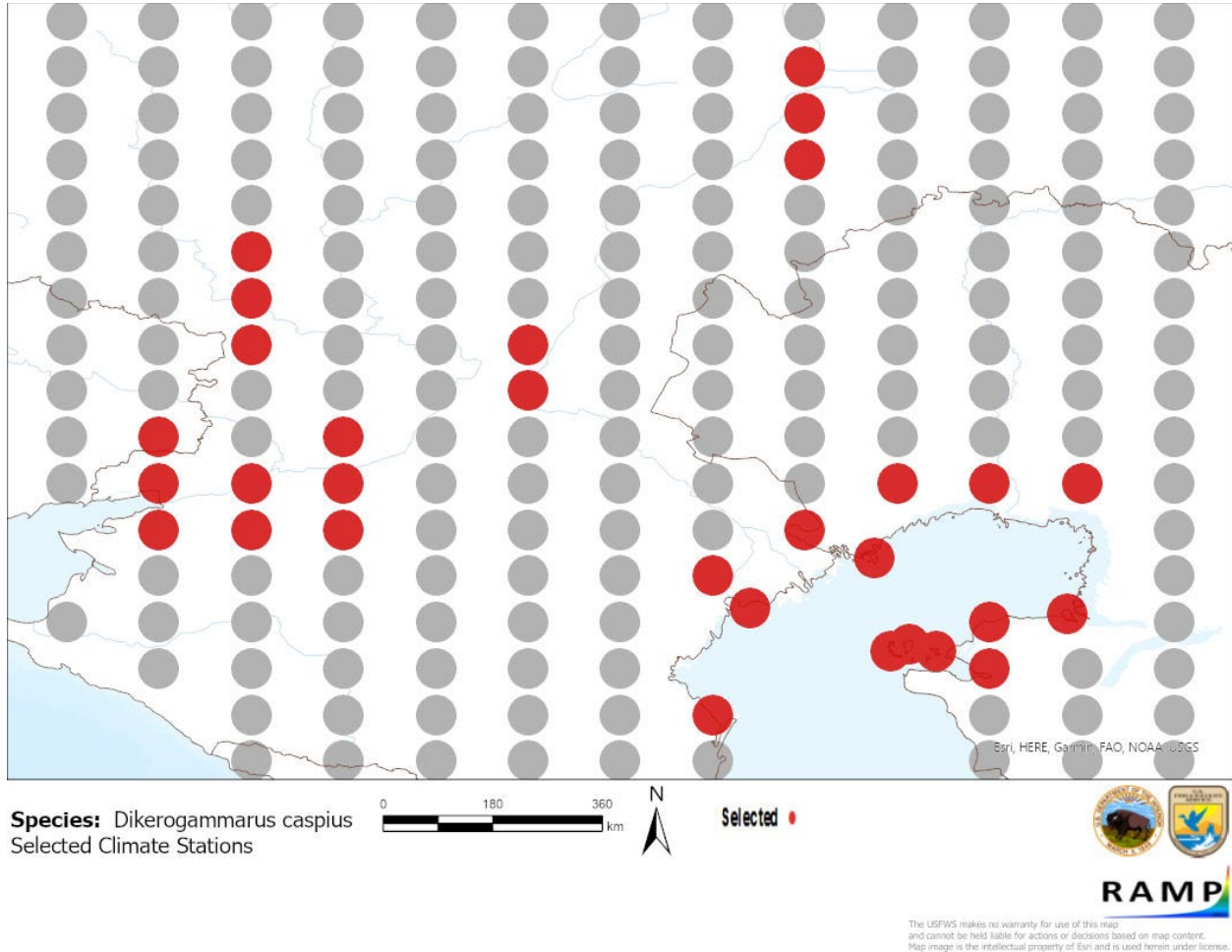


Figure 2. RAMP (Sanders et al. 2021) source map showing weather stations in the Ponto-Caspian region selected as source locations (red; Russia, Ukraine, Kazakhstan) and non-source locations (gray) for *Dikerogammarus caspius* climate matching. Source locations based on occurrences described by Son et al. (2020) and Sonina and Filinova (2011).

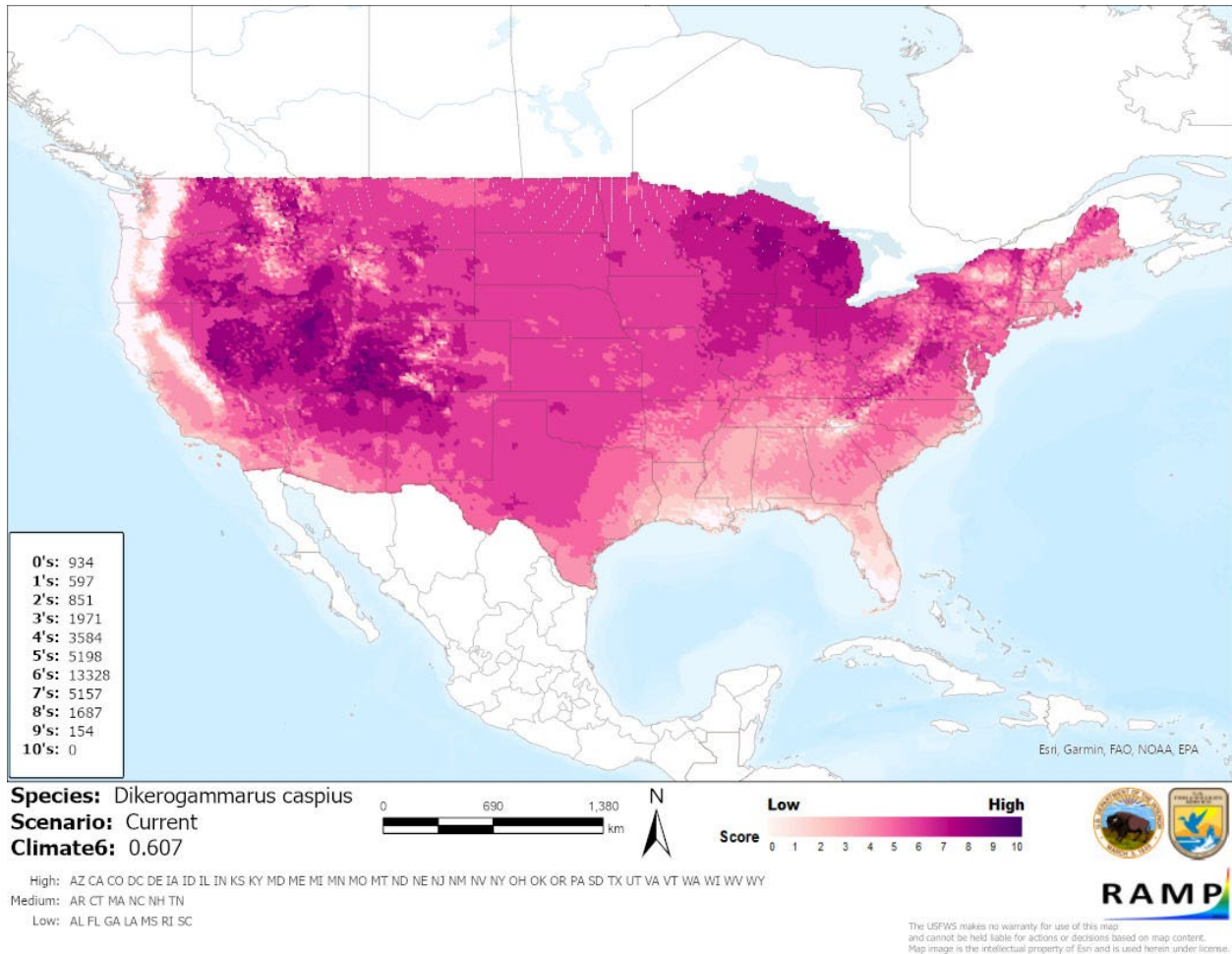


Figure 3. Map of RAMP (Sanders et al. 2021) climate matches for *Dikerogammarus caspius* in the contiguous United States based on occurrences described by Son et al. (2020) and Sonina and Filinova (2011). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = 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

There is some information available about the biology and distribution of *Dikerogammarus caspius*. Its habitat preferences outside of its native range have been well-studied. Research concerning this species is generally sparse, especially with regards to impacts of introductions. Climate match locations were unavailable for the species' native range. Additionally, a majority

of the scientific literature for this species was not available in English, further reducing the certainty of assessment. Certainty of assessment is Low.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Dikerogammarus caspius is a Ponto-Caspian amphipod species native to the northern Caspian Sea. The exact native range of this species is not known, but it is documented to be established in the Volga River Delta and upstream to Saratov Reservoir via natural dispersion. It is also established in the Taganrog Gulf of the Sea of Azov and in the Don River basin. The means of its introduction to these environments is not known. The history of invasiveness is classified as Data Deficient due to a lack of peer-reviewed information about the invasive potential of *D. caspius*. There are statements that it displaces native amphipods, but the supporting information was not available to assess. There was a High climate match with the contiguous United States, especially in the Great Lakes basin and interior West, but it has not been reported as introduced or established in the United States. The certainty of this assessment is Low due to a general lack of information and lack of georeferenced observations of *D. caspius* in its the native range. The overall risk assessment category is Uncertain.

Assessment Elements

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

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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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