

Belica (*Leucaspheus delineatus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, May 2020

Revised, January 2022

Web Version, 3/11/2022

Organism Type: Fish

Overall Risk Assessment Category: Uncertain



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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2020):

“Europe and Asia: From Lower Rhine and northern Germany eastward to southern Baltic basin; Black Se [sic] basin south to Rioni drainage, northern and western Caspian basin (south to Kura drainage); Aegean Sea basin (from Maritsa to Nestos). Absent in Italy, Adriatic basin, Great Britain and Scandinavia (except southernmost Sweden).”

According to CABI (2019), *Leucaspilus delineatus* is native to the following countries: Iran, Kazakhstan, Turkey, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Denmark, Estonia, Germany, Greece, Hungary, Latvia, Lithuania, Moldova, Netherlands, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, and Ukraine.

From Farr-Cox et al. (1996):

“In western Europe it is native to Germany, southern Denmark, the southern tip of Sweden, Holland, Belgium and northern France.”

From CABI (2019):

“[Belgium] Questionable invasiveness. Contradicting statements in the literature exist as to whether the sunbleak is native to Belgium (see Leu et al., 2009 and refs therein)”

Status in the United States

No records of *Leucaspilus delineatus* in trade or in the wild in the United States were found.

Means of Introductions in the United States

No records of *Leucaspilus delineatus* in the wild in the United States were found.

Remarks

The common name “sunbleak” is also frequently applied to this species (CABI 2019; Froese and Pauly 2020).

From CABI (2019):

“In contrast to its alien and invasive status in the UK and some countries in Northern Europe, *L. delineatus* is considered rare or vulnerable throughout much of its native range (Lelek, 1987). It is listed as protected under Appendix III of the Bern Convention (Pinder and Gozlan, 2003).”

“In England and Wales, the Prohibition of Keeping or Release of Live Fish (Specified Species) Order 1998 made under the Import of Live Fish (England and Wales) Act 1980 covers *L. delineatus*. This legislation requires any individual wishing to keep any listed species as pets (in either aquarium or garden pond), or angling clubs wishing to stock a listed species, first to obtain a licence [*sic*] under the Act.”

From Froese and Pauly (2020):

“Locally threatened due to draining of wetlands.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2020):

“Current status: Valid as *Leucaspius delineatus* (Heckel 1843).”

From ITIS (2020):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Leucaspius*
Species *Leucaspius delineatus* (Heckel, 1843)

Size, Weight, and Age Range

From Froese and Pauly (2020):

“Max length : 9.0 cm SL male/unsexed; [Kottelat and Freyhof 2007]; common length : 6.0 cm TL male/unsexed; [Muus and Dahlström 1968]; max. reported age: 2 years [Muus and Dahlström 1968]”

From CABI (2019):

“Although individuals have been aged up to 5 years, few individuals will live longer than 2 to 3 years (Beyer, 2008).”

Environment

From Froese and Pauly (2020):

“Freshwater; brackish; pelagic; pH range: 6.0 - 10.0; dH range: ? - 15; potamodromous [Riede 2004]; depth range 0 - 1 m [Gerstmeier and Romig 1998]. [...] 2°C - 32°C [Arnold and Längert 1995]”

Climate

From Froese and Pauly (2020):

“Temperate; [...]; 64°N - 38°N, 1°E - 60°E”

Distribution Outside the United States

Native

From Froese and Pauly (2020):

“Europe and Asia: From Lower Rhine and northern Germany eastward to southern Baltic basin; Black Se [sic] basin south to Rioni drainage, northern and western Caspian basin (south to Kura drainage); Aegean Sea basin (from Maritsa to Nestos). Absent in Italy, Adriatic basin, Great Britain and Scandinavia (except southernmost Sweden).”

According to CABI (2019), *Leucaspius delineatus* is native to the following countries: Iran, Kazakhstan, Turkey, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Denmark, Estonia, Germany, Greece, Hungary, Latvia, Lithuania, Moldova, Netherlands, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, and Ukraine.

From Farr-Cox et al. (1996):

“In western Europe it is native to Germany, southern Denmark, the southern tip of Sweden, Holland, Belgium and northern France.”

From CABI (2019):

“[Belgium] Questionable invasiveness. Contradicting statements in the literature exist as to whether the sunbleak is native to Belgium (see Leu et al., 2009 and refs therein)”

Introduced

From CABI (2019):

“The species has been widely introduced in the upper Rhine drainage and locally in the UK (primarily southwest England), Switzerland (Kottelat, 1997), and in southern France (Farr-Cox et al., 1996).”

“Norway and Sweden: *L. delineatus* has recently been recorded in a small catchment area in southernmost Norway. This introduction is assumed to have taken place in the early 1990s, with more recent introduction recorded in the Swedish section of the Enningdalselva hydrosystem, which drains into Norway (Hesthagen and Sandlund, 2007).”

From Farr-Cox et al. (1996):

“The fish *Leucaspius delineatus* (Heckel) (Cyprinidae) has been introduced to southern England [...]. It is now established at several waters (lakes, canals, and lowland rivers) in Hampshire and Somerset.”

“It is not indigenous to the British Isles, southern France, or south of the Pyrenees or Alps.”

“In France it is reported in several Départements (Pas-de-Calais, Nord, Somme and Marne) (Spillmann 1961) [...]”

According to FAO (2020), *Leucaspius delineatus* is listed as introduced and established in Belgium, Finland, United Kingdom, France, and Norway. This species has also been introduced to Sweden, where the status of establishment is unknown. According to Froese and Pauly (2020), *L. delineatus* is also introduced and established in Switzerland.

From Freyhof and Kottelat (2008):

“Widely introduced in France, upper Rhine drainage, locally in Great Britain and Switzerland and invasive in western Siberia (Ob basin in Russia and Kazakhstan).”

From Interesova (2012):

“[...] successfully naturalized in waterbodies of south west Siberia.”

From Froese and Pauly (2020):

“[Finland] Found in 1992 from couple of small lakes in Saviponni near Kotka town.”

“[United Kingdom] Introduced in Great Britain [Kottelat and Freyhof 2007]. Recorded from East Sussex and Kent [Zięba et al. 2010]. Also [Maitland and Lyle 1996].”

Means of Introduction Outside the United States

From Farr-Cox et al. (1996):

“The fish *Leucaspius delineatus* (Heckel) (Cyprinidae) has been introduced to southern England as a result of importation as an ornamental fish.”

“In France it is reported in several Départements (Pas-de-Calais, Nord, Somme and Marne) (Spillmann 1961) although it may have entered some of these areas by immigration through canals from southern Belgium. [...] Since 1990 it has been captured in several localities in southern England as a result of importation, originally as an ornamental fish and possibly by accidental introduction with other species of fish from Europe, and dispersal from sites of introduction by natural and anthropogenic means.”

From CABI (2020):

“England: Initial dispersal of *L. delineatus* from their original location in Hampshire is believed to have occurred via the River Test, which was used by the fish as a conduit to disperse and subsequently colonise lakes downstream. As these lakes were then used as stock ponds for other fisheries, this resulted in the inadvertent movement of *L. delineatus* to lakes in other catchments, such as those in the River Itchen valley. The origins of populations located in the Somerset levels are not clear. Their first official recording was in 1990 although the date of entry is assumed to be in the 1980s (Farr-Cox et al., 1996), when the species first appeared in the Kings Sedgmoor Drain. From here they have spread rapidly, and are now extremely common throughout drains, rivers and connected waterbodies of the Levels. They are also present in several lakes in this area and at a complex of fishing lakes near Sherborne in Dorset. The mechanism for dispersal to these stillwaters is unknown, but it is likely that the fish were introduced either unintentionally or intentionally by man (Pinder and Gozlan, 2003). Introduction of eggs transported on anglers keep-nets has been blamed for further translocations to Uckfield, East Sussex (Zieba et al., 2010).”

“Given the lack of angling and aquaculture interest in the species, all such introductions are likely to be accidental, occurring through the inadvertent movement of the species within batches of other fish being stocked out.”

From Interesova (2012):

“It first appeared in West Siberia in 1962 in ponds of the Zerkal’nyi fish farm on the Oyash River, where it was accidentally introduced together with the common carp from Bryansk oblast (Krivoshchekov, 1973).”

Short Description

From Froese and Pauly (2020):

“Dorsal spines (total): 2 - 3; Dorsal soft rays (total): 7-9; Anal spines: 3; Anal soft rays: 10 - 13; Vertebrae: 36 - 42. Diagnosed from other cyprinids in central and eastern Europe by having incomplete lateral line with about 8-12 pored scales, keel covered by scales between pelvic origin and anus, mouth superior, and 11-13½ branched anal rays [Kottelat and Freyhof 2007]. A small fish with large silvery scales and an inconspicuous intense silvery band along each side. Lateral line incomplete, sometimes absent, with perforated scales. Anal fin longer than dorsal fin. Mouth turns upwards. The lower edge of the body between the pelvic fins and the vent forms a sharp keel. The scales are very loosely attached and fall away if the fish is handled. Also Ref. [Keith and Allardi (coords.) 2001].”

Biology

From Froese and Pauly (2020):

“Inhabits lowland riverine habitats especially oxbows and other water bodies only connected to rivers during floods. Often encountered in ponds, steppe lakes and small water bodies not connected to rivers [Kottelat and Freyhof 2007]. Occurs in large schools which are most

numerous in autumn. Found between weeds in shallow pools and creeks, shallow lakes, peat and clay excavations and canals. It is exposed to the stormy flow of water (in spring, autumn and winter), but usually choose quite [sic] places like small bays, plots behind bottom stones extending out of water and concrete foundations of bridges. In autumn, the schools of fish keep to the surface and rarely go to the pelagic zone. Towards winter, the schools break up and the number of fish per unit of river square decreases rapidly [Pipoyan 1996]; they spend the winter in deeper waters [Arnold and Längert 1995]. Feeds on phytoplankton and zooplankton and on flying insects [Gerstmeier and Romig 1998]. Spawns among vegetation [Billard 1997].”

“Territorial males clean the spawning sites and guard the eggs which are attached in strings around roots, reeds, aquatic vegetation or any material drifting on the water surface [Kottelat and Freyhof 2007]. When males tend the clutch, which is usually located on the stem of a water plant, they provide the clutch with fresh water by nudging the water plant. In addition, they spread an anti-bacterial fluid over the eggs [Riehl and Baensch 1991]. If possible, some fish will enter streams for spawning.”

From CABI (2019):

“Reproductive Biology

Sexual maturity is usually attained at age one year and standard length about 4 cm (Movchan and Smirnov, 1981). A batch spawner, individual females will lay several batches of eggs in a spawning season (generally between April and July when temperatures reach 15–20°C; Cepkyn, 2002), guarded by the male until emergence. This combination of early maturity and nest guarding means that a relatively low number of eggs are produced when compared with other species of the Cyprinidae family. However, their parental care ensures higher egg and larval survival rates. In addition, as their reproduction is spread across an extended spawning period, larvae are less vulnerable to episodic changes in environmental conditions, thus enhancing survival rates (Gozlan et al., 2003).

During spawning, males take up territories around the stems and underside of the leaves of water-lilies, and other flat-surfaced structures. They then clean any accumulated bio-films from the spawning substrate. The ripe females, which develop swollen, distended ovipositors during spawning, then join the male and deposit strips of up to 80 highly adhesive eggs on the spawning substrate, generally 20–30 eggs (Kryzhanovskij, 1949). An individual female can typically deposit a strip of 40 eggs in less than one second. The maximum fecundity reported is 5000 eggs (Cepkyn, 2002). After the female has spawned, the male guards the eggs and encourages other females to deposit their eggs at the same nest site. The male then guards the eggs until they emergence [sic], which takes approximately four days at 22°C (Pinder and Gozlan, 2003).”

“Activity Patterns

In autumn, the shoals of fish tend to keep in the surface layers and are rarely found in deeper waters. With the onset of winter, these shoals tend to disperse (at least from these areas) and so the number of fish per unit area decreases rapidly (Pipoyan, 1996).”

“Nutrition

The fry of *L. delineatus* feed on phytoplankton and zooplankton (rotifers and crustaceans). The diet of the fishes at age 10-15 days and older can include larvae of the aquatic insects (Chironomidae, Ephemeroptera and others; Movchan and Smirnov, 1981) and, occasionally, flying insects that fall into the water (Pinder and Gozlan, 2003).”

Human Uses

From Froese and Pauly (2020):

“Fisheries: of no interest; aquarium: public aquariums”

“Aquarium keeping: at least 10 individuals; minimum aquarium size 100 cm; not recommended for home aquariums [BMELF 1999]. Scales were utilized for production of Essence d'Orient, which was used for coating artificial pearls.”

Diseases

No records of OIE-reportable diseases (OIE 2020) were found for *Leucaspis delineatus*.

Poelen et al. (2014) list the following as parasites of *L. delineatus*: *Gryporhynchus cheilancristrotus*, *Dactylogyrus alatus*, *Gyrodactylus euzeti*, *Gyrodactylus decorus*, *Gyrodactylus vimbi*, *Diplostomum pseudospathaceum*, *Diplostomum commutatum*, *Posthodiplostomum cuticola*, *Posthodiplostomum brevicaudatum*, *Rhipidocotyle illense*, *Diplostomum paraspithaceum*, *Ornithodiplostomum scardinii*, *Paracoenogonimus ovatus*, *Allocreadium transversale*, *Dactylogyrus minor*, *Dactylogyrus parvus*, *Gyrodactylus gracilihamatus*, *Diplostomum paracaudum*, *Paradiplozoon homoion*, *Ichthyocotylurus platycephalus*, *Dactylogyrus anchoratus*, *Dactylogyrus fraternus*, *Dactylogyrus crucifer*, *Diplostomum indistinctum*, *Diplostomum mergi*, *Gyrodactylus prostae*, *Gyrodactylus laevis*, *Gyrodactylus carassii*, *Diplostomum helveticum*, *Ligula colymbi*, *Metorchis xanthostomus*, *Phyllodistomum folium*, *Rhipidocotyle campanula*, *Ichthyocotylurus pileatus*, *Allocreadium isoporum*, *Metagonimus yokogawai*, *Apophallus muehlingi*, *Caryophyllaeides fennica*, *Diplostomum spathaceum*, cat liver fluke (*Opisthorchis felinus*), *Raphidascaris acus*, *Proteocephalus torulosus*, *Pomphorhynchus laevis*, *Rhabdochona denudata*, eel swimbladder nematode (*Anguillicola crassus*), *Schistocephalus solidus*, *Neoechinorhynchus rutili*, *Ligula intestinalis*, *Philometra rischta*, *Valipora campylancristrota*, *Neogryporhynchus cheilancristrotus*, and *Sphaerothecum destruens*.

From CABI (2019):

“In the UK, sunbleak have been found to host the non-native parasite *Ergasilus briani*, raising concerns that they could aid its spread (Beyer, 2008).”

Threat to Humans

From Froese and Pauly (2020):

“Harmless”

3 Impacts of Introductions

No impacts of introductions could be found for *Leucaspis delineatus*, the following information pertains to *potential* impacts of introductions.

From CABI (2019):

“There have been few studies on the impacts of invasive populations of this species. Pinder and Gozlan (2003) suggest there is considerable potential for their depredation of the eggs of other fishes. Leu et al. (2009) reported their predation on the eggs of native amphibians. In the UK, sunbleak have been found to host the non-native parasite *Ergasilus briani*, raising concerns that they could aid its spread (Beyer, 2008).”

From Gozland et al. (2003):

“Sunbleak possess many important attributes to be an ideal invasive species. The short life span and early life reproduction aids the colonization process by increasing the turnover of the population (Rosecchi et al. 2001), the egg guarding behaviour of the males ensures high survival of eggs and the batch spawning tactic (Cassou & LeLouarn 1991) provides the larvae with a better survival rate, with regard to temporal environmental variations.

There is also a very important factor contributing to the rapid dispersal of sunbleak within a catchment, in that this species has the ability to spawn on any smooth objects such as branches, floating leaves, plastic debris, even the bottom of boats (Cassou & LeLouarn 1991, CEH unpublished data). This range of spawning substrate could aid dispersal of the eggs from upstream to downstream on floating objects but also on boats from downstream to upstream and even between different catchments via navigation canal connections.

Sunbleak has already proved to be very well adapted to different watercourses in southern England since its introduction in 1987 (Farr-Cox et al. 1996) and has since spread throughout the entire Bridgewater canal and River Brue catchment as well as mysteriously appearing in still waters such as Revels Fisheries (Dorset) and several unconnected lakes and ponds in the Somerset area. This unexplained dispersal highlights that sunbleak could spread even further if introduced to the neighbouring Bristol Avon catchment as this river provides access to the canal network of Britain. [...] if food resources must be shared with juveniles and adults of sunbleak which are better adapted to competition (Masuda & Tsukamoto 1999), early life for these native cyprinids will be an even more vulnerable period (Gardner 1996, Bischoff & Freyhof 1999).”

4 History of Invasiveness

The history of invasiveness for *Leucaspilus delineatus* is classified as Data Deficient. This species has been introduced outside of its native range, where it has become established. However, only potential impacts of introduction were found. Without information on observed impacts of introduction, the history of invasiveness can only be classified as Data Deficient.

5 Global Distribution

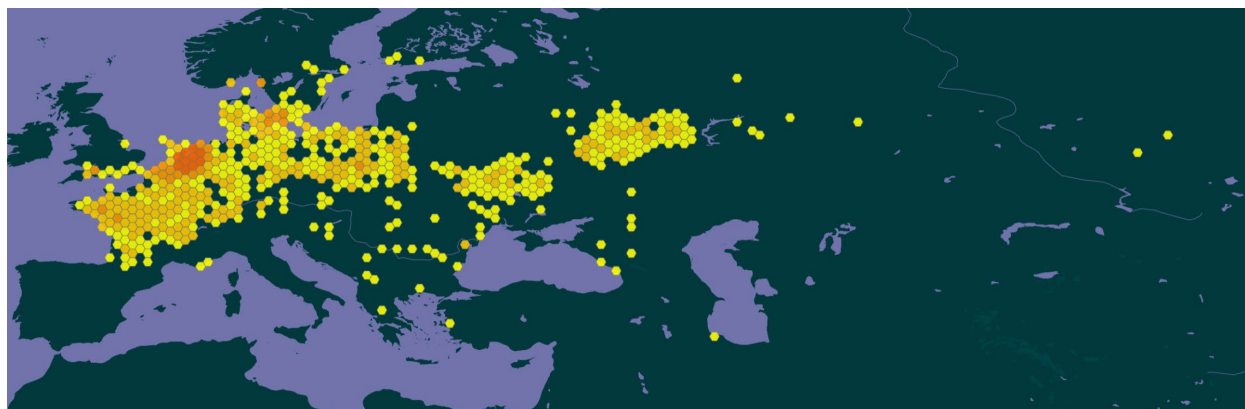


Figure 1. Known global distribution of *Leucaspilus delineatus*. Observations are reported across Europe and western Asia. Map from GBIF Secretariat (2022). Froese and Pauly (2020) indicate an established population in small lakes near Kotka, Finland that is not reported in the above map, therefore, a point location will be selected during the climate match to represent this population.

6 Distribution Within the United States

No records of *Leucaspilus delineatus* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Leucaspilus delineatus* in the contiguous United States is generally high. Low match was found along the coast in the Pacific Northwest, southwestern Arizona, and the Gulf Coast, while high match was found mostly in the Upper Midwest, northern Great Plains, Great Lakes, and coastal California. The area of highest match was in the Great Lakes region. Medium and low match areas were mainly located in the Southeast. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.864, high. (Scores of 0.103 or greater are classified as high.) All States had a high individual Climate 6 score except for Florida, which had a low individual Climate 6 score.

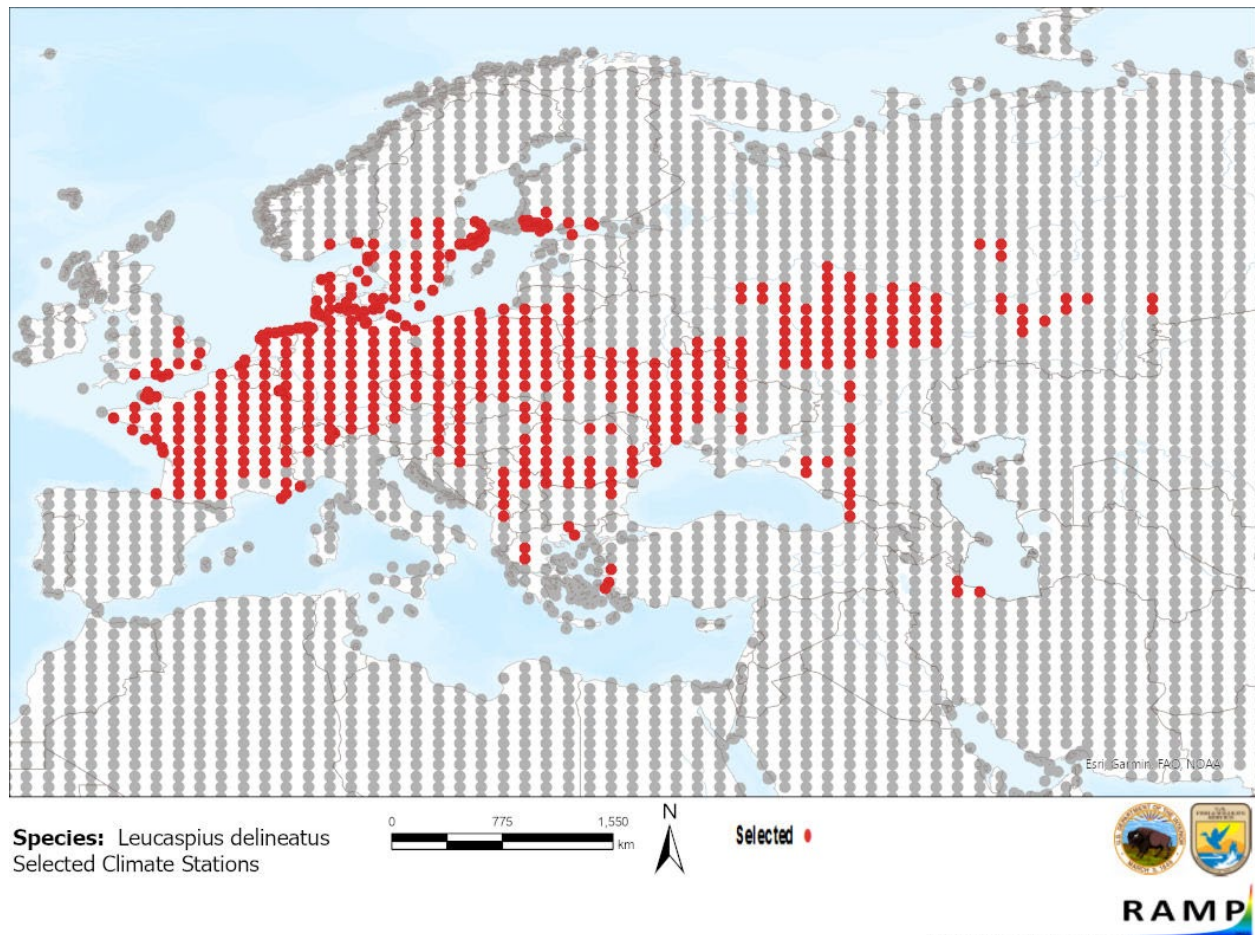


Figure 2. RAMP (Sanders et al. 2021) source map showing weather stations in Europe and western Asia selected as source locations (red; Iran, Turkey, Austria, Belarus, Belgium, Bulgaria, Croatia, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovenia, Sweden, Switzerland, Ukraine, and United Kingdom) and non-source locations (gray) for *Leucaspis delineatus* climate matching. Source locations from GBIF Secretariat (2022) and Froese and Pauly (2020). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

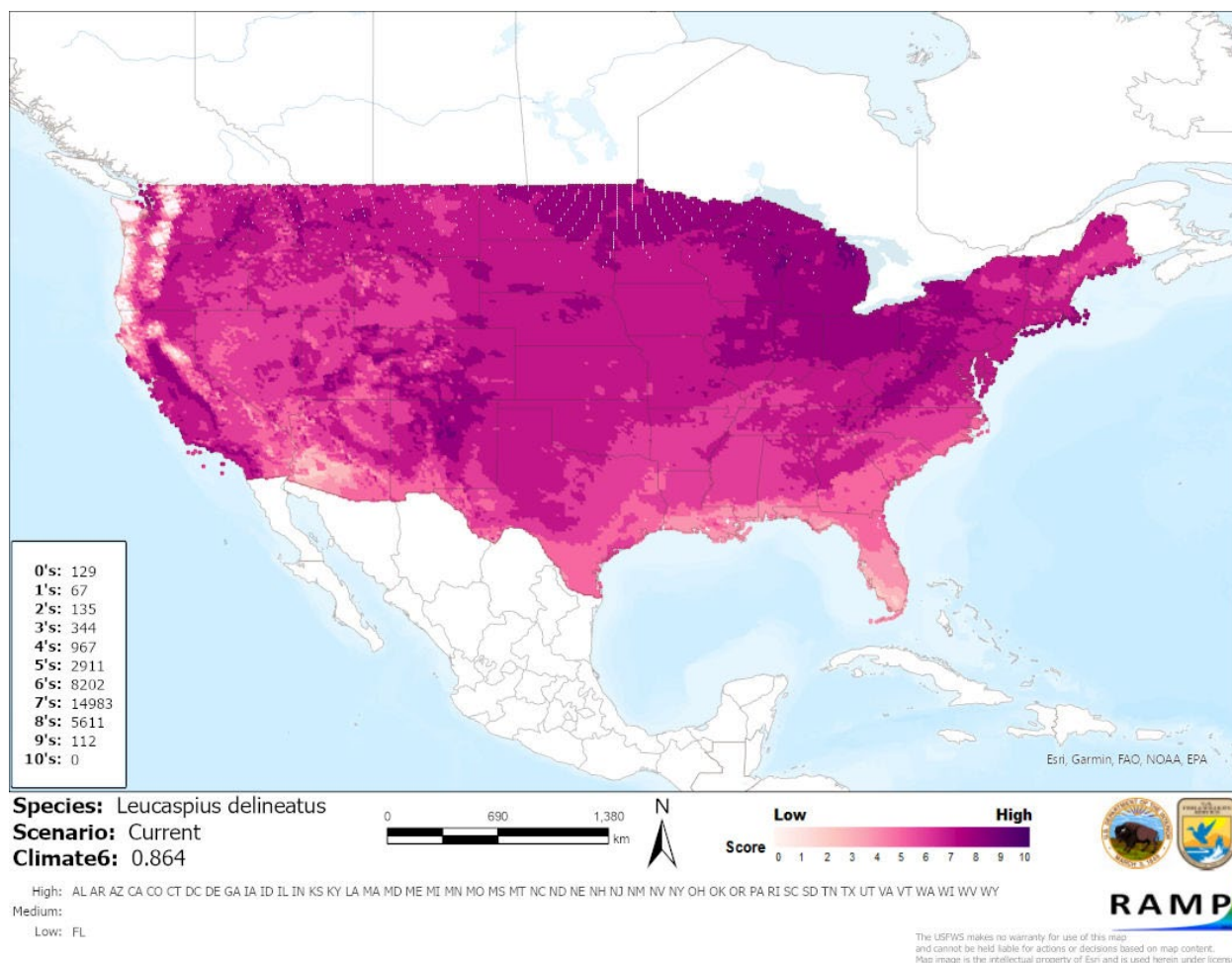


Figure 3. Map of RAMP (Sanders et al. 2021) climate matches for *Leucaspis delineatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2022) and Froese and Pauly (2020). Counts of climate match scores are tabulated on the left. 0/Light Pink = Lowest match, 10/Dark 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

The certainty of assessment is Low. There is quality information on the biology and ecology of this species. This species has been introduced and established outside of its native range; however only potential impacts of introduction have been reported.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Leucaspius delineatus, the Belica, is a small temperate fish found in fresh and brackish waters. This species is native to many countries in Europe and western Asia. It has been introduced and become established in surrounding countries or regions including Belgium, Finland, France, Norway, Siberia, Switzerland, and the United Kingdom. It has been introduced to Sweden as well, but its establishment status is unknown. The primary human use of *L. delineatus* is for public aquariums. Potential impacts of introduction have been reported, however, no actual documented impacts were found. The history of invasiveness is classified as Data Deficient. The overall climate match category for the contiguous United States is High. All States had a high individual Climate 6 score except for Florida, which had a low individual Climate 6 score. The area of highest climate match is in the Great Lakes Region. The certainty of assessment is Low. The overall risk assessment category for *Leucaspius delineatus* 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: *L. delineatus* is host to the nonnative parasite *Ergasilus briani* in the United Kingdom.**
- **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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