Black and Caspian Sea Sprat (*Clupeonella cultriventris*)

Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Freyhof and Kottelat (2008):

"Northwestern Black Sea and Sea of Azov."

From Froese and Pauly (2016):

"Eurasia: Black Sea (northwestern parts), Sea of Azov and Caspian Sea, also most of the affluent rivers of the area, reaching as far as 60 km inland. Also, Lake Palaeostomi (Bulgaria) and in Bay

of Feodosiya (Romania), also Lake Apolyont (Turkey) (Whitehead 1985). Previously, two subspecies were recognized by some: *Clupeonella cultriventris cultriventris* (Nordmann, 1840) from the Black Sea and the Sea of Azov and *Clupeonella cultriventris caspia* (Svetovidov, 1941) from the Caspian Sea (Coad 1995; Reshetnikov et al. 1997)."

Status in the United States

From Baker et al. (2015):

"Not established in North America, including the Great Lakes"

Means of Introductions in the United States

No records of *Clupeonella cultriventris* in the United States were found. The following details potential vectors for this species.

From Baker et al. (2015):

"This species is not known to hitchhike or foul vessels. *Clupeonella cultriventris* is not stocked, commercially cultured, or sold in the Great Lakes region. It may be able to survive ballast tank environment due to its high salinity tolerance. Although it occurs in waters from which shipping traffic to the Great Lakes originates, it does not currently occur in ports that have direct trade connections with the Great Lakes. *Clupeonella cultriventris* has not been observed in ballast tanks of ships entering the Great Lakes."

Remarks

From CABI (2016):

"*C. cultriventris* is considered a medium to high risk invader. It was identified as having a high probability of invasion if introduced to the Great Lakes via ballast water (Ricciardi and Rasmussen, 1998; Kolar and Lodge, 2002) and the Baltic Sea via natural and artificial waterways (Panov et al., 2007). However, Slynko (Institute for Biology of Inland Waters, Russia, personal communication, 2011) notes that the probability of invasion via ballast waters is low as the eggs and young are easily damaged. Dispersion of *C. cultriventris* is still limited within the Black and Caspian Sea basin although *C. cultriventris* has already been recorded in the River Pripyat (Belarus), very close to Baltic Sea basin (Semenchenko et al., 2009). Since the 1980s an abundance of *Mnemiopsis leidyi* (a severe competitor to plankton-feeding fish) in the Black and Azov seas and later the Caspian Sea led to a sharp decline in stocks in the Black and Asov seas (Aseinova, 1989, 1992; Zaitsev et al., 1997), therefore lowering risk of introduction via ballast water. *C. cultriventris* stocks did not decline in the Caspian Sea due to their high plasticity and capacity to migrate for feeding to the areas with low salinity, which are not available for *M. leidyi* (Shiganova, 2011)."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Eschmeyer et al. (2016):

"***cultriventris, Clupea*** Nordmann [A. von] 1840:522 [Voyage dans la Russie méridionale et la Crimée] Pont Euxin coast, Black Sea. Syntypes: MNHN 0000-3681 (3) Odessa, Black Sea. Type catalog: Bertin 1940:282-283, Whitehead & Bauchot 1986:10-11. •Synonym of *Clupeonella delicatula* (Nordmann 1840) [which is itself preoccupied] -- (Berg 1948:165). •Valid as *Clupeonella cultriventris* (Nordmann 1840) -- (Svetovidov 1973:101, Whitehead in Whitehead et al. 1984:274, Whitehead 1985:52, Hoestlandt 1991:53, Heckman 1991:71, Coad 1995:8, Kottelat 1997:41, Reshetnikov et al. 1997:728, Dorofeeva 1998:29, Coad 1998:102, Bogutskaya et al. 2001:43, Bilecenoglu et al. 2002:36, Bogutskaya & Naseka 2004:37, Vassilev & Pehlivanov 2005:164, Fricke et al. 2007:26, Kottelat & Freyhof 2007:76, Vasil'eva 2007:49, Ninua & Japoshvili 2008:164, Parin et al. 2014:58, Çiçek et al. 2015:143). **Current status:** Valid as *Clupeonella cultriventris* (Nordmann 1840). Clupeidae."

From ITIS (2016):

"Taxonomic Status: Current Standing: valid"

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Clupeomorpha
Order Clupeiformes
Suborder Clupeoidei
Family Clupeidae
Subfamily Clupeinae
Genus *Clupeonella*
Species *Clupeonella cultriventris* (Nordmann, 1840)"

Size, Weight, and Age Range

From Freyhof and Kottelat (2008):

"Lives up to five years."

From Froese and Pauly (2016):

“Max length: 14.5 cm TL male/unsexed; [Hoestlandt 1991]; common length: 10.0 cm SL male/unsexed; [Whitehead 1985]; max. reported age: 5 years [Heckman 1991]”

From Baker et al. (2015):

“This species has a lifespan of 1 - 6 years and has a survival rate of about 0.200-0.218/year (Fazli et al. 2007, Karimzadeh et al. 2010).”

Environment

From Freyhof and Kottelat (2008):

“Euryhaline, in coastal waters, lagoons and lakes, estuaries and lower reaches of large rivers with a salinity up to 13 ‰. Absent from pure seawater.”

“Pelagic.”

From Froese and Pauly (2016):

“Marine; freshwater; brackish; pelagic-neritic; anadromous [Riede 2004]; depth range 10 - 13 m [Heckman 1991].”

“Essentially a brackish water species but tolerating salinities up to 34 ppt and with semi-anadromous and purely freshwater forms in rivers and lakes.”

From Baker et al. (2015):

“It inhabits coastal areas that are shallower than 50 – 70 m (Fazli and Besharat 1998). It is considered oxyphilic.”

Climate/Range

From Froese and Pauly (2016):

“Temperate; 60°N - 36°N, 27°E - 56°E”

From Baker et al. (2015):

“This eurythermal fish occurs in waters with temperatures of 2.6 - 26°C and its optimal temperature range is 16 - 22°C (Aseinova 2003, Invasive Species Compendium 2011).”

Distribution Outside the United States

Native

From Freyhof and Kottelat (2008):

"Northwestern Black Sea and Sea of Azov."

From Froese and Pauly (2016):

"Eurasia: Black Sea (northwestern parts), Sea of Azov and Caspian Sea, also most of the affluent rivers of the area, reaching as far as 60 km inland. Also, Lake Palaeostomi (Bulgaria) and in Bay of Feodosiya (Romania), also Lake Apolyont (Turkey) (Whitehead 1985). Previously, two subspecies were recognized by some: *Clupeonella cultriventris cultriventris* (Nordmann, 1840) from the Black Sea and the Sea of Azov and *Clupeonella cultriventris caspia* (Svetovidov, 1941) from the Caspian Sea (Coad 1995; Reshetnikov et al. 1997)."

Introduced

From CABI (2016):

"In the Volga basin: *C. cultriventris* was established by the mid-1960s in the Kuybyshev Reservoir, by mid-1970s it was found in the Gorki Reservoir, in the 1990s it was established in the Rybinsk Reservoir, in 2000 it was found in Ivanovo Reservoir and it is now found up to the Beloye Lake (Kiyashko et al., 2006)."

"In Dnieper River basin *C. cultriventris* was recently found to be present in all reservoirs up to the River Pripyat (Semenchenko et al., 2009)."

From Baker et al. (2015):

"It has been recorded in the Pripyat River basin, Belarus in 1986 (Semenchenko 2009). In Russia, *Clupeonella cultriventris* was reported in the Rybinsk Reservoir in 1994 (Khalko 2007). It has populated the lower reaches of the Kama River in 1963-1966 (Mordukhai-Boltovskoi 1979). It had been first recorded in the 1950s in the Kuybyshev Reservoir in the late 1950s and had naturalized by the mid-1960s (Slynko et al. 2002). *Clupeonella cultriventris* occurs in the deltas and lagoons of the Dniester, Danube, Dnieper, Don, Kuban, Volga, and Ural rivers, and its expansion into these regions has been attributed to the construction of reservoirs (Kiyashko et al. 2006). It dominates fish communities in the Sheksna Reservoir up to Beloye Lake. After the late 1980s, *Clupeonella cultriventris* completely colonized the Uglich and Ivan'kov reservoirs of the Volga River within the span of 12 years. It is found in the Mediterranean Sea (Lleonart 2005), but it is not known whether it is nonindigenous there."

Means of Introduction Outside the United States

From Baker et al. (2015):

"In the Rybinsk Reservoir, *Clupeonella cultriventris* has been locally introduced to the Dneiper, Volga, and Kama rivers after the construction of dams (Kiyashko et al. 2006). It has not been introduced further north towards the Volga-Baltic canal system (Kiyashko et al. 2012)."

From Semenchenko et al. (2011):

"Unexpected and casual appearance of this species (Gulugin, Kunitsky 1999) can only be attributed to transport via ships entering the Mykashevichy river port."

Short Description

From Froese and Pauly (2016):

"Dorsal spines (total): 0; Dorsal soft rays (total): 13-21; Anal spines: 0; Anal soft rays: 12 - 23. Head short and wide; belly sharply keeled, with 24 to 29 scutes; pectoral fin tips pointed; last 2 anal fin rays enlarged; pterotic bulla absent; no notch at the center of the upper jaw. Based on pelvic and pectoral fin length, Svetovidov (1952 and 1963) recognized 2 subspecies: *C. cultriventris cultriventris* with longer pectoral and pelvic fins compared to that of *C. cultriventris caspia*."

From CABI (2016):

"Body comparatively deep, maximum depth 15.5-23.5% of TL, 19.7% average. Head moderate, average 21% of TL. Mean eye diameter 25% of head length. Lower jaw slightly extended. Ventral scutes well developed. Pectorals and pelvics long, pectorals 17.7-21.2% (average 12.7%) of TL, pelvics 11.7-13.8% (average 12.7%) of TL. Gill-rakers: 51-62 (average 60). Vertebrae 40-43 (average 41). The back and the upper part of head vary in colour from light green to blue-green, abdomen silvery white or golden yellow (Whitehead, 1985; Aseinova, 1989, 1992; Hoestlandt, 1991)."

Biology

From Freyhof and Kottelat (2008):

"Spawns in open water in late evening in April-July at 10-18°C. Eggs are pelagic. In Azov See [sic], there are two spawning runs, one in spring and one in autumn. Individuals migrating in autumn overwinter close to spawning sites and spawn in spring. Returns to sea after spawning. Juveniles migrate to sea during first summer. Feeds on crustaceans such as copepods and cladocerans."

From Froese and Pauly (2016):

"Forms schools. Migratory between winter or autumn feeding and summer spawning grounds. Feeds on zooplankton [Whitehead 1985]; crustaceans such as copepods and cladocerans

[Kottelat and Freyhof 2007]. Breeds in early summer in the Sea of Azov with a peak in May, and from about May in the lower reaches of rivers (e.g. Dneiper and Dneister) [Whitehead 1985]. Eggs are pelagic [Kottelat and Freyhof 2007]."

Human Uses

From Froese and Pauly (2016):

"Fisheries: highly commercial"

From CABI (2016):

"*C. cultriventris* is an important commercial fish in the Azov, Black and Caspian seas (Aseinova, 2003). They are eaten fresh, salted, smoked, or tinned. In the former USSR they were an important part of the diet (Svetovidov, 1964)."

Diseases

No records of OIE reportable diseases were found.

From Bailly (2008):

"Host of *Paracoenogonimus ovatus* Katsurada, 1914 (parasitic: endoparasitic)"

Threat to Humans

From Froese and Pauly (2016):

"Harmless"

3 Impacts of Introductions

No records of documented *actual* impacts were found. The information below details *potential* impacts.

From CABI (2016):

"It consumes the same zooplankton as young specimens of aboriginal fish species. In some cases feeding similarity exceeds 50% (Kiyashko et al., 2007), therefore high densities of *C. cultriventris* could alter growth of young aboriginal fish species."

"About 60% of *C. cultriventris* stock is consumed by predators (Aseinova, 2003). In newly established areas *C. cultriventris* becomes a very important food item for almost all predatory fishes (Stepanov and Kiyashko, 2008)."

From Baker et al. (2015):

"*Clupeonella cultriventris* dominated pelagic fish communities of the Volga and Sheksna reservoirs (Slynko et al. 2002) and continues to spread northwards as average water temperatures rise with the progression of climate change (Kiyashko et al. 2006). The lack of competitors and low predation pressure in these reservoirs as well as eutrophication, retarded flow, and the creation of habitats suitable for pelagic fish may have contributed to their spread and dominance in the fish communities. The dominance of this species in the reservoirs of the Volga River may have suppressed native fish populations (Mordukhai-Boltovskoi 1979b, Ricciardi and Rasmussen 1998). In locations where *Clupeonella cultriventris* is very abundant, its diet is similar to the diets of native species, with a feeding similarity index greater than 50% (Kiyashko et al. 2007). On the other hand, where this species is less numerous, its feeding similarity with native species is less than 40%. It may compete with planktivorous fish for zooplankton."

4 Global Distribution

Figure 1. Known global distribution of *Clupeonella cultriventris*. Map from GBIF (2013).

The location in Turkey was from unknown evidence and was not included as a source point for the climate match.

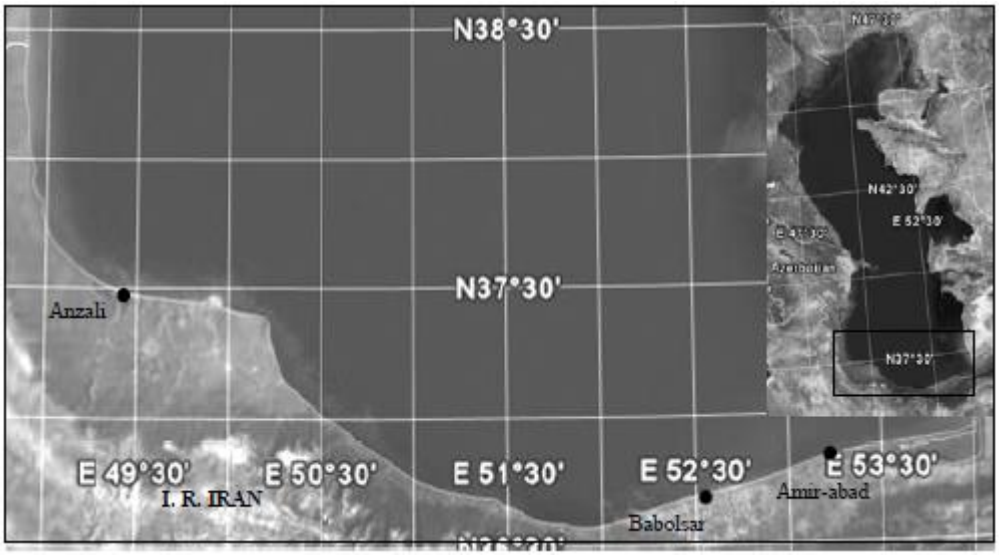

Figure 2. Iranian waters of the Casipan Sea where *Clupeonella cultriventris* is caught. Map from Fazli et al. (2007, Figure 1).

5 Distribution Within the United States

No records of *Clupeonella cultriventris* in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Clupeonella cultriventris* was high in areas of the Great Lakes Basin, and pockets of the western Great Plains. The climate match was low along the Atlantic, Gulf, and northern Pacific coasts, the extreme southwest and middle Great Plains. The match was medium everywhere else. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the Continental U.S. was 0.143, high, and high in Arizona, California, Colorado, Idaho, Illinois, Indiana, Michigan, New Mexico, Nevada, New York, Ohio, Oregon, Utah, Washington, and Wyoming.

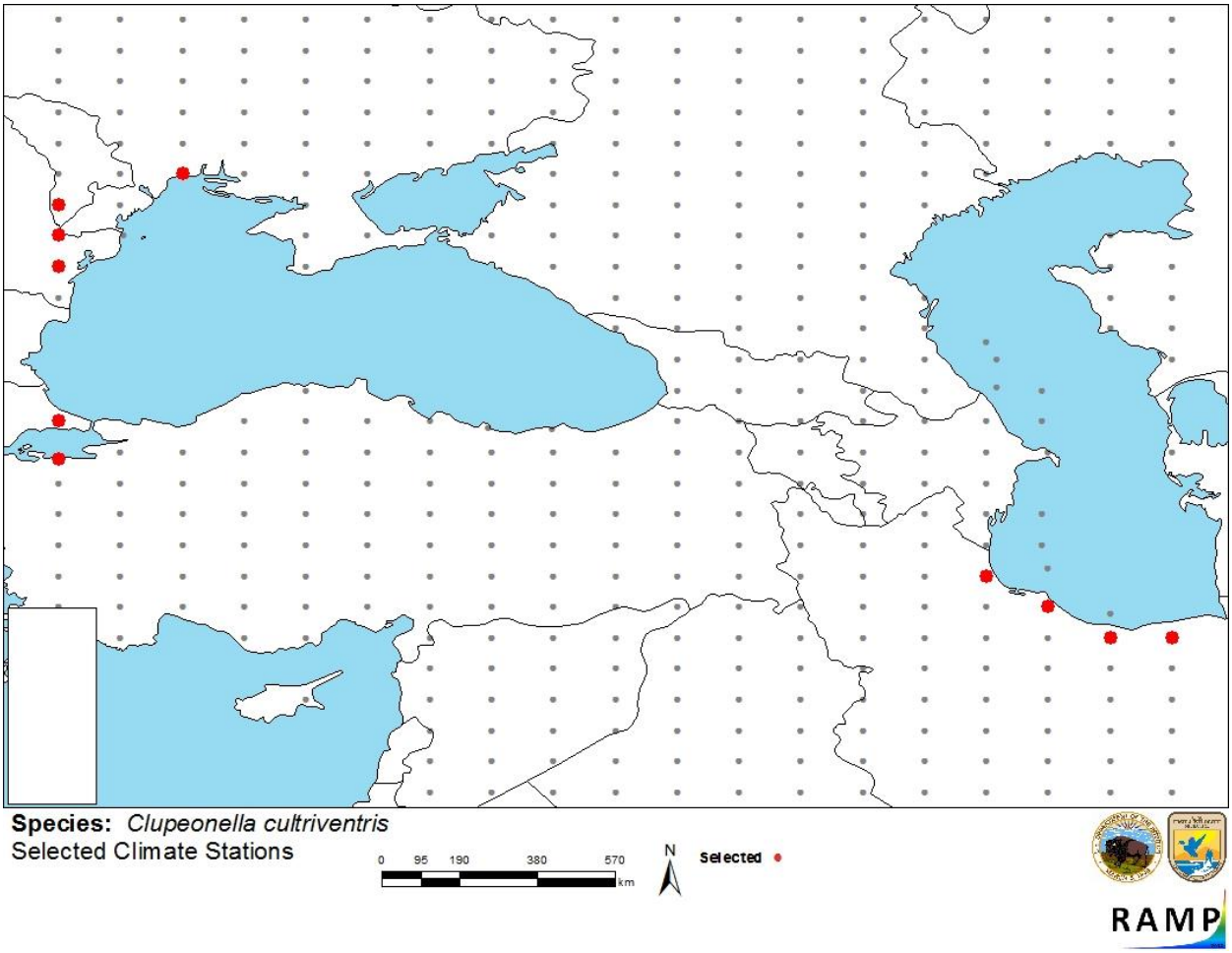

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Clupeonella cultriventris* climate matching. Source locations from Fazli et al. (2007) and GBIF (2013).

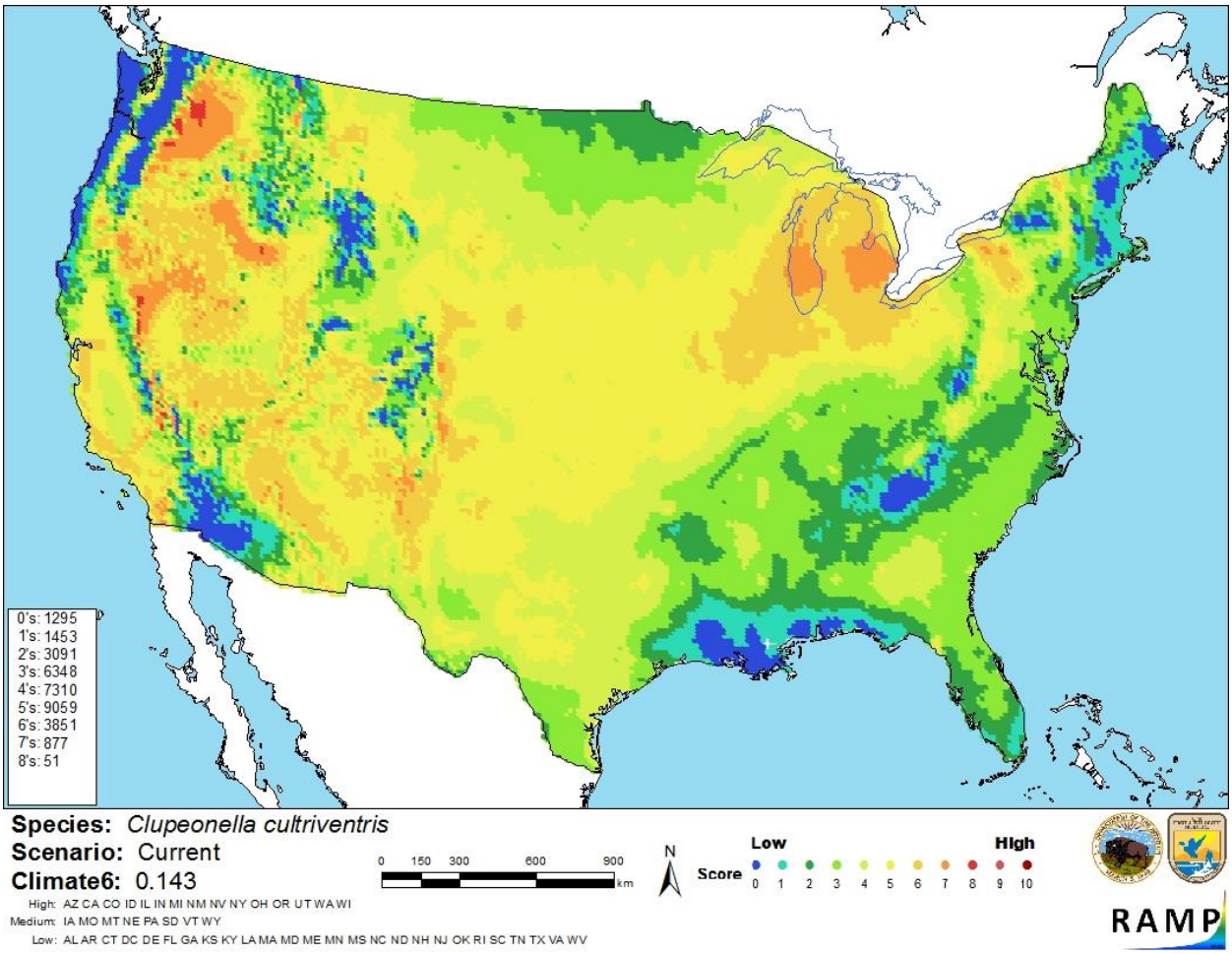

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Clupeonella cultriventris* in the continental United States based on source locations reported by Fazli et al. (2007) and GBIF (2013). 0 = Lowest match, 10 = Highest match.

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 medium. There was adequate ecological and biological information available. Records of introduction were found and some information on potential impacts of introductions was found. Most of the introductions occurred in countries where it is hard to obtain peer-reviewed literature. Specific information on the full range of the species was

not available. The climate match is based on a limited number of known locations. However, it is expected that the climate 6 score would only be higher with a better understanding of the range.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The history of invasiveness for *Clupeonella cultriventris* is not documented. There were many records of introductions with resulting established populations that are still expanding. This species can compete with native species and become a dominant species in invaded areas but the associated ecological impacts have not been documented. The climate match is high. The source points available for the match were limited but a more complete set of source points would only lead to a greater climate match. The certainty of assessment is medium. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **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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