Spine Loach (*Cobitis taenia*)

Ecological Risk Screening Summary

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1 Native Range and Status in the United States

Native Range

From Freyhof (2013):

"Atlantic drainages from Seine northward, Baltic basin south of 61ºN, upper Volga drainages, northern Black Sea basin (except Danube). Ancient records from Adour, Garonne and Loire drainages (France) require confirmation."

"Native: Belarus; Belgium; Czech Republic; Denmark; Estonia; Finland; France; Germany; Latvia; Lithuania; Luxembourg; Moldova; Netherlands; Norway; Poland; Russian Federation; Slovakia; Sweden; Ukraine; United Kingdom"

From Kitagawa et al. (2005):

"Although the striated spined loaches were first described as *Cobitis taenia striata* by Ikeda (1936), *Cobitis taenia* being distributed from Europe to Asia, based mainly on the rounded lamina circularis in mature males, *C. t. striata* in fact comprises several distinct species (Minamori, 1960)."

"In addition, *Cobitis lutheri*, characterized by a striped coloration pattern on the lateral midline in mature males, is distributed in the Amur Basin and rivers flowing into the Yellow Sea from northeastern China and the Korean Peninsula (Kim and Park, 2002). Although initially considered as a subspecies of *C. taenia* along with the striated spined loaches (Rendahl, 1935), it was later raised to species level (Kim and Lee, 1988)."

Status in the United States

No records of *Cobitis taenia* in the United States were found.

Means of Introductions in the United States

No records of *Cobitis taenia* in the United States were found.

Remarks

From Freyhof (2013):

"Protected under the Natura 2000 directive of the EU."

From Froese and Pauly (2016):

"In Appendix III of the Bern Convention (protected fauna) (Vostradovsky 1973)."

Records of *Cobitis taenia* in Mongolian, Russian, and Chinese literature were the result of misidentification of *C. melanoleuca* (Kottelat 2006).

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Eschmeyer et al. (2016):

"***taenia, Cobitis*** Linnaeus [C.] 1758:303 [Systema Naturae, Ed. X v. 1] Europe. Possible type: ZMUU Linn. Coll. 205 (1). Type catalog: Lönnberg 1896:44, Wheeler 1991:163. Kottelat 1997:90 "restricted" the type locality to Lake Mälaren, but the Code does not provide for such restriction in that manner. •Valid as *Cobitis taenia* Linnaeus 1758 -- (Berg 1949:890, Okada

1961:561, Mai 1978:225, Bianco & Taraborelli 1984, Roberts 1984:343, Sawada in Masuda et al. 1984:58, Wang 1984:75, Sivkov & Dobrovolov 1986:3, Bianco 1987:207, Lelek 1987:247, Coad 1991:18, Ahnelt & Tiefenbach 1994:11, Poll & Gosse 1995:95, Coad 1995:21, Kottelat 1997:89, Reshetnikov et al. 1997:744, Vasil'eva 1998:99, Coad 1998:102, Bogutskaya et al. 2001:44, Ludwig et al. 2001:388, Wang et al. 2001:176, Ivanova & Dobrovolov 2002:35, Bogutskaya & Naseka 2004:106, Vassilev & Pehlivanov 2005:172, Janko et al. 2005:405, Hanel & Lusk 2005:283, Fricke 2007:26, Kottelat & Freyhof 2007:315, Sabet et al. 2012:11, Kottelat 2012:29, Parin et al. 2014:100, Mousavi-Sabet et al. 2015:561, Zhang et al. 2016:152). **Current status:** Valid as *Cobitis taenia* Linnaeus 1758. Cobitidae."

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 Ostariophysi
Order Cypriniformes
Superfamily Cobitoidea
Family Cobitidae
Subfamily Cobitinae
Genus *Cobitis*
Species *Cobitis taenia* Linnaeus, 1758"

Size, Weight, and Age Range

From Freyhof (2013):

"Females live up to five years, males up to three."

From Froese and Pauly (2016):

"Maturity: Lm 5.3, range 8 - ? cm
Max length: 13.5 cm TL male/unsexed; [Berg 1964]; 9.5 cm SL (female); common length: 5.0 cm TL male/unsexed; [Muus and Dahlström 1968]; max. reported age: 5 years [Kottelat and Freyhof 2007]"

Environment

From Freyhof (2013):

"Able to inhabit very degraded streams especially if siltation is a problem. In Baltic Sea at salinity up to 5 %."

From Froese and Pauly (2016):

"Freshwater; demersal; pH range: 7.0 - 7.7; dH range: 10 - 15; potamodromous [Riede 2004]."

Climate/Range

From Froese and Pauly (2016):

"Temperate; 14°C - 18°C [Riehl and Baensch 1991]; 62°N - 36°N, 7°W - 40°E"

Distribution Outside the United States

Native

From Freyhof (2013):

"Atlantic drainages from Seine northward, Baltic basin south of 61ºN, upper Volga drainages, northern Black Sea basin (except Danube). Ancient records from Adour, Garonne and Loire drainages (France) require confirmation."

"Native: Belarus; Belgium; Czech Republic; Denmark; Estonia; Finland; France; Germany; Latvia; Lithuania; Luxembourg; Moldova; Netherlands; Norway; Poland; Russian Federation; Slovakia; Sweden; Ukraine; United Kingdom"

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"In addition, *Cobitis lutheri*, characterized by a striped coloration pattern on the lateral midline in mature males, is distributed in the Amur Basin and rivers flowing into the Yellow Sea from northeastern China and the Korean Peninsula (Kim and Park, 2002). Although initially considered as a subspecies of *C. taenia* along with the striated spined loaches (Rendahl, 1935), it was later raised to species level (Kim and Lee, 1988)."

Introduced

Froese and Pauly (2016) report an introduction of *Cobitis taenia* to the Philippines; the time period of introduction, source location, status of the species in the wild, and any ecological effects were unknown.

From Sorokin et al. (2011):

"Another possible source of the penetration of north-western gobies in Crimean Peninsula could be an accidental introduction caused by acts on acclimatization of economic-valuable fishes in Crimean reservoirs. As a result, they were found by J. Freyhof (see Freyhof and Naseka 2007) in several Crimean rivers, namely Al'ma and Kacha. The same reasons resulted in an appearance of spined loach *Cobitis taenia* Linnaeus, 1758 (Cobitidae, Cypriniformes) in the Al'ma River, Crimea. This finding should not be treated as colonization from presumed refugial population (Culling et al. 2006), because historically *C. taenia* was absent in the Al'ma River."

From Orrù et al. (2010):

"A total of 14 introduced fish species are established in Sardinian fresh waters. These species comprise members of the […] Cobitidae (spinedloach, *Cobitis taenia*), […]"

Means of Introduction Outside the United States

From Sorokin et al. (2011):

"Another possible source of the penetration of north-western gobies in Crimean Peninsula could be an accidental introduction caused by acts on acclimatization of economic-valuable fishes in Crimean reservoirs. As a result, they were found by J. Freyhof (see Freyhof and Naseka 2007) in several Crimean rivers, namely Al'ma and Kacha. The same reasons resulted in an appearance of spined loach *Cobitis taenia* Linnaeus, 1758 (Cobitidae, Cypriniformes) in the Al'ma River, Crimea. This finding should not be treated as colonization from presumed refugial population (Culling et al. 2006), because historically *C. taenia* was absent in the Al'ma River."

From Orrù et al. (2010):

"Spined loach first appeared in a lowland stream with moderate current and abundant submerged plants in south-western Sardinia during the late 1980s, probably introduced by anglers using live bait (Massidda et al., 2008)."

Short Description

From Froese and Pauly (2016):

"Dorsal spines (total): 3; Dorsal soft rays (total): 6-8; Anal spines: 3; Anal soft rays: 5; Vertebrae: 40 - 42. Caudal fin with 15-16 rays [Spillman 1961]. Single small spot on upper caudal base. Pigmentation (Gambetta's longitudinal zone of pigmentation): zones Z1-Z4 usually well differentiated, extending backward to caudal peduncle; height of blotches of zone Z4 usually less than 2 times in their length; if more than 2 times, then height equal to or greater than horizontal eye diameter. One lamina circularis [Kottelat and Freyhof 2007]."

From Wildscreen (2016):

"The small, bottom-dwelling spined loach (*Cobitis taenia*) has an elongate flat-sided body, which is brownish grey in colour with dark patches to the flanks (4) [Cihar 1991; Perrow and

Jowitt 2000]. There are six barbels around the mouth [Cihar 1991], which are often difficult to see. Erectile spines below the eyes give the species its common name [Perrow and Jowitt 2000]."

Biology

From Freyhof (2013):

"Females spawn for the first time at 2-3 years, males at 1-2 years and more than 45 mm SL. Spawns in April-July, at temperatures above 18°C. Eggs are spawned in dense vegetation. Fractional spawner, producing 1-18 portions (under laboratory conditions). Larvae negatively phototactic, hiding under vegetation and in debris until beginning of exogenous feeding. Usually occurring together with hybridogenous, sperm-parasitic lineages, which have originated by hybridisation with *C. elongatoides*."

"From small lowland streams to large rivers. In channels, ditches, backwaters and lakes on sand bottom."

From Froese and Pauly (2016):

"Filter sand for food particles [Freyhof 1999]. Nocturnal, stays hidden under rocks or buried in the sand or mud during the day [Billard 1997]. Oviparous, with distinct pairing during breeding [Breder and Rosen 1966]. Spawn in spring; scatters eggs into mats of plant material [Freyhof 1999]. Eggs are found attached to gravel and weed in shallow, flowing water [Pinder 2001]."

"Start of courtship is observed when both male and female swim excitedly then progresses to a chase done by the male. When movements become synchronised, the male entwines itself around the female's body, squeezing it and causing egg spawning [Lodi and Malacarne 1990]. Triploid females can occur; they produce triploid eggs which can develop without fertilization, but need contact with sperm to start development (gynogenesis) [Freyhof 1999]. Also Sokolov and Berdicheskii (1989)."

From Wildscreen (2016):

"This species has a peculiar mode of feeding in which it uses mucus to extract food particles from fine material pumped through the mouth [Perrow and Jowitt 2000]. It is able to survive in low oxygen conditions because the gill area is very large. It is also thought that if oxygen levels fall drastically, spined loaches are able to gulp air from the surface of the water, and absorb oxygen through the gut wall into the blood stream [Perrow and Jowitt 2000]."

Human Uses

From Froese and Pauly (2016):

"Fisheries: of no interest; aquarium: public aquariums"

Diseases

No records of OIE reportable diseases were found.

From Froese and Pauly (2016):

“Schulmanela Infestation, Parasitic infestations (protozoa, worms, etc.)”

From Bailly (2010):

“Host of *Lernaea cyprinacea* Linnaeus, 1758 (parasitic: ectoparasitic)”

Threat to Humans

From Froese and Pauly (2016):

“Harmless”

3 Impacts of Introductions

No records of impacts from introductions of *Cobitis taenia* were found.

4 Global Distribution

Figure 1. Known global distribution of *Cobitis taenia*. Map from Freyhof (2013).

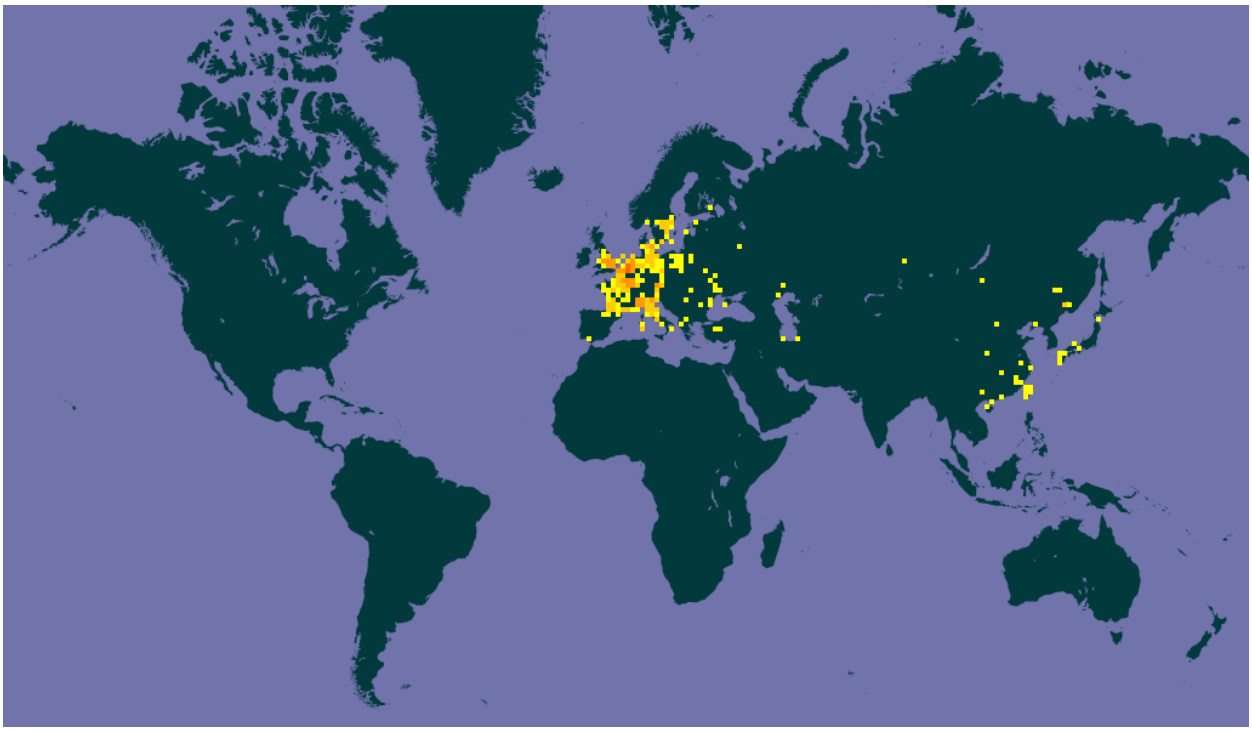

Figure 2. Known global distribution of *Cobitis taenia*. Map from GBIF Secretariat (2016).

The locations in and near Mongolia have been verified as misidentifications and should be recorded as *C. melanoleuca* (Kottelat 2006). Those locations were not used as source points for the climate match.

Originally *Cobitis taenia* was considered to have a native distribution from Europe to Japan. More recent taxonomic research, morphological and genetic, has determined that the populations in Asia, either previously considered *C. taenia* or a subspecies were distinct species from *C. taenia* (e.g. Kitagawa et al. 2005). None of those locations were used as source points in the climate match.

5 Distribution Within the United States

No records of *Cobitis taenia* in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match of *Cobitis taenia* was high around the Great Lakes, Appalachia, and in parts of the Great Plains. The match was low in Florida, along the Gulf Coast, extreme southwest, and Pacific Northwest. 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 0.345, high, and high in Arkansas, Arizona, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Virginia, Vermont, Washington, West Virginia, Wisconsin, and Wyoming.

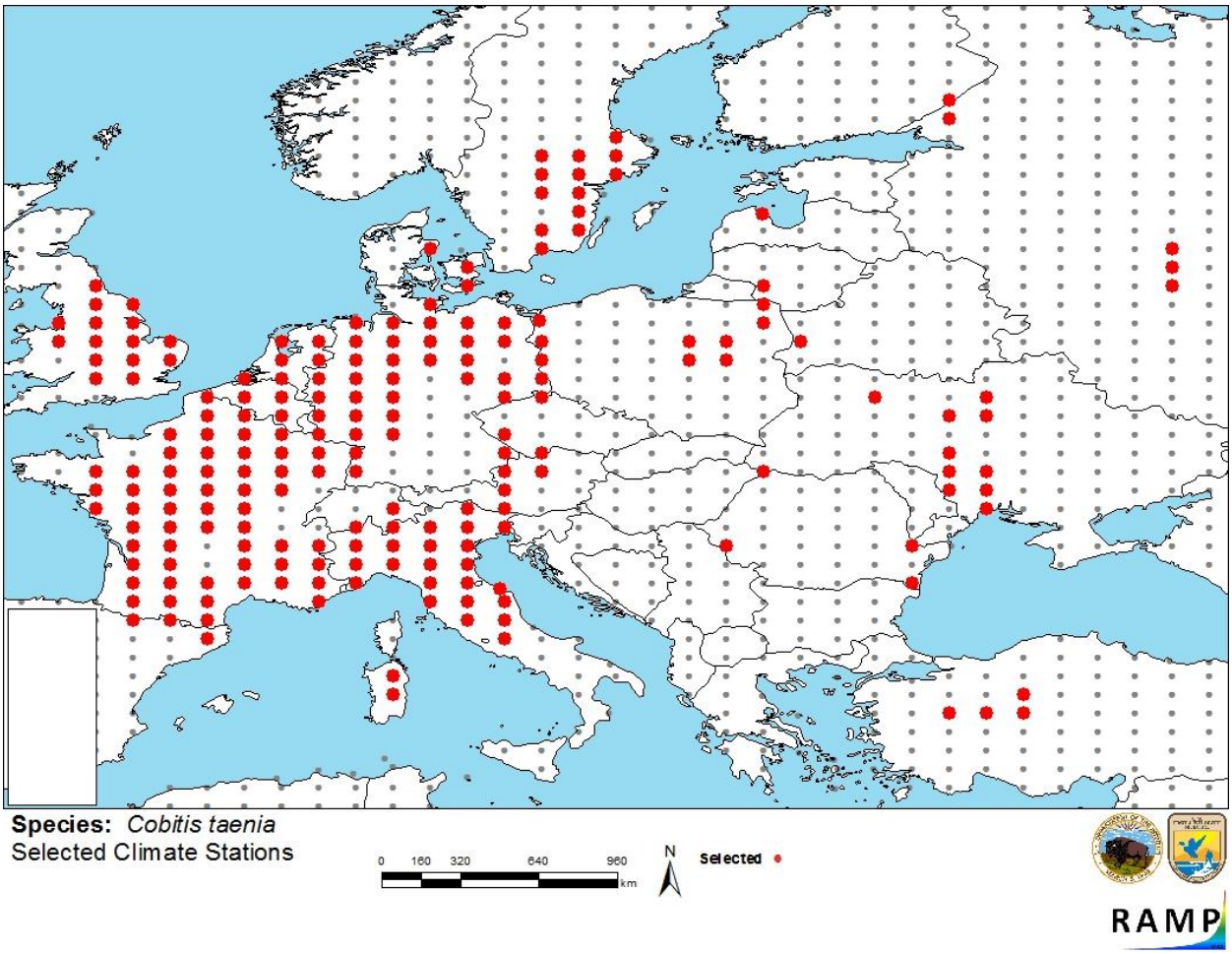

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (grey) for *Cobitis taenia* climate matching. Source locations from Kitagawa et al. (2005), Kottelat (2006), Freyhof (2013), and GBIF Secretariat (2016).

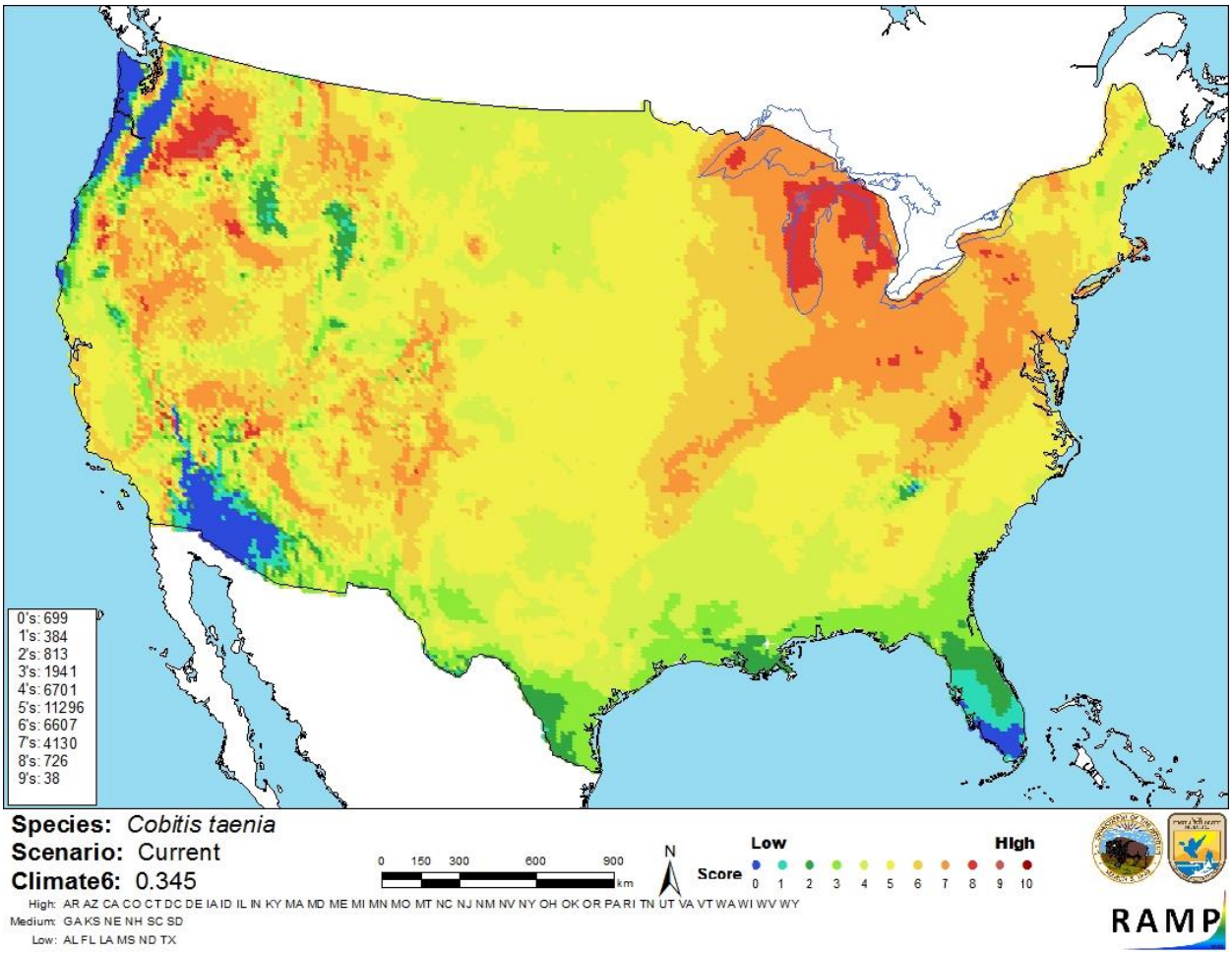

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Cobitis taenia* in the contiguous United States based on source locations reported by Kitagawa et al. (2005), Kottelat (2006), Freyhof (2013), and GBIF Secretariat (2016). 0 = Lowest match, 10 = Highest match.

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 for *Cobitis taenia* is medium. There was adequate biological and ecological information available. The records pertaining to the native distribution of this species and any potential introductions are unclear in some cases. There have been changes in the organization of the genus that confuse the records, especially those older than 20 years. Records of *Cobitis taenia* in Mongolian, Russian, and Chinese literature were the result of

misidentification of *C. melanoleuca* (Kottelat 2006). The climate match was based on a more conservative interpretation of the current distribution of the species.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The history of invasiveness for *Cobitis taenia* is not documented. There are a few records of introductions available but no records of impacts from those introductions were found. The climate match is high, especially in the Great Lakes Basin. The climate match could change if more detailed accurate distribution information was available, however the match should remain in the high category. The certainty of assessment is medium. The overall risk assessment category is uncertain. The taxonomic changes occurring in genus *Cobitis* impede the ability to clearly define native an invaded ranges for this species.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information** No additional remarks.
- **Overall Risk Assessment Category: Uncertain**

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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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