

European Chub (*Squalius cephalus*)

Ecological Risk Screening Summary

Web Version—07/18/2014

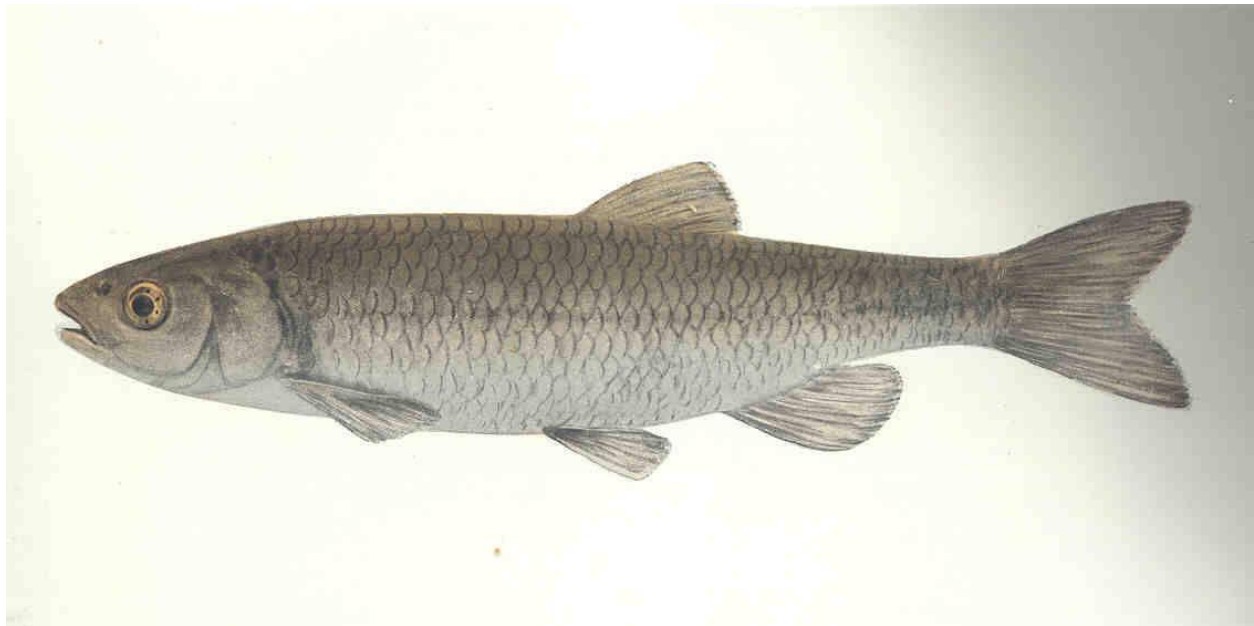


Photo (edited): F. Supino, Freshwater and Marine Image Bank from EOL (2014).

1 Native Range, and Status in the United States

Native Range

From Kottelat and Freyhof (2007):

“Eurasia: North, Baltic, northern Black, White, Barents and Caspian Sea basins, [Atlantic] basins southward to Adour drainages (France), Great Britain north to 56°C, Scandinavia: southern Finland, Sweden north to [about] Stockholm. Mediterranean basin from Var to Hérault (possibly Aude) (France) drainages. Introduced elsewhere, Naturally absent from Italy and Adriatic basin.”

Status in the United States

The species has not been reported in the U.S.

Means of Introductions to the United States

The species has not been reported in the U.S.

Remarks

The accepted scientific name for this species changes frequently, making it difficult to locate reports on this species. Over 50 different scientific names have been used for this species (CABI 2014).

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Kottelat and Freyhof (2007):

“Kingdom Animalia
Phylum Chordata
Class Actinopterygii
Order Cypriniformes
Family Cyprinidae
Genus *Squalius*
Species *Squalius cephalus* (Linnaeus, 1758)

Taxonomic Status: Valid.”

Size, Weight, and Age Range

From Kottelat and Freyhof (2007):

“Maturity: Lm ?, range 7 - 30 cm. Max length : 60.0 cm SL male/unsexed; common length : 30.0 cm TL male/unsexed; (Muus and Dahlström 1968); max. published weight: 8.0 kg (Spillman 1961); max. reported age: 22 years (Wüstemann and Kammerad 1995).”

Environment

From Kottelat and Freyhof (2007):

“Freshwater; brackish; pH range: 6.0 - 7.8; dH range: 8 - 25 benthopelagic; potamodromous (Riede 2004).”

From CABI (2014):

“*S. cephalus* prefers slow-flowing waters. Although it is considered tolerant to anthropogenic perturbations, large animals may be particularly vulnerable to reduced water flow levels due to the pelagic conditions of the species. Detailed studies on environmental preferences to establish lower and upper tolerance values have not been published. A study performed on Iberian populations of *S. laietanus* (i.e. formerly *S. cephalus*) considers the species tolerant to poor water quality and physical habitat degradation gradients (Maceda-Veiga and De Sostoa, 2011).”

Climate/Range

From Kottelat and Freyhof (2007):

“Temperate; 4°C - 20°C (Baensch and Riehl 1991); 64°N - 35°N, 10°W - 60°E.”

Distribution Outside the United States

Native

From Kottelat and Freyhof (2007):

“Eurasia: North, Baltic, northern Black, White, Barents and Caspian Sea basins, [Atlantic] basins southward to Adour drainages (France), Great Britain north to 56°C, Scandinavia: southern Finland, Sweden north to [about] Stockholm. Mediterranean basin from Var to Hérault (possibly Aude) (France) drainages. Introduced elsewhere, Naturally absent from Italy and Adriatic basin.”

Introduced

From CABI (2014):

“Recorded from Ombrone, Albegna, Fiora, and Bruna [Italy] (Kottelat and Freyhof 2007).”

“Introduced to River Inny [Ireland] in late 1990s early 2000s (Caffrey et al. 2008).”

From National Biodiversity Data Centre (2010):

“Only found in one river in Ireland and eradicated in 2011.”

From CABI (2014):

“*Squalius cephalus* has long been considered to be widely distributed throughout most of Europe, from the Iberian Peninsula to the Urals, the Caspian Sea basin and central Iran. For a long time, many *Squalius* populations in the Mediterranean basin have attracted little attention and they have been uncritically identified as *S. cephalus* or dumped into a ‘*S. cephalus* complex’ or ‘*S. cephalus* species group’.”

“Several peri-Mediterranean populations are now considered morphologically and genetically distinct enough to be considered valid species or subspecies. Some morphological characters may be difficult to identify in live fish and, in particular, in juveniles: therefore, genetic analysis is recommended for correct identification. The recent description of new species and the previous wide range of *S. cephalus* makes the identification of introduced populations in Europe difficult.”

Means of Introduction Outside the United States

From CABI (2014):

Species was introduced to River Inny by anglers.

Species was stocked in rivers in Italy.

Short description

From Kottelat and Freyhof (2007):

“Dorsal spines (total): 3; Dorsal soft rays (total): 7-9; Anal spines: 3; Anal soft rays: 7 - 10; Vertebrae: 42 - 48. Differs from its congeners in France, North, Baltic, Arctic, Black and Caspian Sea basins by the possession of the following characters: dorsal profile with a well-marked discontinuity between head and trunk; a row of black pigments along free margin of each flank scale, forming a regular reticulate pattern, with no or very few pigments on central part of scales; anal and pelvic fins orange to red; dorsal fin with 8½ branched rays; anal fin with 8½ branched rays (rarely 9½); scales on lateral line 40-45 + 2-3; mouth terminal, with well marked chin; lower jaw tip not included in the upper lip; interorbital distance 37-42% HL; postorbital distance 47-51% HL; eye diameter 17-22% HL, 1.5-2.3 times in snout length; body depth 22-27% SL; lower jaw long, length greater than depth of operculum; iris whitish; pharyngeal teeth 2,5-5,2; in stretched anal fin of individuals larger than about 15 cm SL, distance between tips of first and last branched rays usually greater than caudal peduncle depth (Kottelat and Freyhof 2007). Caudal fin with 19 rays (Spillman 1961).”

Biology

From Kottelat and Freyhof (2007):

“Most abundant in small rivers and large streams of [lowland] zone with riffles and pools. Found along shores of slow-flowing lowland rivers, even in very small mountain streams, and in large lake[s], undertaking spawning migration to inflowing streams. Adults are solitary while juveniles occur in groups. Feeding larvae and juveniles live in very shallow shoreline habitats. Feed on a wide variety of aquatic and terrestrial animals and plant material. Large individuals prey predominantly on fishes. Breed in fast-flowing water above gravel bottom, rarely among submerged vegetation. Often form fertile hybrids with *Alburnus alburnus* (Kottelat and Freyhof 2007).”

From CABI (2014):

“Sokolov and Berdicheskii (1989) reported that spawning occurs in fast-flowing water above gravel bottom, rarely among submerged vegetation. Males reach sexual maturity at the age of 2-4 years whereas females reach it at 4-6. Maturity is influenced by environmental factors and some individuals may mature much later. Spawning takes place in May-August, when temperature rises above 14°C. Multiple spawning is described during each breeding season. Males assemble at spawning sites and follow ripe females, often with much splashing, to shallow riffles. Females then lay sticky eggs into the gravel (Kottelat and Freyhof, 2007). Pale yellow eggs are found

attached to gravel, weed and stones in flowing water (Pinder, 2001). Billard (1997) also reported eggs added to plants.”

“Fecundity varies seasonally and geographically. The lowest value of fecundity (1158-2050 eggs) was detected in Turkey (Ünver, 1998; Ünlü and Balci, 1993) and the highest values (100,000 eggs) were detected in Europe (Vostradovsky, 1973). Maitland and Campbell. (1992) reported the same maximum values in Western Greece and Peloponnese.”

“Feeds on a wide variety of aquatic and terrestrial animals and plant material. Large individuals are predominantly piscivorous (Kottelat and Freyhof, 2007). In the UK is recorded as feeding on worms, molluscs, crustaceans, and various insect larvae (Maitland and Campbell, 1992); large chub eat considerable numbers of small fish, such as chub, eels, dace, roach, gudgeon and minnows; also frogs, crayfish, voles and young water birds.”

Human uses

From Kottelat and Freyhof (2007):

“Fisheries: minor commercial; gamefish: yes.”

“Popular with amateur sport fishermen. Can be caught with various baits and lures. The flesh is of poor quality (Dahl and Medem 1964).”

Diseases

There are no known OIE-reportable diseases for this species.

Threat to humans

Harmless.

3 Impacts of Introductions

From Caffrey et al. (2008):

“At the low density recorded in the River Inny in 2006, chub do not appear to pose a problem for natural biodiversity or for the resident fish communities. It is probable, however, that, as the chub become more abundant and widespread, they will impact on our native or naturalized fishes. The impact could be direct, through predation, or indirect, by competing for available habitat or for common food items. A further risk associated with the introduction of non-native, invasive species relates to the viral, bacterial or parasitic fauna that these fish harbour (Hoffman and Schubert 1984; Boxshall and Frear 1990; Kennedy 1994; Beyer et al. 2005).”

From CABI (2014):

“The introduction of exotic species may cause hybridization with native species, predation, resource competition and agonistic behaviour with native species and/or the introduction of diseases. Chub does not represent a risk for humans but it may cause changes to ecosystems (i.e.

altering food web structures) and it may predate on native species. The risk of hybridization is particularly important with closely related fish species, in particular with other members of the *Squalius* genus. Fertile hybrids with *Alburnus alburnus* have also been reported (Kottelat and Freyhof, 2007). Studies on the effects of chub on native fish species are lacking.”

Important note: No impacts besides hybridization have been observed for this species. *Alburnus alburnus* and *Squalius* spp. are not known to be established in the United States (USGS 2013), which limits the risk of hybridization. The above references speculate on potential impacts but do not provide evidence to support their speculations.

4 Global Distribution

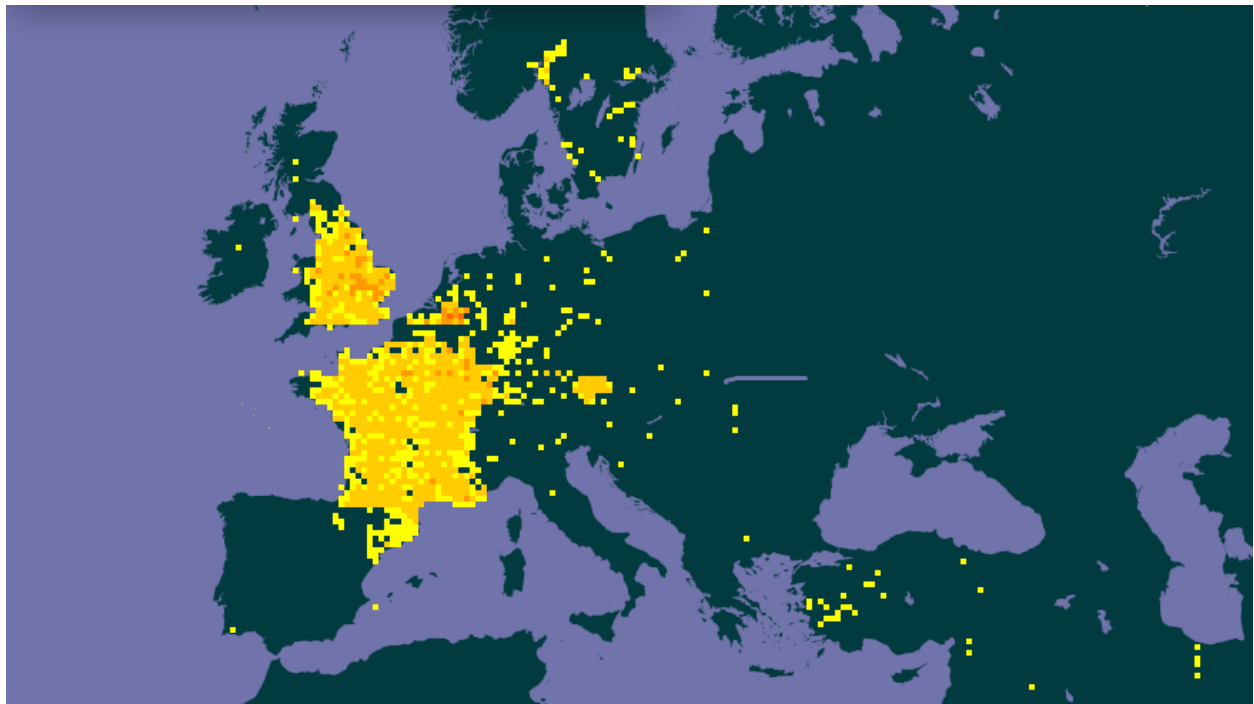


Figure 1. Map of known global distribution of *Squalius cephalus*. Map from GBIF (2010). Locations in Canada and off the coast of France and Sweden were not included because they were incorrectly located.

5 Distribution within the United States

This species has not been reported in the U.S.

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2008; 16 climate variables; Euclidean Distance) was high in most of the contiguous U.S. Very high matches were found along the Pacific Coast, especially throughout Napa/Willamette/Columbia River Valleys, and also in the Great Lakes, Plains, and Mid-Atlantic states. Climate 6 proportion indicated that the contiguous United States has a high climate match. The range for high climate match is 0.103 and greater; climate match of *Squalius cephalus* is 0.515.

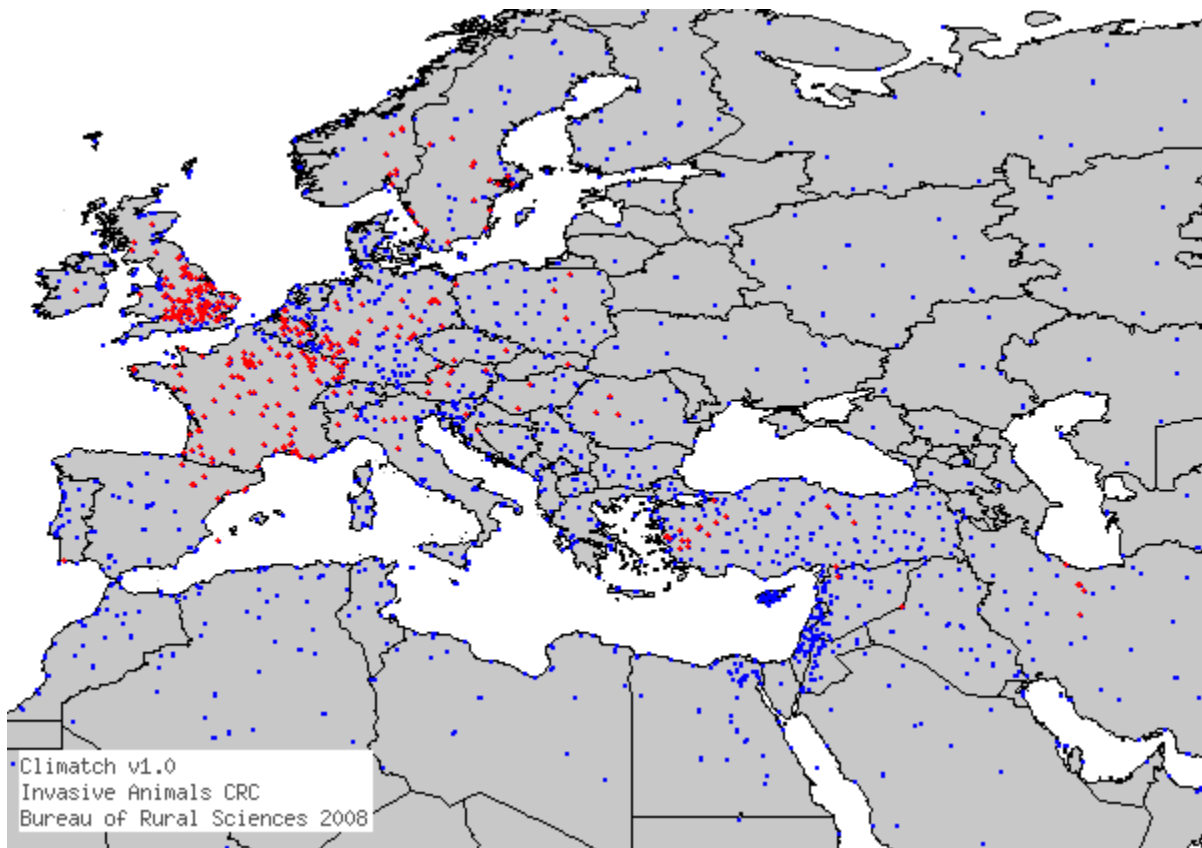


Figure 2. CLIMATCH (Australian Bureau of Rural Sciences 2008) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *Squalius cephalus* climate matching. Source locations from GBIF (2010).

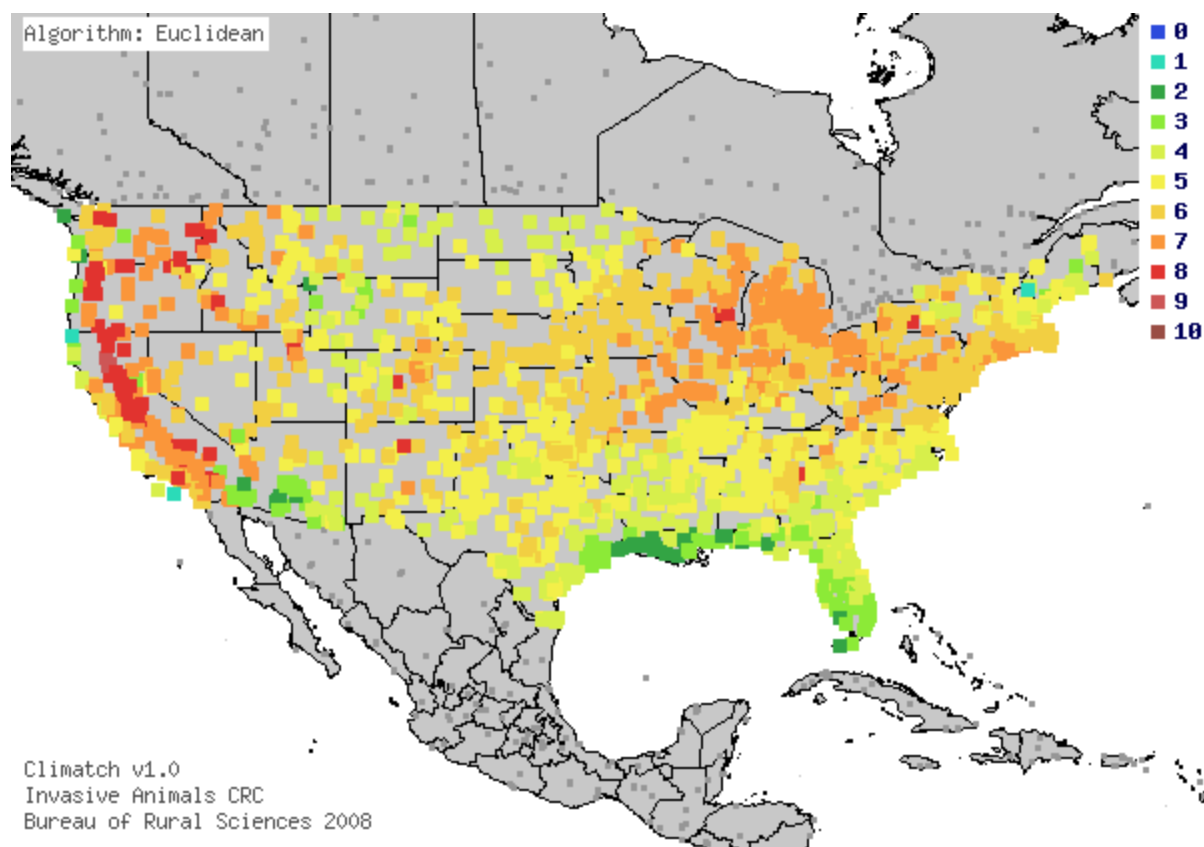


Figure 3. Map of CLIMATCH (Australian Bureau of Rural Sciences 2008) climate matches for *Squalius cephalus* in the contiguous United States based on source locations reported by GBIF (2010). 0= Lowest match, 10=Highest match.

Table 1. CLIMATCH (Australian Bureau of Rural Sciences 2008) climate match scores.

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	0	3	39	120	294	501	612	330	72	3	0
Climate 6 Proportion =		0.515									

7 Certainty of Assessment

Information on the distribution of this species is uncertain due to taxonomic changes and challenges in discerning the native range from the introduced range. Impacts of introduction are largely unknown, and should be further studied. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Squalius cephalus is a freshwater and brackish water species with a broad native range in Europe and Asia Minor. This species is popular with anglers, which has facilitated its spread. *Squalius cephalus* has been introduced to Ireland (now eradicated), Italy, and possibly other locations. This species is known to hybridize with similar species, but congeners are not present in the United States. Other negative impacts of introduction have been speculated upon but not observed. Studies on the effects of introduced *Squalius cephalus* are lacking, which makes its history of invasiveness uncertain. This species has a high climate match with the contiguous United States. Most likely habitat is in California, Oregon, Washington, Idaho, and the Great Lakes. Due to a lack of information on impacts and uncertainty surrounding the established range of this species, the certainty of this assessment is low. The overall risk for this species is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3):** Uncertain
- **Climate Match (Sec.6):** High
- **Certainty of Assessment (Sec. 7):** Low
- **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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10 References Quoted But Not Accessed

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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