Tench (*Tinca tinca*)
Ecological Risk Screening Summary

Web Version—09/05/2014

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1 Native Range, and Status in the United States

Native Range

From Kottelat and Freyhof (2007):

"Eurasia: hypothesized as native in most Europe, naturally absent only in Ireland, Scandinavia north of 61°30'N, eastern Adriatic basin and western and southern Greece where it is now introduced. In Asia, native eastward to western Yenisei drainage south of 60° N. Introduced elsewhere."

Status in the United States

From Nico et al. (2014):

"The tench has been documented for 38 states. Baughman (1947) indicated that this species was established in California, Colorado, Idaho, Washington, and apparently Oregon; he also quoted information of previously breeding populations in Maryland. In a more recent work, Page and Burr (1991) considered it established in California, Colorado, Connecticut, and Washington, and possibly Delaware, Maryland, and New York. Courtenay et al. (1991) believed it to be established in California, Colorado, Connecticut, Idaho, and Washington. Dill and Cordone (1997) found evidence that the tench is still established in California, but described its distribution as very limited. Although the data are more than a decade old, Woodling (1985) confirmed that the species continued to survive in several Colorado waters. Zuckerman and Benhke (1986) also noted that the species persisted in Colorado, but they indicated populations in the San Luis Valley had declined dramatically in recent years. Whitworth (1996) reported that no specimens had been obtained in Connecticut for over fifteen years. There is recent literature indicating the species is still established in Washington and, probably, Idaho. For instance, in their analysis of Northwest drainages, McPhail and Lindsey (1986) listed tench as present in the upper, middle, and lower Columbia River system and in the Chehalis river system. Although Idaho was not listed by Page and Burr (1991), the continued presence or established status of tench in that state has been documented by several authors (i.e., Simpson and Wallace 1978, Courtenay et al. 1991, Idaho Fish and Game 1996). However, it likely has been extirpated in Delaware (contrary to Page and Burr 1991), where surveys since 1950 have failed to find the species (M. Raasch, personal communication). Koster (1957) stated that this species occurred in the middle Rio Grande Valley of New Mexico, and Bond (1973) described its distribution in Oregon as the Columbia River and probably the lower Willamette River. Lee et al. (1980 et seq.) also recorded tench as established in Oregon and New Mexico. However, in more recent works, Sublette et al. (1990) considered it extirpated from New Mexico, and Courtenay et al. (1986) believed that tench had been extirpated from both Oregon and New Mexico. In his revised treatment of Oregon fishes, Bond (1994) noted tench as introduced to the Columbia River and stated that the species was once present in lower Willamette River. The Willamette is a tributary of the Columbia River. Although it seems to be the case that tench are no longer present in Oregon, Bond (1973, 1994) did not definitively state that the Willamette River population was the only Columbia River site with tench known in that state. Its present status in both Maryland and New York is unclear. According to Baughman (1947) it was temporarily established in Maryland. Schwartz (1964) concluded that wild populations no longer exist in Maryland. In fact, he indicated that the last wild specimens known from the state were taken from the C & O Canal at Buzzard's Hole, Maryland, in 1911; however, Schwartz did note that some tench may exist in Catoctin and Huntington creeks, Frederick County, as a result of escape from commercial ponds where the fish were reared for sale to the "dime-store goldfish trade." Apparently Schwartz did not consider tench in the two creeks to be reproducing. However, Lee et al. (1984) noted that it may occur in isolated areas of Piedmont in Maryland. Rohde et al. (1994) did not mention tench in their recent work on fishes of Delaware, Maryland, and Virginia. Similarly, Smith (1985) did not mention tench in his treatment of New York fishes. Nevertheless, Schmidt (1986), in his analysis of fish distribution in 14 Atlantic coastal drainages, listed tench as introduced to lowland lacustrine habitats in the Delaware, Long Island, and Housatonic drainages. Shortly after its introduction, Smith and Bean (1899) indicated that the species was becoming common in the

Potomac River. Much more recently, Hocutt et al. (1986) listed it as introduced to the Potomac River. However, Jenkins and Burkhead (1994) concluded that there was no evidence that the species persists in the Potomac drainage, a conclusion also reached by Starnes et al. (2011). Although the tench has maintained breeding populations in a few places, the frequent absence of this species in most fish samples suggests that the tench is no longer present in many areas where it had previously been introduced and, in some cases, was temporarily established (e.g., Hall 1956, Morris et al. 1974, Hendricks et al. 1979, Courtenay et al. 1986, Menhinick 1991). Ravenel (1896) reported that the U.S Fish Commission stocked 1,600 tench in the Musconetcong River in New Jersey. That is the only record of the species in that state. During the late 1800s, the U.S. Fish Commission distributed tench to many states. In many cases the Commission documented that tench were released into specific rivers or lakes. However, for a number of states the Commission simply noted that tench were distributed to "various applicants" without indicating whether or not these fish were ever released into open waters (Baughman 1947). Later data indicated that tench were found or collected in open waters of a few of these states (e.g., Arizona), but for ten states (i.e., Alabama, Arkansas, Florida, Kentucky, Louisiana, Massachusetts, Michigan, West Virginia, Wisconsin, and possibly Utah) the presence of this species in open waters has not been adequately confirmed. Nevertheless, it is conceivable that some of the tench delivered by the Commission to various applicants eventually found their way to open waters as a result of floods, dam breaks, or because of intentional releases. Such losses were frequent with common carp, another cyprinid widely distributed by the U.S. Fish Commission during the late 1800s (Smiley 1886). Tanner (1936) listed tench as one of the species introduced into Utah streams, but he provided no details."

"States in which this species has been stocked or reported include Alabama (Baughman 1947); Arizona (Baughman 1947, Courtenay et al. 1991); Arkansas (Baughman 1947); California (Shapovalov 1944, Kimsey and Fisk 1964, Skinner 1972, Courtenay et al. 1984, 1991, Dill and Cordone 1997, Moyle 2002, Wydoski and Whitney 2003); Colorado (Ellis 1914, Baughman 1947, Beckman 1952, Everhart and Seaman 1971, Woodling 1985, Zuckerman and Behnke 1986, Rasmussen 1998, Wydoski and Whitney 2003); Connecticut (Webster 1942, Connecticut State Board of Fisheries and Game 1959, Whitworth et al. 1968, Courtenay et al. 1986); Delaware (Ravenel 1898, Baughman 1947, Lee et al. 1976, Raasch and Altemus 1991); Florida (Baughman 1947); Georgia (Bean 1896, Ravenel 1898, Baughman 1947); Idaho (Smith 1896, Ravenel 1898, Lampman 1946, Baughman 1947, Linder 1963, Simpson and Wallace 1978, Idaho Fish and Game 1990, 1996, Wydoski and Whitney 2003); Illinois (Ravenel 1898, Baughman 1947); Indiana (Baughman 1947); Iowa (Bean 1896, Ravenel 1898, Baughman 1947); Kansas (Ravenel 1898, Baughman 1947); Kentucky (Baughman 1947); Louisiana (Baughman 1947); Maryland (Ferguson 1876, Anonymous 1892, Bean 1884, 1903, McDonald 1893, Ravenel 1898, Truitt et al. 1929, Baughman 1947, Schwartz 1963, 1964, Courtenay el al. 1991, Starnes 2002, Starnes et al. 2011); Massachusetts (Baughman 1947, USFWS 2005); Michigan (Baughman 1947); Mississippi (Ravenel 1896); Missouri (McDonald 1893, Evermann and Kendall 1895, Worth 1895, Bean 1896, Ravenel 1896, 1898, Baughman 1947, Pflieger 1971); Nebraska (Baughman 1947, Morris et al. 1974); Nevada (Smith 1896, Miller and Alcorn 1946, Baughman 1947, Deacon and Williams 1984); New Jersey (Ravenel 1896); New Mexico (Ravenel 1896, Baughman 1947, Koster 1957, Sublette et al. 1990); New York (Bean 1903, Baughman 1947, Courtenay et al. 1986, Schmidt 1986, Malchoff et al 2005); North Carolina (Ravenel 1896, Baughman 1947); Ohio (Ravenel 1898, Baughman 1947, Trautman 1981);

Oklahoma (McDonald 1893, Bean 1896, Baughman 1947, Hall 1956); Oregon (Smith 1896, Ravenel 1898, Chapman 1942, Lampman 1946, Baughman 1947, Courtenay et al. 1986, Wydoski and Whitney 2003); Pennsylvania (Ravenel 1898, Baughman 1947, Hendricks et al. 1979); South Carolina (Ravenel 1896, 1898, Baughman 1947); Tennessee (Ravenel 1898, Baughman 1947); Texas (Worth 1895, Bean 1896, Ravenel 1896, 1898, Baughman 1947, Hubbs 1954, Howells 1992); Utah (Tanner 1936, Baughman 1947); Vermont (Vachon and Dumont 2002). Virginia (Baird 1887, Ravenel 1896, 1898, Baughman 1947, Hocutt et al. 1986, Courtenay et al. 1991, Jenkins and Burkhead 1994); Washington (Smith 1896, Ravenel 1898, Chapman 1942, Lampman 1946, Baughman 1947, Gray and Dauble 1977, McPhail and Lindsey 1986, Killgore et al. 1991, Wydoski and Whitney 2003); West Virginia (Baughman 1947); and Wisconsin (Baughman 1947, Becker 1983)."

Means of Introductions in the United States

From Nico et al. (2014):

"This species was imported into North America from Germany by the U.S. Fish Commission in 1877 apparently for use as a food and sport fish (Baird 1879). The Commission apparently spent several years learning to culture tench, for it was not until well into the 1880s that the agency started to seriously distribute the species in the United States. According to Baughman (1947), the Commission planted more than 138,000 tench across North America during the period 1886 to 1896. By the end of that period, the Commission had provided tench to at least 36 different states. Shortly thereafter, the agency discontinued working with tench and turned over their hatchery ponds to the rearing of bass (Baughman 1947). The U.S. Fish Commission stocked tench into lakes and ponds in the Pacific states, including Idaho, Oregon, and Washington, in 1895 (Smith 1896). Additional introductions occurred in Washington when tench exhibited at the 1909 Worlds Fair, held in Seattle, were dumped into a large pond on the University of Washington campus. Some of these fish later were transferred to Lake Washington; the population eventually spread to Lake Union (Wydoski and Whitney 2003). Although most tench introductions were the result of intentional stockings, some introductions were the result of escape from holding facilities. In 1889, many of the fish, including an estimated 25 tench, held in federal ponds in Washington, D.C., escaped into the Potomac River during a flood (McDonald 1893). However, tench had been introduced to the Potomac River prior to that date. For instance, Smiley (1889) recorded the taking of tench from that river during March 1887. Evermann and Kendall (1895) reported the escape of tench from the Neosho fish hatchery into Spring Branch near Neosho in southwestern Missouri. Baughman (1947) discussed the escape of tench into the Olentangy River of Ohio after the banks of an artificial lake collapsed in 1898. Schwartz (1964) stated that tench had escaped from commercial ponds into creeks in Maryland. Tench were first brought to California in 1922. At that time, specimens obtained in Italy were illegally released into a private reservoir near Half Moon Bay, San Mateo County; the species was later spread to other California waters by ranchers (Shapovalov 1944, Dill and Cordone 1997)."

Remarks

From Nico et al. (2014):

"Baughman (1947) reviewed the history of tench introductions in North America. He also presented evidence suggesting the presence of centrarchids somehow prevented more widespread

establishment of tench. Zuckerman and Behnke (1986) noticed that the decline of tench in Colorado coincided with the spread and establishment of the common carp. These authors also noted the occurrence of tench at two sites in Colorado at elevations greater than 2,850 meters. Shapovalov (1944) and Dill and Cordone (1997) reviewed the history of tench in California. In addition to the normal- or wild-colored tench, the U.S. Fish Commission distributed an orange-yellow or reddish variety, the golden tench, to various applicants in the United State during the late 1800s (Bean 1896). That genetic strain apparently was only distributed as an ornamental. There is no evidence that this ornamental variety was introduced to open waters. The golden tench is still used as an ornamental fish in European ponds (Scott and Crossman 1973, Muus and Dahlstrom 1978).”

“DeVaney et al. (2009) performed ecological niche modeling to examine the invasion potential for tench and three other invasive cyprinids (common carp *Cyprinus carpio*, grass carp *Ctenopharyngodon idella*, and black carp *Mylopharyngodon piceus*). All of the current established populations of tench were in areas of predicted high suitability for this species. Interestingly, many areas where tench failed to become established or is currently extirpated (e.g., Great Lakes region) also had a moderate to high predicted suitability. DeVaney et al. (2009) attributed this potentially to negative interactions with sunfishes or unmeasured environmental factors.”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2011):

“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 Cyprinoidea
Family Cyprinidae
Genus Tinca
Species Tinca tinca (Linnaeus, 1758)

Taxonomic Status: Valid.”

Size, Weight, and Age Range

From Kottelat and Freyhof (2007):

"Maturity: Lm ?, range 20 - ? cm; Max length : 70.0 cm SL male/unsexed; (Allen et al. 2002); common length : 20.0 cm TL male/unsexed; (Muus and Dahlström 1968); max. published weight: 7.5 kg (Muus and Dahlström 1968)."

Environment

From Kottelat and Freyhof (2007):

"Freshwater; brackish; demersal; potamodromous (Riede 2004); depth range 1 - ? m (Darwin 1877). "

Climate/Range

From Kottelat and Freyhof (2007):

"Temperate; 4°C - 24°C (Baensch and Riehl 1997); 64°N - 36°N, 10°W - 104°E."

Distribution Outside the United States

Native

From Kottelat and Freyhof (2007):

"Eurasia: hypothesized as native in most Europe, naturally absent only in Ireland, Scandinavia north of 61°30'N, eastern Adriatic basin and western and southern Greece where it is now introduced. In Asia, native eastward to western Yenisei drainage south of 60° N. Introduced elsewhere."

Introduced

From Kottelat and Freyhof (2007):

This species is listed as introduced in Portugal, Italy, Turkey, Kyrgyzstan, British Columbia, Ireland, Norway, New Zealand, India, Australia, Netherlands, El Golea, Canada, South Africa, Chile, Zimbabwe, Indonesia, Finland, Madagascar, Morocco, Zambia, Jordan River, Damachi fish farm, Japan, Tunisia, Cyprus and China (FAO 1997).

Means of Introduction Outside the United States

From Kottelat and Freyhof (2007):

Reasons listed for introductions of this species include accidental, fisheries, aquaculture, angling, phyto-zooplankton control, diffused from other countries, snail control and unknown. This species is listed as established in most locations where introduced and having negative impacts on native species in some of those locations (FAO 1997).

Short description

From Kottelat and Freyhof (2007):

"Dorsal spines (total): 4; Dorsal soft rays (total): 8-9; Anal spines: 3-4; Anal soft rays: 6 - 8; Vertebrae: 39 - 41. Body thickset, heavy, and laterally compressed, the caudal peduncle characteristically deep and short. Skin thickened, slimy; the scales small, embedded. Overall coloration olive-green, at times dark green or almost black, with golden reflections on ventral surface. Head triangular, eye orange-red, small; snout relatively long; interorbital broad; mouth terminal, small in size with thick lips and a pair of well-developed barbels, one at each corner of the mouth. Caudal fin with 19 rays (Spillman 1961). Diagnosed from other cyprinid species in Europe by the following characters: body golden greenish brown; one pair of barbel (maxillary); lateral line with 96-115 scales, small and deeply embedded; dorsal fin with 8-9½ branched rays; and anal fin with 6-9½ branched rays."

Biology

From Kottelat and Freyhof (2007):

"Typically found in shallow, densely vegetated lakes and backwaters. Often overwinters buried in mud. Larvae and juveniles confined to dense vegetation. Adults inhabit warm lakes and pools with weed and mud bottom. Tolerates low oxygen saturations (Billard 1997, Allen et al. 2002). Feeds on detritus, benthic animals and plant materials. Adult often prey mainly on molluscs. Spawns among dense vegetation in still water. [...] Locally under threat due to river engineering. Reported to reach a maximum length of 84 cm TL (Page and Burr 1991)."

Human uses

From Kottelat and Freyhof (2007):

"Fisheries: commercial; aquaculture: commercial; gamefish: yes; aquarium: public aquariums."

"Used as a fodder fish for bass (Skelton 1993). Utilized fresh and frozen; eaten pan-fried, broiled, and baked (Frimodt 1995). Popular with amateur sport fishers. Its flesh is highly esteemed (Billard 1997)."

Diseases

From Kottelat and Freyhof (2007):

Pseudocapillaria Infestation 1, Parasitic infestations.

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

Threat to humans

Harmless.

3 Impacts of Introductions

From Nico et al. (2014):

"For the most part, unknown. In the 1940s this species was reported to be a nuisance because of high abundance in certain parts of Maryland and Idaho (Baughman 1947). The diet consists mainly of aquatic insect larvae and molluscs (Scott and Crossman 1973). Moyle (2002) considered it a potential competitor for food with sport fishes and native cyprinids. In their discussion of tench introduced to Africa, de Moor and Bruton (1988) noted that the species is known to stir up bottom sediments, possibly affecting water quality, but not to the extent of common carp *Cyprinus carpio*."

From GISD (2014):

"Impacts specific to tench are difficult to find, as this species is often lumped together with others in the Cyprinidae family, such as koi and common carp. In Australia it is thought that tench may directly compete with trout and native fish for food resources (IFS 2000). The ability of tench to survive in degraded environments causes some confusion, as it is unclear whether they contribute to this degradation or simply inhabit a niche that native fish cannot occupy. Most impacts are likely to be related to the wide range of organisms consumed by tench. An experimental study by Bekliogu & Moss (1998) showed that tench can increase periphyton (algal) biomass through selective predation on gastropods, which keep periphyton under control through grazing. This 'trickle-down' effect could have negative impacts on aquatic communities if it occurs to a significant extent in the wild. Impacts of tench were reviewed by Rowe (2004). There is no evidence that they affect other fish directly, however, a number of studies have implicated them in water quality decline."

From Sabapathy (2014):

"*Tinca tinca* was introduced into the River Murray in 1876 and has spread rapidly throughout the Murray-Darling System. A small population has been reported in the Onkaparinga River. Numbers were reduced in the 1970s when the common carp population increased. *T. tinca* do not represent a serious threat to native fish in Australia."

"The US Fish Commission imported *T. tinca* into North America from Germany in 1877 for use as a food and sport fish, distributing it to some 36 states during the late nineteenth century. Although most *T. tinca* introductions were the result of intentional stockings, some introductions were the result of escape from holding facilities. Recent studies indicate that *T. tinca* is no longer present in areas it had been introduced to or in some case was temporarily established. Baughman (1947) presented evidence suggesting that the presence of centrarchids somehow prevented the more widespread establishment of *T. tinca* in the USA."

"Their omnivorous diet and tolerance of a wide range of environmental conditions has [led] to some countries labelling tench an invasive species, due to concerns over competition with native fish (ISSG 2011)."

From Economidis et al. (2000):

"The species shows a rather neutral ecological character and contributes to the enhancement of fish production in lakes."

4 Global Distribution

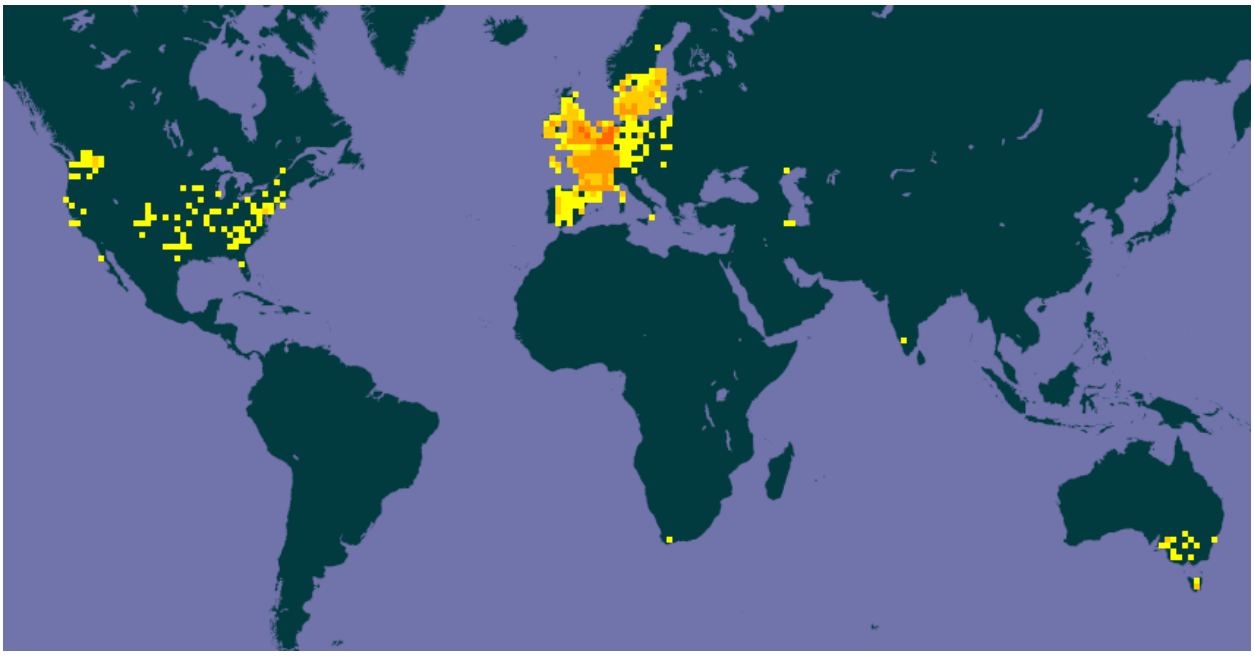

Figure 1. Global distribution of *Tinca tinca*. Map from GBIF (2014).

5 Distribution within the United States

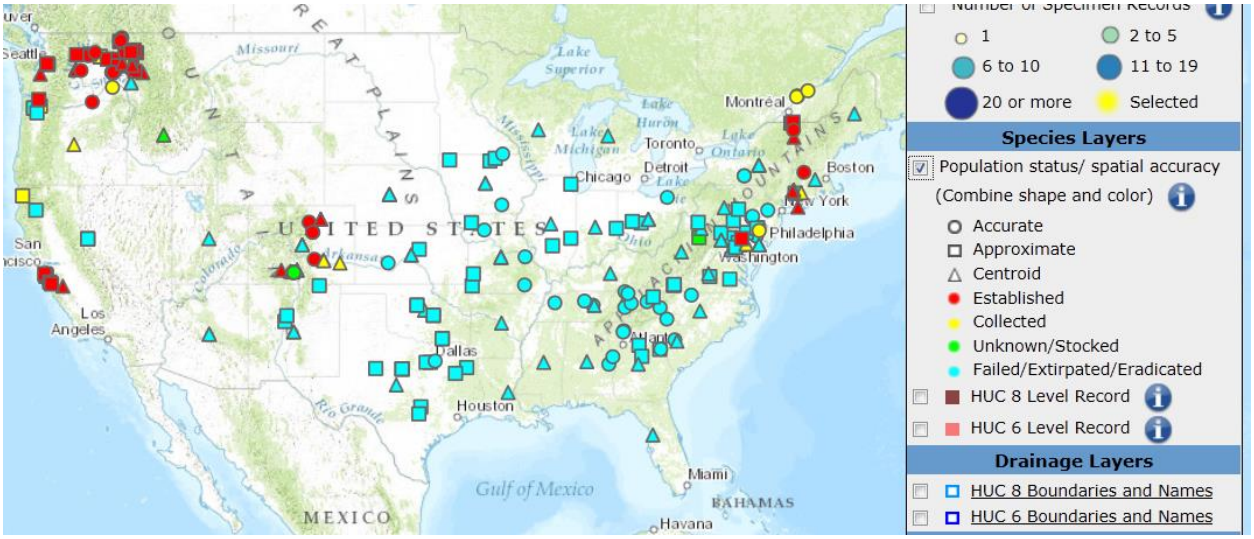

Figure 2. Distribution of *Tinca tinca* in the U.S. Map from Nico et al. (2014).

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2008; 16 climate variables; Euclidean Distance) was high throughout most of the contiguous U.S. Medium to low readings were found in the Southeast and the extreme Southwest. Climate 6 proportion indicated that the contiguous U.S. has a high climate match. The range for a high climate match is 0.103 and greater; climate match of *Tinca tinca* is 0.671.

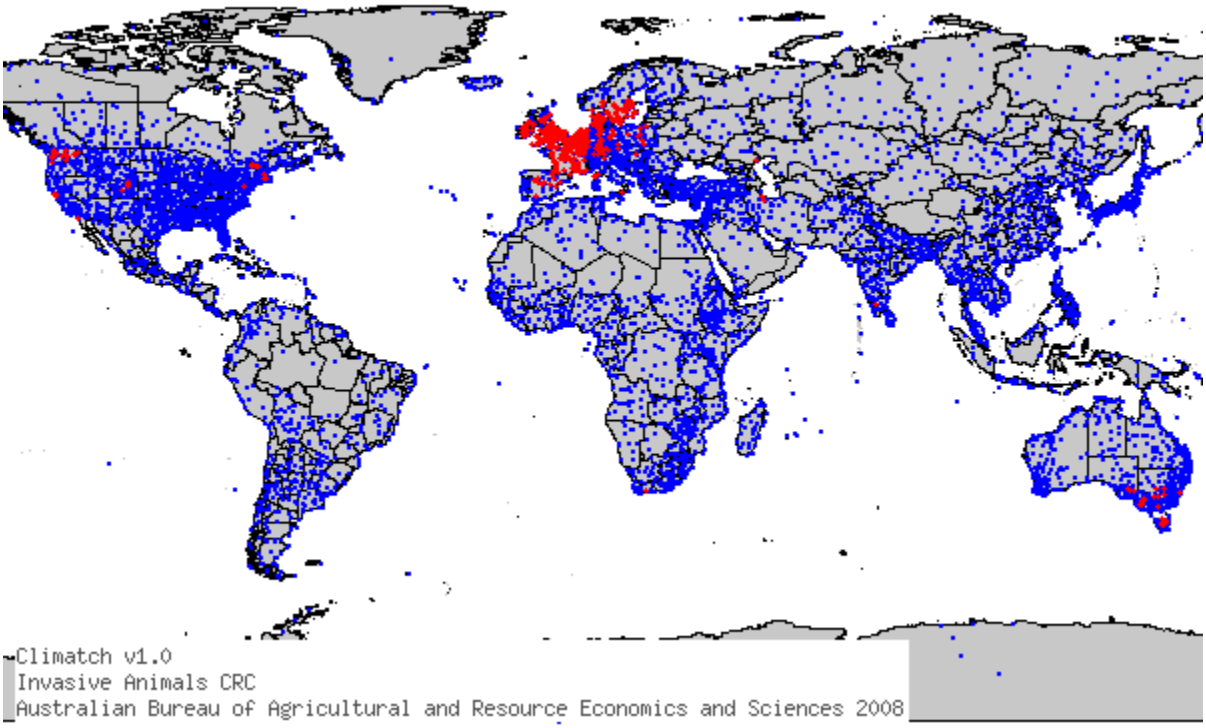

Figure 2. CLIMATCH (Australian Bureau of Rural Sciences 2008) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *Tinca tinca* climate matching. Source locations from GBIF (2014) and Nico et al. (2014).

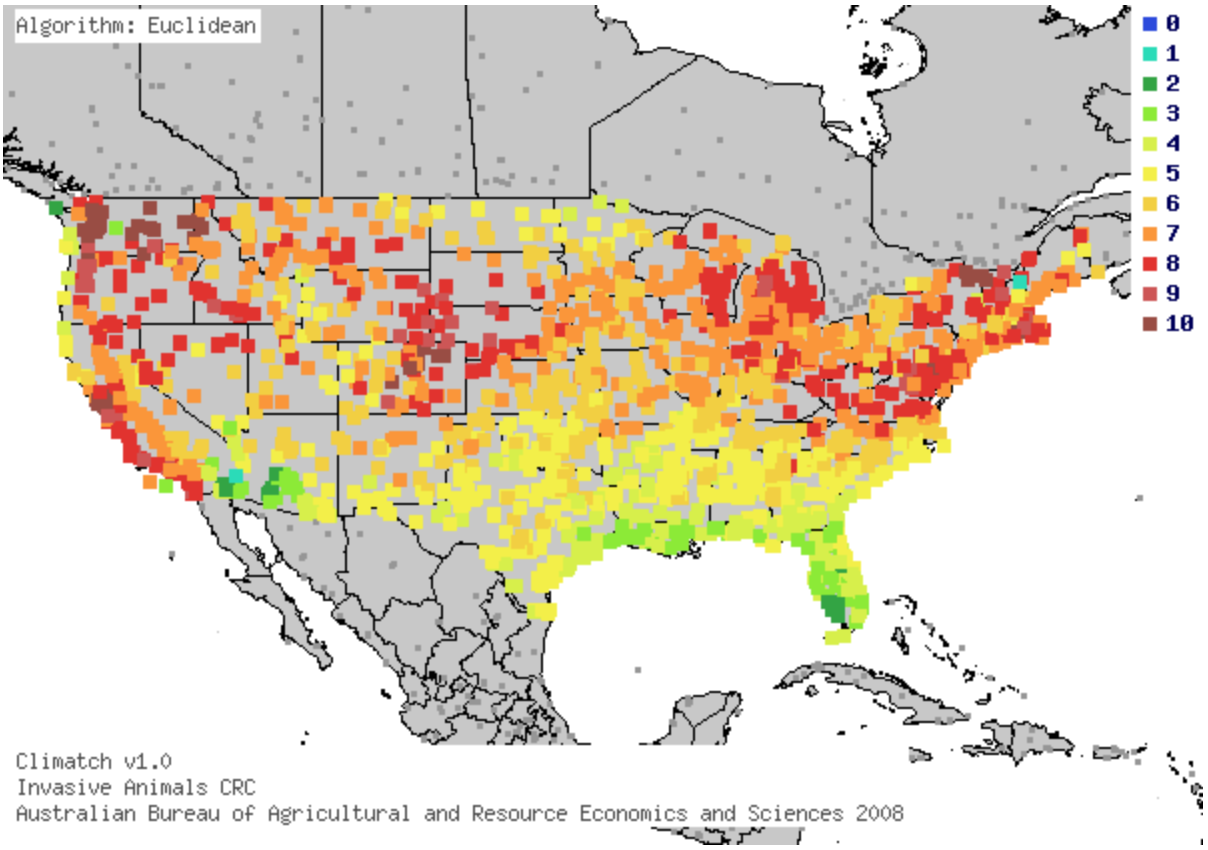

Figure 4. Map of CLIMATCH (Australian Bureau of Rural Sciences 2008) climate matches for *Tinca tinca* in the contiguous United States based on source locations reported by GBIF (2014) and Nico et al. (2014). 0= Lowest match, 10=Highest match.

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	2	18	86	184	360	388	463	349	59	65
Climate 6 Proportion =		0.671									

7 Certainty of Assessment

Information on the biology and distribution of this species is readily available. However, there is little information available on impacts of this species. The little information that is available is mostly anecdotal or speculation. The certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Tinca tinca is a freshwater and brackish water fish native to Eurasia. This species has established in many countries outside of its native range, including the U.S. This species has a high climate match with the U.S. Bait bucket introductions, flooding, and natural range expansion are all possible vectors for this species to be introduced to new areas. Impacts associated with this species are largely unknown. Most likely the main impact they have is a deterioration of water quality. The lack of information on impacts makes the overall risk for this species 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**

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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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