U.S. Fish & Wildlife Service

European Perch (*Perca fluviatilis*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, August 2012
Revised, March 2019
Web Version, 8/27/2019

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019a):

"Eurasia: throughout Europe to northernmost extremity of Scandinavia, except Iberian Peninsula, central Italy, and Adriatic basin; Aegean Sea basin in Matriza and from Struma to Aliakmon drainages; Aral Sea basin; Siberia in rivers draining the Arctic Ocean eastward to Kolyma."

"Occur in adjacent or contiguous drainage basins to Afghanistan [Coad 1981]."

"[In Turkey,] Known from the European Black Sea, European Mediterranean Sea and Anatolian Black Sea watersheds; […]"

"Occurs in Odra and Morava river basins [Czech Republic] [Hanel 2003]."

"Occurs throughout the country [Denmark] [Frier 1994]."

"Abundant in the Gulf of Riga and Gulf of Finland [Estonia] [Ojaveer and Pihu 2003]. Only fish species in Estonia found in bog lakes [Anonymous 1999]."

"Occurs through the country. Perch is the most common fish in Finland; […]"

"Occurs throughout France. One of the most common species."

"Found in the Elbe estuary [Germany] [Thiel et al. 2003]; Danube and Rhine drainages [Kottelat and Freyhof 2007]. Found in Neckar [Günther 1853]."

"[In Greece,] Recorded from the Strymonikos Gulf [Koutrakis et al. 2000]; Lake Doiran [Kottelat and Freyhof 2007]."

"Known from Danube drainage [Hungary] [Kottelat and Freyhof 2007]."

"[In Russia,] Distributed in the Arctic Ocean basin from the Kola River to the Kolyma, White Sea basin and Solovetskie Is. [Berg 1965]."

"Native and regular [in Sweden] [Kullander 1999]. Found in the southern Bothnian Sea [Thorman 1986]."

"Known from Lake Windermere, England [Near 2002]. […] Found in England, Wales, and Scotland [Maitland and Lyle 1996]."

Status in the United States

From Baker et al. (2019):

"It is not stocked, cultured, or sold in the Great Lakes region."

No verified records of *Perca fluviatilis* in the wild or in trade in the United States were found. A few observation records for *P. fluviatilis* in the United States are found in the BISON and GBIF databases but no other sources confirmed the presence of the species in North America. The collection dates are all in the 1880s or 1960s (BISON 2019; GBIF Secretariat 2019), which is prior to the solidification of European Perch (*Perca fluviatilis*) and the native Yellow Perch (*P. flavescens*) as separate species (Marsden et al. 1995; see Remarks, below). Those records could very well be misidentifications of the native species and were not considered valid observations of *P. fluviatilis* for this screening.

Perca fluviatilis was officially listed as an injurious wildlife species in 2016 under the Lacey Act (18.U.S.C.42(a)(1)) by the U.S. Fish and Wildlife Service (USFWS 2016). The importation of European perch into the United States, any territory of the United States, the District of Columbia, the Commonwealth of Puerto Rico, or any possession of the United States, or any shipment between the continental United States, the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, or any possession of the United States is prohibited.

Means of Introductions in the United States

No verified records of *Perca fluviatilis* in the wild in the United States were found.

Remarks

A previous version of this ERSS was published in 2014. Revisions were done to incorporate new information and to bring the document in line with current standards.

Perca fluviatilis is also known by the common name of Eurasian perch (Froese and Pauly 2019a).

From Marsden et al. (1995):

"The yellow perch (*Perca flavescens* Mitchill) is widely distributed across North America and is a popular and economically important sport fish. In Europe and Asia, the Eurasian perch, *Perca fluviatilis* L., has equivalent life-history characteristics, geographic spread, and fishing popularity. Despite their absolute geographic isolation, the species status of these two percids has been questioned. Svetovidov and Dorofeeva (1963, cited in Collette and Banarescu, 1977) and McPhail and Lindsey (1970) considered them to be subspecies (P. *fluviatilis fuviatilis* and *P. f. flavescens*). Thorpe (1977) compiled existing data on morphological, physiological, behavioral, and ecological characteristics of both forms and concluded that they were "biologically equivalent," a somewhat ambiguous term from a taxonomic standpoint. Bailey et al. (1970) and Binarescu (1960, cited in Thorpe, 1977) listed them as separate species. The only known anatomical difference between the two perch is the position of the predorsal bone (Collette and Banarescu, 1977). In *P. flavescens*, this bone is located between the first and second neural spines, whereas in *P. fluviatilis* it lies anterior to the first neural spine. On the basis of this single difference, Collette and Banarescu hypothesized that the two perch must be separate species."

"Fixed allelic differences between two sympatric populations clearly indicate reproductive isolation; in cases where a high proportion of loci show fixed allele differences, species-level separation is warranted (e.g., Thorpe, 1983). The degree of differentiation between *P. flavescens* and *P. fluviatilis* found in this study is extensive and leaves little question that the two are indeed distinct species."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

"**Current status:** Valid as *Perca fluviatilis* Linnaeus 1758."

From ITIS (2019):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Percoidei
Family Percidae
Genus *Perca*
Species *Perca fluviatilis* Linnaeus, 1758"

Size, Weight, and Age Range

From Froese and Pauly (2019a):

"Maturity: L_m 16.8, range 11 - 23.4 cm
Max length : 60.0 cm SL male/unsexed; [Kottelat and Freyhof 2007]; common length : 25.0 cm TL male/unsexed; [Muus and Dahlström 1968]; max. published weight: 4.8 kg [Berg 1965]; max. reported age: 22 years [Beverton and Holt 1959]"

Environment

From Froese and Pauly (2019a):

"Freshwater; brackish; demersal; pH range: 7.0 - 7.5; dH range: 8 - 12; anadromous [Riede 2004]; depth range 1 - 30 m [Frimodt 1995], usually 3 - 4 m [Smolian 1920]."

From Baker et al. (2019):

"It is considered a eurythermal fish and can tolerate [water] temperatures between 4-31°C (Toner and Rougeot 2008). It can tolerate dissolved oxygen levels of 1.3-13.5 mg/L (Toner and Rougeot 2008) and salinities up to 10 ppt (Ložys 2004). […] High nutrient levels and turbidity may be detrimental to the growth and survival of this species."

Climate/Range

From Froese and Pauly (2019a):

"Temperate; […]; 74°N - 38°N, 91°W - 168°E"

Distribution Outside the United States

Native

From Froese and Pauly (2019a):

"Eurasia: throughout Europe to northernmost extremity of Scandinavia, except Iberian Peninsula, central Italy, and Adriatic basin; Aegean Sea basin in Matriza and from Struma to Aliakmon drainages; Aral Sea basin; Siberia in rivers draining the Arctic Ocean eastward to Kolyma."

"Occur in adjacent or contiguous drainage basins to Afghanistan [Coad 1981]."

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"Known from Lake Windermere, England [Near 2002]. […] Found in England, Wales, and Scotland [Maitland and Lyle 1996]."

Introduced

From Froese and Pauly (2019a):

"Introduced from its native range to other regions in the country [China] (stocked in great inland waters) [Ma et al. 2003]. […] Occurs in Ulungur lake, Erqishi, Tarim and Yili rivers [Walker and Yang 1999]."

"[…]; introduced to the Aegean Sea watersheds [of Turkey] [Fricke et al. 2007]. […] Introduced into the Ürkmez Dam Lake (Izmir) in order to test performance and weight conditions [Innal and Erk'akan 2006]."

"Introduced in Lake Skadar [Albania and Montenegro] [Kottelat and Freyhof 2007]."

"Recorded from the São Miguel Lake [Azores Islands]."

"Established in the whole country [Italy] [Bianco 2014] in 1860 [Bianco and Ketmaier 2001]. Wildly distributed in northern and central Italy (Michele Riva, pers. Comm. 10/2000)."

"This [*Perca fluviatilis*] has been translocated to areas within the country [Russia] for stocking in open waters. It has rapidly expanded its range and is now widely established in the country [Bogutskaya and Naseka 2002]."

"There is an increasing trend of spread of this fish [in Spain] [Elvira 1998]."

"[In Australia,] Known from MacIntyre River drainage, N.S.W. to Avon River drainage [Paxton et al. 1989]. Recorded from Victoria, Tasmania and South Australia [Allen et al. 2002]."

"Introduced [to New Zealand] in 1868-1877 [Paulin et al. 1989]. […] Widespread in North and South Is. Range is expanding [Chadderton et al. 2003]."

"Recorded from the Ain Zada reservoir [Algeria, not established], […]"

From GISD (2017):

"[In Western Australia,] Present in the Murray, Harvey, Collie, Capel, Carbunup, Margaret, Blackwood, Swan, Warren and Donnelly Rivers. Not captured in rivers or lakes and is not known from east of the Warren River or north of the Swan River."

GISD (2017) lists *Perca fluviatilis* as introduced and established in Cyprus, Morocco, and South Africa.

From Baker et al. (2019):

"It was introduced to Ireland hundreds of years ago."

"The introduction of *Perca fluviatilis* to South Africa is considered marginally successful."

From Banha et al. (2015):

"The presence of *P. fluviatilis* in a small reservoir (Vale Longo [Portugal]; […]) used for water supply by a conglomerate industry near Proença-a-Nova […] was reported in the web forum from 2013. Two field surveys were conducted in this reservoir in February 2014. […] The session took 4 h, before sunset and a mature male (sexually active) *P. fluviatilis* was captured. No other individuals from this or from other species were captured, but 2 other small *P. fluviatilis* individuals (<10 cm) were seen near the banks. […] During the field work, personal communications from three local fishermen revealed that this species is currently captured by anglers and its presence at this location dates from six to seven years ago."

Means of Introduction Outside the United States

From Froese and Pauly (2019a):

"[…], probably part of the 2006 summer introduction of carps [Kara 2011]."

From Baker et al. (2019):

"*Perca fluviatilis* has been introduced to several countries including Australia, South Africa, China, Cyprus, Ireland, Italy, Morocco, New Zealand, Spain, and South Africa for its reputation as an angling species (Welcomme 1988)."

Short Description

From Froese and Pauly (2019a):

"Dorsal spines (total): 14 - 20; Dorsal soft rays (total): 13-16; Anal spines: 2; Anal soft rays: 7 - 10; Vertebrae: 39 - 42. Diagnosed from other species of Percidae in Europe by having the following unique characters: pelvic and anal fins yellow to red; posterior part of first dorsal fin with dark blotch; and flank with 5-8 bold dark bars, usually Y-shaped. Differs further by the combination of the following features: two dorsal fins, clearly separated from each other; and 56-77 scales along lateral line [Kottelat and Freyhof 2007]. Body greenish-yellow; 5-9 transverse black bands on the sides; first dorsal fin gray, black spot at the tip; second dorsal greenish-yellow; pectorals yellow; other fins red. First dorsal fin markedly higher than the second. Caudal fin emarginate [Berg 1965]."

From CABI (2019):

"The colour of the perch depends on the habitat in which they live. In shallow areas where light penetration is good, they tend to be darkly coloured whereas in poorly lit areas without vegetation they are lightly coloured. Carotenoids, derived from crustaceans in the diet, sometimes make them deeply reddish-yellow. The dorsal surface is usually bright green to olive which extends down the sides in seven tapering bars. The sides are yellow to yellow-green and the ventral surface grey to white. The eyes are green to yellow, as are the caudal and dorsal fins. The first spine of the dorsal fin is often black and the membrane between spines one and two and that between the last four or five spines is also blackish. The pectoral fins are amber and

transparent whereas the pelvic and anal fins are silver-white to yellow and opaque. Some perch have been observed to be entirely black."

Biology

From Froese and Pauly (2019a):

"Inhabits a very wide range of habitats from estuarine lagoons, lakes of all types to medium-sized streams. Feeding larvae occur in open water. This is an opportunistic diurnal feeder which preys mainly during sunrise and sunset, using all available prey. Larvae and small juveniles usually feed on planktonic invertebrates. During first summer, many juveniles move near shores to feed on benthic prey. Often feeds on fishes at about 12 cm SL. May undertake short spawning migrations. Males attain first sexual maturity at 1-2 years and females at 2-4 years of age. Spawns in February-July [Kottelat and Freyhof 2007]. Eggs grouped in long white ribbons (up to 1 m) are found over submerged objects [Pinder 2001]."

"During breeding, males arrive at the spawning area ahead of the females. One or two of these males chases a ripe female as soon as it arrives in the area (polyandry) [Maitland and Campbell 1992]. The queue of males maybe longer composed of about 15 to 25 individuals, but only two prod their snouts against the female's belly [Breder and Rosen 1966]. After rounds of curved course through the interlacing branches near the surface [Breder and Rosen 1966], males fertilize the egg ribbon as the female lays them over weeds or other submerged objects [Maitland and Campbell 1992]. Eggs grouped in long white ribbons (up to 1 m) are found over submerged objects [Pinder 2001]. Eggs hatch in about 8 to 16 days at normal temperatures [Maitland and Campbell 1992]. Males mature at 2-3 years and females at 4 years. Spawning, in the Northern hemisphere, happens in spring in waters with temperatures between 7-8°C. Eggs are laid in sticky strings becoming fixed to aquatic plants and rocks. Incubation lasts about 1- 8 days at 1-3°. Egg size 2.0-2.5mm, larval length at hatching 5mm."

From Morgan et al. (2002):

"It is often reported that the *P. fluviatilis* populations in south-western Western Australia, and indeed elsewhere, are stunted (e.g. Alm 1946; Rask 1983), however, the growth rates of *P. fluviatilis* in Big Brook during this study are considerably greater than those reported for this species in systems in the Northern Hermisphere [its native range] (Alm 1946, Le Cren 1958; Thorpe 1977; Rask 1983; Treasurer *et al.* 1992) and in New Zealand (Jellyman 1980). […] The higher growth rates in the south-western Western Australian populations of *P. fluviatilis* are presumably indicative of the warmer climatic regime to which the fish are exposed, but may also be a combination of access to an abundant food source, low initial population densities and little competition."

Human Uses

From Froese and Pauly (2019a):

"Its flesh is excellent and not so bony. Utilized fresh and frozen; eaten pan-fried and baked [Frimodt 1995]. May be captured with natural or artificial bait [Billard 1997]."

"Utilized in sport fishing (Azevedo, pers. comm.)."

"Commercially taken from Lake Peipus [Estonia] [Anonymous 1999]."

"[…]; it is an important recreational fishing species [in Finland]."

"It was traditionally produced in small quantities under extensive conditions together with carp. Tench, etc. There is currently renewed interest on the semi-intensive monospecific breeding of this species [Billard 1997]."

"Important food fish in early-mediaeval times [in Poland] [Klyszejko et al. 2004]."

"Used to be cultured commercially in Australia [FAO Fishery Information, Data and Statistics Service 1993]."

Diseases

Infection with epizootic haematopoeitic necrosis virus, *Gyrodactylus salaris*, and koi herpes virus are OIE-reportable diseases (OIE 2019).

Gozlan et al. (2014) list *Perca fluciatilis* as a host for *Dermocystidium cyprini*, *D. fennicum*, and *D. percae*.

From Soleng and Bakke (1998):

"The present results are in accordance with previous laboratory experiments on the susceptibility and resistance of other non-salmonids to *G*. [*Gyrodactylus*] *salaris*, such as […], and perch (*Perca fluviatilis* L.) (Bakke et al. 1990), where parasite attachment but no reproduction were observed, leading to parasite elimination after 2 to 8 days."

Kempter et al. (2012) list *Perca fluviatilis* as a confirmed carrier for koi herpes virus.

Wallace et al. (2017) report *Perca fluviatilis* as testing positive for infection with infectious pancreatic necrosis virus.

From Froese and Pauly (2019a):

"Perch Rhabdovirus, Viral Disease"

Froese and Pauly (2019b) list *Perca fluviatilis* as host for the following additional pathogens *Abergasilus amplexus*, *Achtheres percarum*, *Argulus foliaceus*, *Ascasirs truncatula*, *Ascasirs velocissma*, *Caligus lacustris*, *Schulmanela pstruschewkii*, *Cucullanus elegans*, *Dibothriocephalus latus*, *Diplostomum baeri*, *D. nordmanni*, *Ergasilus briani*, *Ergasilus centrachidarum*, *Ergasilus luciopercarum*, *Ergasilus seiboldi*, *Rhipidocotyle campanula*, *Lernaea cyprinacea*, *Neoergasilus japonicas*, *Paracoenogonimus ovatus*, *Paraergasilus longidigitus*, *Paraergasilus nordmanii*, *Proteochephalus percae*, *Rhipidocotyle campanula*, *Sphaerostoma bramae*, *Thersitina gasterostei*, *Tracheliastes maculatus*, and *Tylodelphys calvata*.

From Baker et al. (2019):

"*Perca fluviatilis* is a carrier of the epizootic haematopoeitic necrosis (EHN) virus."

Poelen et al. (2014) list *Acanthocephalus lucii*, *A. clavula*, *Aeromonas salmonicida*, *Ancyrocephalus percae*, eel swimbladder nematode (*Anguillicola crassus*), *Apatemon annuligerum*, *Bunodera luciopercae*, *Bunodera* sp., *Camallanus lacustris*, *Contracaecum rudolphii*, *Dermocystidium percae*, *Dioctophyma renale*, Fish tapeworm (*Diphyllobothrium latum*), *Diplostomum gasterostei*, *D. spathaceum*, *Echinorhynchus cinctulus*, *Eimeria percae*, *Enterobacter cloacae*, *Eubothrium crassum*, *Eustrongylides excisus*, *Eustrongylides* sp., *Gyrodactylus luciopercae*, *Hedruris spinigera*, *Ichthyocotylurus erraticus*, *I. pileatus*, *I. variegatus*, *Naegleria clarki*, Perch perhabdovirus, *Philometra obturans*, *Proteocephalus percae*. *P. dubius*, *Pseudomonas chlororaphis*, ranavirus, *Salmonella enterica*, *Triaenophorus nodulosus*, *Triangula percae*, *Trichodina* sp., *Trypanosoma percae*, *Tyrodelphys clavata*, and *T. podicipina* as additional parasites and pathogens of *Perca fluviatilis*.

Threat to Humans

From Froese and Pauly (2019a):

"Potential pest"

No further information as to what 'potential pest' may mean was found.

3 Impacts of Introductions

From Morgan et al. (2002):

"The large native fish populations (i.e. *E.* [*Edlia*] *vittata*, *B.* [*Bostockia*] *porosa* and *G.* [*Galaxiella*] *munda*) that were previously recorded in Big Brook Dam have essentially disappeared since the introduction of *P. fluviatilis* (Pen *et al.* 1988, 1991a, 1991b). It is likely that a combination of both abiotic (habitat change through the creation of the dam) and biotic (predation and/or competition from feral fish) factors may be responsible for the demise of the native freshwater fish fauna in the headwaters of Big Brook."

"*Perca fluviatilis* have previously been shown to feed on the small native fish of south-western Western Australia (Hutchison 1991a; Pen and Potter 1992) and their piscivorous nature is well documented. The absence of native fish in Big Brook is reflected in their absence in the diets of *P. fluviatilis*. Hutchison (1991a) suspected that the decline of *E. vittata* in the Murray River was directly attribuitable to predation by *P. fluviatilis* and found these species coexisting at only one of the 17 sites sampled. Furthermore, Pen and Potter (1992) frequently found *P. fluviatilis* to prey on *E. vittata* and *B. porosa*, which strongly suggests that *P. fluviatilis* may have been responsible for the elimination of native fish from Big Brook Dam."

"The results of this study, together with that of Pen and Potter (1992) and Beatty (2000), suggest that *P. fluviatilis* may be severely inhibiting marron [native decapods known by *Cherax*

tenuimanus and *C. cainii*] recruitment and inflicting far greater damage on the marron resource than recreational fishing. The fact that marron populations still exist in waters in which infestations of *P. fluviatilis* occur, probably relates to the fact that they grow larger […] than can be consumed by these medium-sized fish."

From Beatty and Morgan (2017):

"The eradication of *P. fluviatilis* from the reservoir preceded the recruitment and subsequent population boom of the small native *G.* [*Galaxias*] *occidentalis*, one of the most widespread and abundant freshwater fishes of the region. As discussed below, the most plausible answer to the increase in abundance of this native species is a release from high predation levels by *P. fluviatilis*, which presumably previously preyed upon *G. occidentalis* to a level that made it undetectable."

From Bain (2011):

"The European perch, *Perca fluviatilis*, became highly abundant in Bosten Lake [China] and supported a major fishery. Its dramatic increase coincided with the disappearance of the datou fish [*Aspiorhynchus laticeps*], and the perch then declined in size to have no fishery value (Xie, 1999)."

From Baker et al. (2019):

"*Perca fluviatilis* is said to compete for food and space with the Murray cod (*Maccullochella peelii peelii*) and golden perch (*Macquaria ambigua*) (Lintermans et al. 1990). In New Zealand, *Perca fluviatilis* suppressed populations of a native fish, the common bully, by direct predation (Closs et al. 2003). Physical removal of *Perca fluviatilis* from ponds resulted in an increased abundance of the common bully."

From NSW DPI (2019):

"However, they are also voracious predators of other fish and invertebrates, can destroy recreational fisheries in enclosed waters by building up large numbers of stunted fish and eliminating other species, and can devastate native fish populations by carrying the epizootic haematopoietic necrosis (EHN) virus. For these reasons, redfin [*Perca fluviatilis*] are considered a serious pest and in December 2010 redfin were listed as a Class 1 noxious species in NSW [New South Wales, Australia]."

"For example, redfin were recorded as eliminating 20,000 newly released rainbow trout fry from a reservoir in south-western Australia in less than 72 hours."

"One of the most significant threats to native fish from redfin is their potential to spread the viral disease Epizootic Haematopoietic Necrosis (EHN). This disease, which was first isolated in 1985 and is unique to Australia, can cause mass mortality in juvenile redfin perch during the summer months.

A number of native species, including silver perch, Murray cod, mountain galaxias and particularly Macquarie perch, are highly susceptible to the disease, and EHN virus may be one factor responsible for the decline in various native species over the last couple of decades."

From Froese and Pauly (2019a):

"Feed selectively on small endemic fishes and fish fry and may have affected the numbers of galaxiids, pygmy perch, *Nannoperca australis*, and the golden perch, *Macquaria ambigua* in southern rivers [in Australia] [Arthington 1989]. Common where there is abundant aquatic vegetation. A predatory species, juveniles feed on zooplankton, bottom invertebrate fauna and other perch fry while adults feed on both invertebrates and fish, mainly stickle-backs, perch, roach and minnows. The dietary preferences have created fears among conservationists who believed this species adversely affects stocks of native fishes including Murray cod, Macquarie perch, pygmy perches and rainbow fishes."

From GISD (2017):

"Release of captured perch is illegal [in Western Australia, Australia]."

"In New Zealand, perch were rated fourth on a list of the top ten invasive freshwater fish species by a group of participants at an invasive fish workshop (Chadderton et al. 2003)."

From NIES (2019):

"Import, transport and keeping are prohibited by the Invasive Alien Species Act [of Japan]. Keeping and release is prohibited in UK."

4 Global Distribution

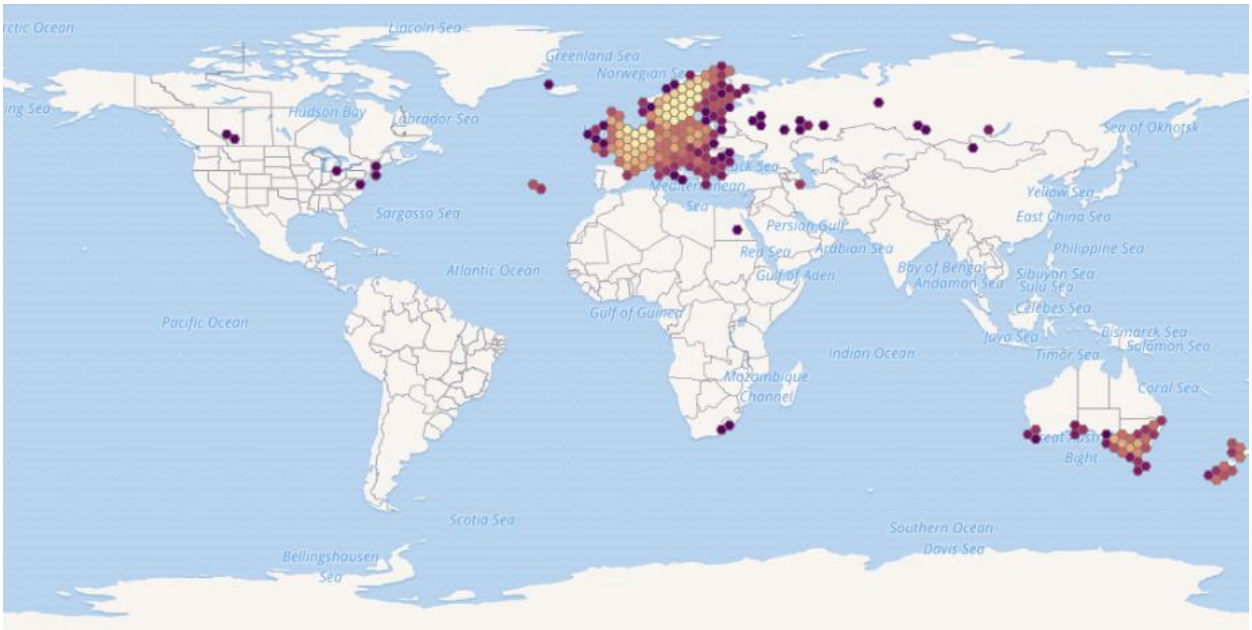

Figure 1. Known global distribution of *Perca fluviatilis*. Map from GBIF Secretariat (2019). The locations in the northeastern United States and southwestern Canada were not used to select source locations for the climate match; they are single collections and do not represent established populations. The locations in Egypt and western Iceland were not used to select source points for the climate match; record information indicates that the observations may be suspect and species is not reported from these countries.

Banha et al. (2015) gives the location of an additional population in continental Portugal.

5 Distribution Within the United States

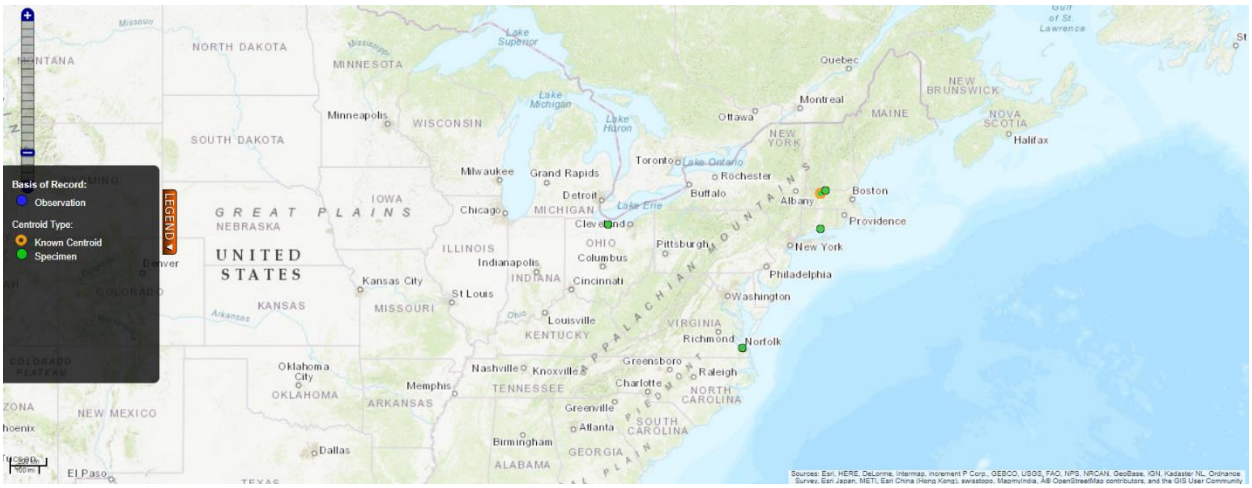

Figure 2. Location of recorded observations of *Perca fluviatilis* in the United States. Map from BISON (2019). The locations in the northeastern United States were not used to select source locations for the climate match. The collection dates are all single specimens caught mostly in the 1800s and there are no corroborating records in the literature that *Perca fluviatilis* has been collected within the United States. Considering the dates of collection, it is possible that those collections represent misidentifications of the native congener, Yellow Perch (*Perca flavescens*).

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Perca fluviatilis* to the contiguous United States was high in the Great Lakes, the upper-mid-Atlantic, central Texas, the upper Midwest, in patches throughout the Great Plains, and along most of the Pacific Coast. Areas of low match were found in interior Maine, the central Gulf Coast, the southwest deserts, the coastal Pacific Northwest, and just over the Rocky Mountains in the Pacific Northwest. Everywhere else had a medium match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for contiguous United States was 0.649, high (scores 0.103 and greater are classified as high). All States had high individual Climate 6 scores except for Florida and South Carolina, which had medium scores, and Alabama, Louisiana, and Mississippi, which had low scores.

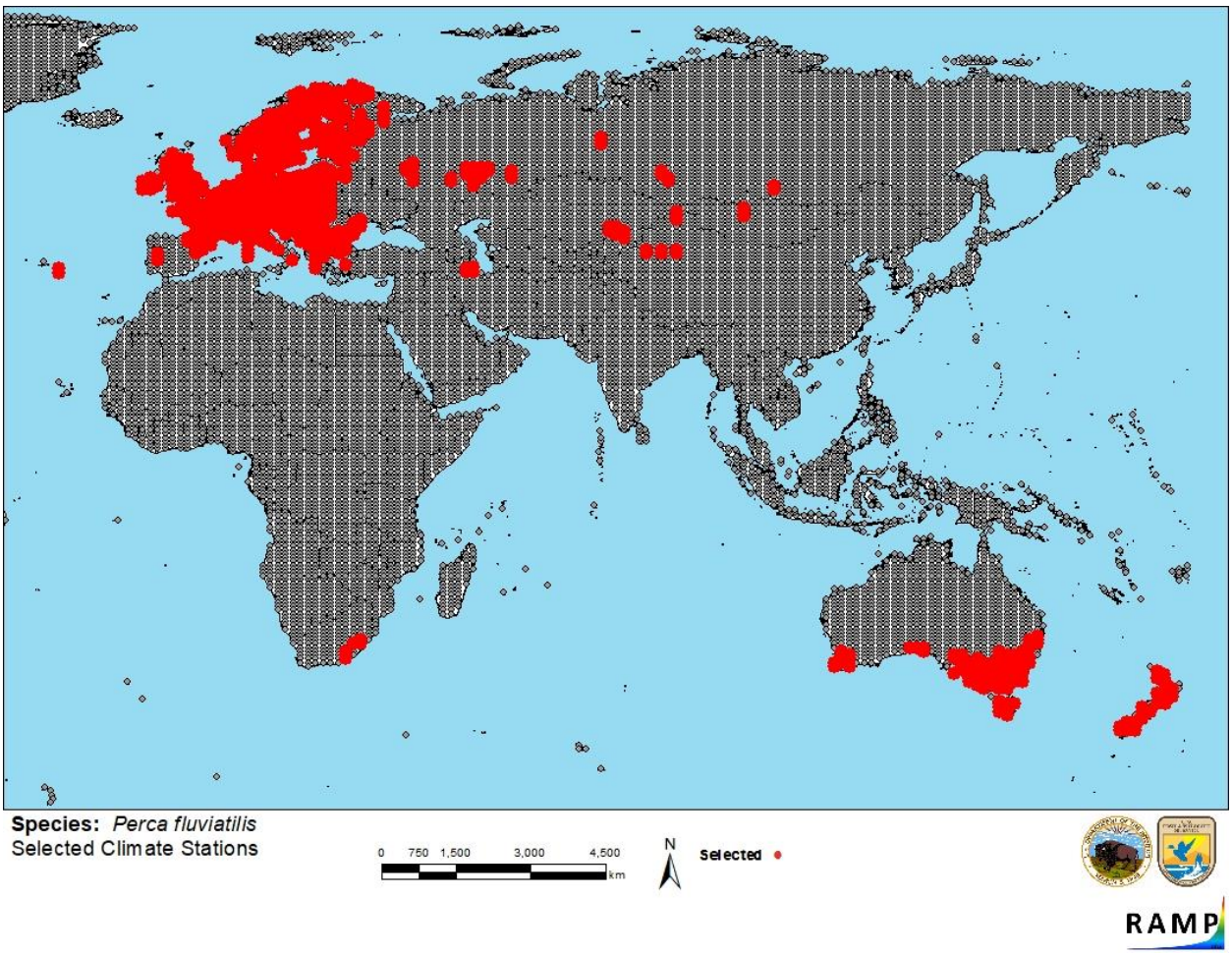

Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in the eastern hemisphere selected as source locations (red; Europe, northern Asia, Australia, New Zealand, South Africa) and non-source locations (gray) for *Perca fluviatilis* climate matching. Source locations from Banha et al. (2015), Froese and Pauly (2019a), and GBIF Secretariat (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

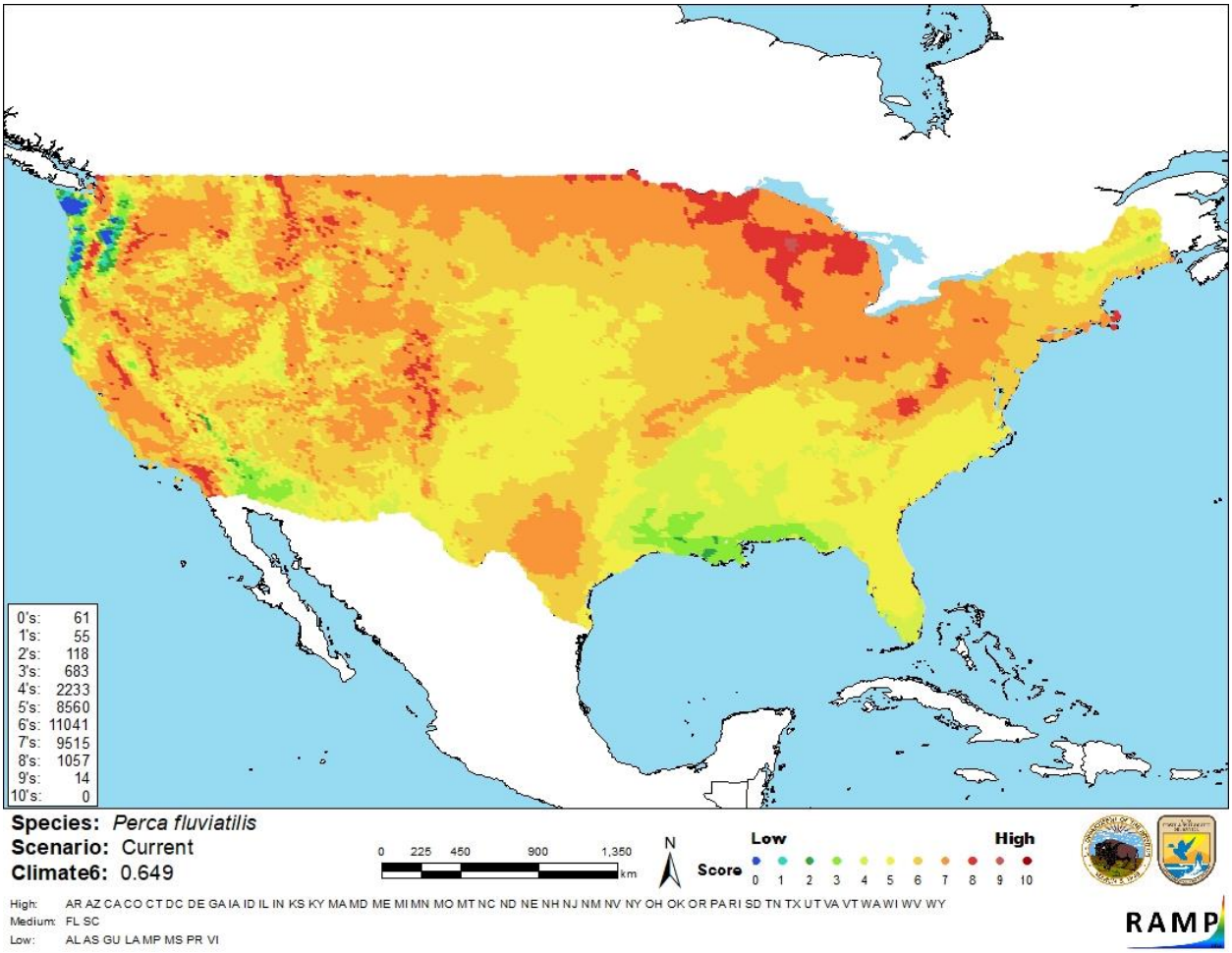

Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Perca fluviatilis* in the contiguous United States based on source locations reported by Banha et al. (2015), Froese and Pauly (2019a), and GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

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 *Perca fluviatilis* is high. Quality, peer-reviewed information is available regarding the biology, ecology, and distribution of this species. The history of introductions is well-documented. Information on impacts of introduction is found in the peer-reviewed literature.

8 Risk Assessment

Summary of Risk to the Contiguous United States

The European Perch (*Perca fluviatilis*) is a predatory fish native to most of Europe and northern Asia. It is highly regarded as a sport fish and has been consumed by humans for centuries. *P. fluviatilis* has been documented to be a host for three OIE-reportable diseases and many other pathogens and parasites. The growth and maturity of *P. fluviatilis* is highly connected to the climatic conditions of the population's location. The history of invasiveness is high. There is a long history of intentional introductions of this species for sustenance and sport fishing. Many of those introductions have resulted in established wild populations. *P. fluviatilis* is implicated in population reduction and extirpations of many native species, some of which themselves are recreational resources. Most impacts come from direct predation or competition but there is also concern that *P. fluviatilis* will spread epizootic haematopoietic necrosis to native species. *P. fluviatilis* was listed as an injurious wildlife species in 2016 under the Lacey Act by the U.S. Fish and Wildlife Service, thereby prohibiting its importation. There are regulations prohibiting keeping and releasing this species in Australia, Japan, and the United Kingdom. The certainty of assessment is high. The overall risk assessment category of *P. fluviatilis* is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks/Important additional information:** Morphologically similar to North American native Yellow Perch (*Perca flavescens*). Host for three OIE-reportable diseases: epizootic haematopoeitic necrosis virus, *Gyrodactylus salaris*, and koi herpes virus. Listed as injurious species in United States.
- **Overall Risk Assessment Category: High**

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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