

Powan (*Coregonus lavaretus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, August 2012
Revised, September 2014 and July 2015



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1 Native Range, and Status in the United States

Native Range

From Froese and Pauly (2015):

“Europe: Native to Lake Bourget (France) and Geneva (Switzerland, France).”

Status in the United States

This species has not been reported as established in the United States.

Means of Introductions in the United States

This species has not been reported as established in the United States.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2015):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata

Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Protacanthopterygii
Order Salmoniformes
Family Salmonidae
Subfamily Coregoninae
Genus *Coregonus* Linnaeus, 1758 – whitefishes
Species *Coregonus lavaretus* (Linnaeus, 1758) – powan”

“Taxonomic Status: valid”

Size, Weight, and Age Range

From Froese and Pauly (2015):

“Maturity: Lm 27.1, range 40 - ? cm

Max length : 73.0 cm TL male/unsexed; [IGFA 2001]; max. published weight: 10.0 kg [Muus and Nielsen 1999]”

Environment

From Froese and Pauly (2015):

“Marine; freshwater; brackish; demersal; pH range: 7.0 - 7.5; dH range: 20 - ?; anadromous [Riede 2004].”

Climate/Range

From Froese and Pauly (2015):

“Temperate; 4°C - 16°C [Baensch and Riehl 1991]; 73°N - 40°N”

Distribution Outside the United States

Native

From Froese and Pauly (2015):

“Europe: Native to Lake Bourget (France) and Geneva (Switzerland, France).”

Introduced

From Froese and Pauly (2015):

“France [Allardi and Keith 1991]” accidental

“Norway [NOBANIS 2013]” unknown

“Kyrgyzstan [Savvaitova and Petr 1999]” unknown
“Japan [Welcomme 1988]” unknown
“Greece [Welcomme 1988]” fisheries
“Germany [Welcomme 1988]” fisheries
“Quebec [Coad 1995]” unknown
“Russian Fed. [NOBANIS 2013]” fisheries
“Netherlands [Welcomme 1988]” fisheries
“Iran [Coad 1995]” unknown
“Romania [FAO 1997]” aquaculture
“Italy [Welcomme 1988]” fisheries
“Czech Republic [Welcomme 1988]” aquaculture, angling/sport
“Slovakia [Welcomme 1988]” aquaculture
“USSR [Welcomme 1988]” aquaculture
“Turkey [Innal and Erk’akan]” angling/sport
“Hungary [FAO 1997]” fisheries, diffused from other countries
“Yugoslavia [Welcomme 1988]” fisheries
“Belgium [FAO 1997]” angling/sport, fisheries
“Bulgaria [Uzunova and Zlatanova 2007]” fisheries
“China [Bartley 2006]” unknown

Means of Introduction Outside the United States

From Froese and Pauly (2015):

“accidental”
“unknown”
“fisheries”
“aquaculture”
“angling/sport”

Short description

From Froese and Pauly (2015):

“Dorsal spines (total): 3 - 5; Dorsal soft rays (total): 9-12; Anal spines: 3-5; Anal soft rays: 10 - 13. Mouth small with protruding upper jaw. Silvery body [Muus and Nielsen 1999]. Caudal fin with 19 soft rays [Keith and Allardi 2001].”

Biology

From Froese and Pauly (2015):

“Gregarious lacustrine forms [Allardi and Keith 1991] and anadromous estuarine forms, rarely in full saltwater. Feeds on planktonic crustaceans, or larger benthic crustaceans in brackish water. Movement in water column as a function of zooplankton repartition [Allardi and Keith 1991]. Spawns in gravel, near shore, in shallow water, in December [Kottelat and Freyhof 2007].”

“Spawning takes place at night.”

Human uses

From Froese and Pauly (2015):

“Fisheries: commercial; aquaculture: commercial; gamefish: yes”

Diseases

From Skall et al. (2004):

“Whitefish are potential carriers of VHSV [viral haemorrhagic septicaemia virus] as they suffer only low mortality after infection but continue to carry virus”

Viral haemorrhagic septicaemia is an OIE-reportable disease.

From Rimaila-Pärnänen (2002):

“Bacterial kidney disease ... *Renibacterium salmoninarum*”

From Amundsen and Kristoffersen (1990):

“Infection with plerocercoids of the pseudophyllidean cestode *Triaenophorus crassus* Forel reduces the market value of whitefish (*Coregonus* spp.)”

From Brzuzan et al. (2007):

“Blue sac disease (BSD) is a syndrome that includes such signs as the induction of cytochrome P-4501A (CYP1A) enzymes, yolk sac oedema, haemorrhaging, craniofacial abnormalities, and mortality early in larval development (Billiard, Querbach & Hodson 1999; Brinkworth, Hodson, Tabash & Lee 2003). ... In larval whitefish, *Coregonus lavaretus* (L.), another genus within the family Salmonidae, BSD occurs only rarely.”

Threat to humans

From Froese and Pauly (2015):

“Harmless”

3 Impacts of Introductions

From Eloranta et al. (2011):

“European whitefish (*Coregonus lavaretus*) is one of the most widely introduced fish species in northern Europe and has partially or completely displaced many native Arctic charr populations, evidently because of its better ability to utilise pelagic food resources (Nilsson & Pejler 1973; Svärdson 1976).”

From Berg et al. (1994):

“The impact of whitefish (*Coregonus lavaretus* (L.)) on the trophic structure of eutrophic lakes was studied in Lake Ring, a small eutrophic Danish lake (22.5 ha, mean depth 2.9 m).”

“A total of 109930 + whitefish were stocked in the lake from October 1989 to July 1990 and the structure of the fish, zooplankton and benthic invertebrate communities studied during the period 1989–91. Stomach contents analysis revealed that the whitefish mainly ate *Daphnia* and copepods in 1990–91, the proportion of copepods decreasing with increasing size of the fish and *Daphnia* being the overall most important food source. The density of *Daphnia* in the lake decreased from 72 ind. l^{-1} in 1989 to 9 ind. l^{-1} in 1991; concomitantly the large species *Daphnia magna* and *D. pulex* almost disappeared and the density of cyclopoid copepods increased from 72 to 101 ind. l^{-1} ”

“Changes were also observed in the benthic invertebrates; *Chaoborus*, oligochaetes, and chironomids all decreased, whereas *Pisidium* increased. It is concluded that the stocking of whitefish in eutrophic lakes for commercial purposes may delay their recovery, or even lead to enhanced eutrophication.”

From Sandlund et al. (2011):

“The introduction of whitefish into fishless lakes obviously must have had a dramatic impact on their diversity of invertebrates. Unfortunately, none of the numerous cases have been properly documented. However, two cases where whitefish was removed by rotenone have been carefully described (Reinertsen et al. 1990, Sanni & Wærvågen 1990). The first one was Lake Haugatjern, which received whitefish during the introduction spree in Røros Municipality in the early 1900s (see above). Rotenone was applied to Lake Haugatjern in 1980 and the removal of whitefish caused a substantial decrease in algal biomass and a shift from large to smaller and more fast-growing algal species. The zooplankton biomass did not change, but species composition changed quite dramatically.”

4 Global Distribution



Figure 1. Map of known global distribution of *Coregonus lavaretus*. Map from GBIF (2014). Location in the Philippine Sea was not included because it was incorrectly located.

5 Distribution within the United States

This species is not currently believed to be in United States waters.

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2008; 16 climate variables; Euclidean Distance) is high in the Great Lakes and isolated locations in the western United States. Medium match is recorded in the Mid-Atlantic, Northeast, Midwest and scattered across the Rocky Mountain States. Low match occurs in the North Central region and along the Gulf and Pacific Coasts. Highest match is found in the Great Lakes. Climate 6 score indicates that the continental U.S. has a high climate match. The range for a high climate match is 0.103 and greater; Climate 6 score of *Coregonus lavaretus* is 0.243.

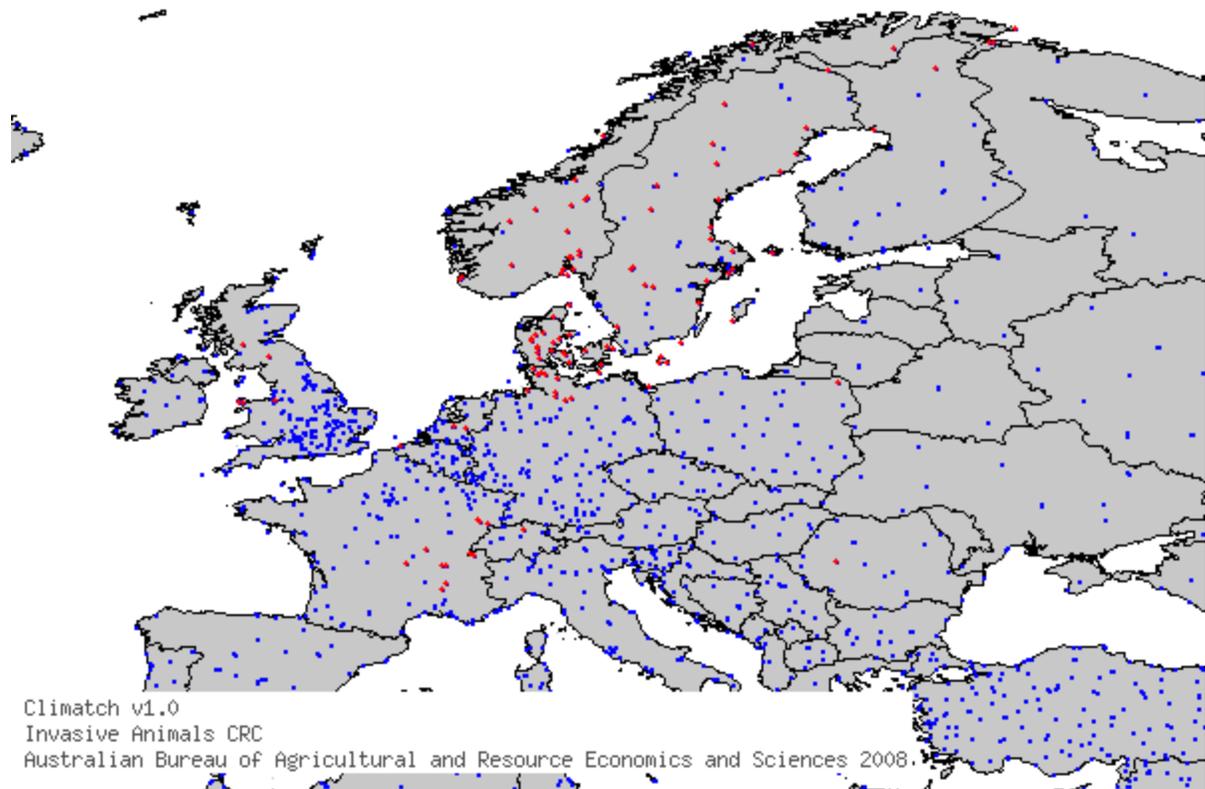


Figure 2. CLIMATCH (Australian Bureau of Rural Sciences 2008) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *Coregonus lavaretus* climate matching. Source locations from GBIF (2014).

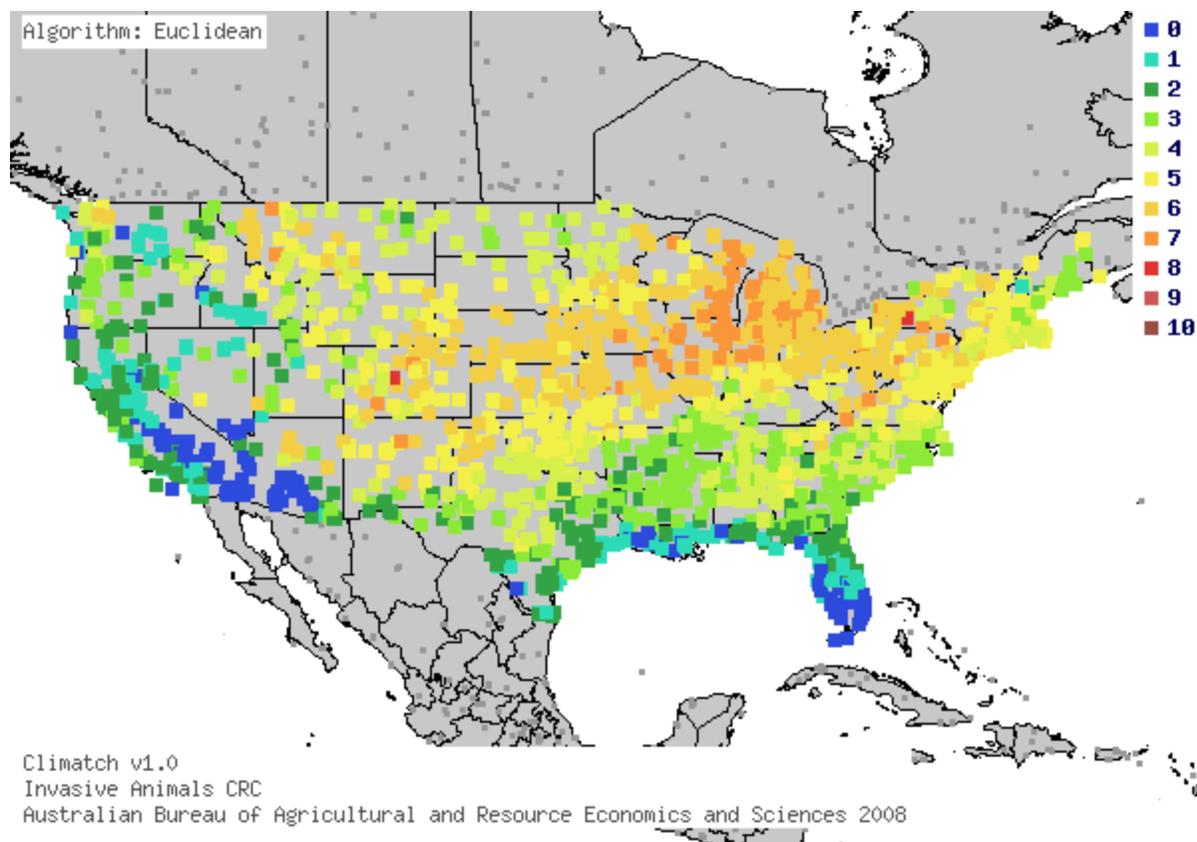


Figure 3. Map of CLIMATCH (Australian Bureau of Rural Sciences 2008) climate matches for *Coregonus lavaretus* in the continental United States based on source locations reported by GBIF (2014). 0= Lowest match, 10=Highest match.

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	135	143	240	286	328	363	381	95	3	0	0
Climate 6 Proportion =		0.243									

7 Certainty of Assessment

The biology and ecology of *C. lavaretus* are well-known. Negative impacts from introductions of this species are documented in the scientific literature. No further information is needed to evaluate the negative impacts the species is having where introduced. Certainty of this assessment is high.

8 Risk Assessment

Summary of Risk to the Continental United States

C. lavaretus is a salmonid fish species native to Europe. Introductions to counties outside its native range have resulted in negative impacts for native species. The species is one of the most widely introduced fish species in northern Europe and has partially or completely displaced many native Arctic charr (*Salvelinus alpinus*) populations. Foraging by introduced *C. lavaretus* can change the structure of the zooplankton community. *C. lavaretus* is also a carrier of viral

haemorrhagic septicaemia, an OIE-reportable disease. Climate match with the contiguous U.S. is high with highest matches occurring in the Great Lakes. Overall risk for this species 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:** Carrier of viral haemorrhagic septicaemia
- **Overall Risk Assessment Category:** **High**

DRAFT

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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