Red Garra (*Garra rufa*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, October 2012
Revised, April 2019
Web Version, 8/15/2019

Photo: Dances. Licensed under Creative Commons Attribution-Share Alike 3.0 Unported. Available: https://commons.wikimedia.org/wiki/File:Garra_Rufa.JPG. (April 2019).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2019):

"Eurasia: In the Jordan [in the country of Jordan], Orontes [Lebanon], and Tigris-Euphrates river basins [Iraq, Turkey]. Also in some coastal rivers in southern Turkey and northern Syria [Aleppo]."

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

"[In Iran:] Hablehrud river, near Borazjan […] [Bianco and Banarescu 1982]. Tigris-Euphrates drainage basin. Kor River, Lake Maharlu and Gulf basins, Hormuz basin [Coad 1995]."

"Along the Jordan River, in Lake Kinneret, and elsewhere [in Israel]."

From Freyhof (2014):

"In Ceyhan, Seyhan and Asi drainages [Turkey] as well as in almost all small coastal streams in between. Also in coastal streams of Syria. Jordan drainage but absent from southern Dead Sea basin. Widespread in Qweik (now mostly extirpated), Euphrates and Tigris drainage. Also in Maharlu basin and Iranian coastal rivers south to Mond river."

Status in the United States

No records of *Garra rufa* in the wild in the United States were found.

From Wildgoose (2012):

"Fish spas [spas that use *Garra rufa* to exfoliate feet] developed in the Far East many years ago, later spreading to Europe and opening in the United States in 2008."

Fish spas using *Garra rufa* are found in many States (Garra Spas 2019) and can be purchased by the public in lots from a few individuals to over 1000 individuals (Arizona Aquatic Gardens 2019).

Means of Introductions in the United States

No records of *Garra rufa* in the wild in the United States were found.

Remarks

From Freyhof (2014):

"While being very widespread and usually very abundant, the species is expected to decline very slowly due to many ongoing threats."

A previous version of this ERSS was published in 2012.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

"**Current Status:** Valid as *Garra rufa* (Heckel, 1843)."

From ITIS (2019):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Garra*
Species *Garra rufa* (Heckel, 1843)"

Size, Weight, and Age Range

From Froese and Pauly (2019):

"Max length : 14.1 cm TL male/unsexed; [Erguden 2016]"

Environment

From Froese and Pauly (2019):

"Freshwater; benthopelagic; non-migratory. […]; 15°C - 28°C [Baensch and Riehl 1991; assumed to be recommended aquarium temperature]"

Climate/Range

From Froese and Pauly (2019):

"Subtropical; […]"

Distribution Outside the United States

Native

From Froese and Pauly (2019):

"Eurasia: In the Jordan [in the country of Jordan], Orontes [Lebanon], and Tigris-Euphrates river basins [Iraq, Turkey]. Also in some coastal rivers in southern Turkey and northern Syria [Aleppo]."

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

"[In Iran:] Hablehrud river, near Borazjan […] [Bianco and Banarescu 1982]. Tigris-Euphrates drainage basin. Kor River, Lake Maharlu and Gulf basins, Hormuz basin [Coad 1995]."

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Introduced

No records of introductions of *Garra rufa* to the wild were found.

Means of Introduction Outside the United States

No records of introductions of *Garra rufa* to the wild were found.

Short Description

From Froese and Pauly (2019):

"Dorsal spines (total): 4; Dorsal soft rays (total): 8"

From Segherloo (2015):

"A scale-less head, two pairs of barbels, an adhesive mental disc and cycloid scales are some characteristics of this species (Jarvis, 2011)."

From Wildgoose (2012):

"This slender greyish brown cyprinid has pharyngeal teeth but the sucking mouth has an expanded lower lip that forms a round or oval sucking pad, which has sharp keratinised edges used for scraping food from the surface of submerged rocks and logs."

Biology

From Froese and Pauly (2019):

"Found in different habitats such as rivers, lakes, small ponds, and small muddy streams. Hides under and among stones and vegetation. Bottom dweller, feeding on aufwuchs [periphyton]. Said to also occur in hot ponds where they feed on the skin scales of bathers, reducing illnesses such as neurodermitis."

Human Uses

From Freyhof (2014):

"At one site in Turkey used in a bathing facility to clean skins of humans."

From Froese and Pauly (2019):

“Said to also occur in hot ponds where they feed on the skin scales of bathers, reducing illnesses such as neurodermitis.”

From Majtan et al. (2012):

“Two different types of therapeutic fish, *Cyprinion macrostomus* and *Garra rufa* (*G. rufa*), have been identified and recommended for therapeutic purposes [Özcelik et al. (2000)].”

From Wildgoose (2012):

“Fish spas [spas that use Garra rufa to exfoliate feet] developed in the Far East many years ago, later spreading to Europe and opening in the United States in 2008.”

“These fish [*Garra rufa*] live in outdoor pools of some Turkish spas where they ‘nibble’ off the thickened and dead skin of human bathers. Consequently, this species of fish is also known as ‘doctor fish’, ‘nibble fish’ or ‘Kangal fish’; the latter name being taken from a spa town in the mountainous area of central Turkey where they are found. This slender greyish brown cyprinid has pharyngeal teeth but the sucking mouth has an expanded lower lip that forms a round or oval sucking pad, which has sharp keratinised edges used for scraping food from the surface of submerged rocks and logs. This feeding method is the basis for their use in foot spa treatments in beauty salons where customers sit with their feet submerged up to mid-calf level for sessions lasting up to thirty minutes.”

“In addition to the cosmetic treatment of normal skin, the fish remove superficial scaly patches that develop on the skin of patients suffering from psoriasis and eczema, leaving the underlying skin surface smooth and clear of scale. This action, in combination with exposure to sunlight, is considered to bring medical benefits to some patients.”

“Companies supplying fish and manufacturing the equipment for these spas have also become established during this time. Due to concerns about commercial exploitation and over-harvesting, *Garra rufa* have been given legal protection in Turkey, although much of the trade now comes from suppliers in the Far East. The fish are bought a t about 4–6cm in size and in 2011 cost approximately £1.40 to £2.40 each.”

“The importation of this species from outside the European Union for non-ornamental use (i.e. spa or medical purposes) requires authorisation by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) on an annual basis. Although there are no official coordinated records of the number of *Garra rufa* imported into the UK for the fish spa trade, over 35,000 per week were imported at times in 2011 (CEFAS, personal communication). Such high numbers suggest that there was a rapid expansion of businesses or a high turnover of stock due to mortalities since the natural lifespan of this species is thought to be between 5–7 years.”

From Verner-Jeffreys et al. (2012):

"The Fish Health Inspectorate of the Centre for Environment, Fisheries & Aquaculture Science estimates that each week 15,000–20,000 *G. rufa* fish are imported from Indonesia and other countries in Asia into the United Kingdom through London Heathrow Airport (the main border inspection post for the import of live fish)."

Fish spas using *Garra rufa* are found in many States (Garra Spas 2019) and can be purchased by the public in lots from a few individuals to over 1000 individuals (Arizona Aquatic Gardens 2019).

Diseases

No OIE-reportable diseases (OIE 2019) were found to be associated with *Garra rufa*.

Poelen et al. (2014) lists *Gyrodactylus elegans, Dactylogyrus acinacus, Pseudochetosoma salmonicola,* and *Dactylogyrus* as parasites of *Garra rufa. Ichthyophthirius multifiliis* is a pathogen of *Garra rufa.*

From Majtan et al. (2012):

"Similarly, author of recent study described a case of mass mortality of *G. rufa* from a private fish hatchery farm in Korea caused by fish pathogenic bacteria *Citrobacter freundi* [Baeck et al. 2009]."

"In conclusion, the findings of the present study provide the first evidence that *A.* [*Aeromonas*] *sobria* is a causative bacterial agent of mass mortality of therapeutic fish *G. rufa*."

Threat to Humans

From Froese and Pauly (2019):

"Harmless"

3 Impacts of Introductions

No records of introductions of *Garra rufa* were found.

4 Global Distribution

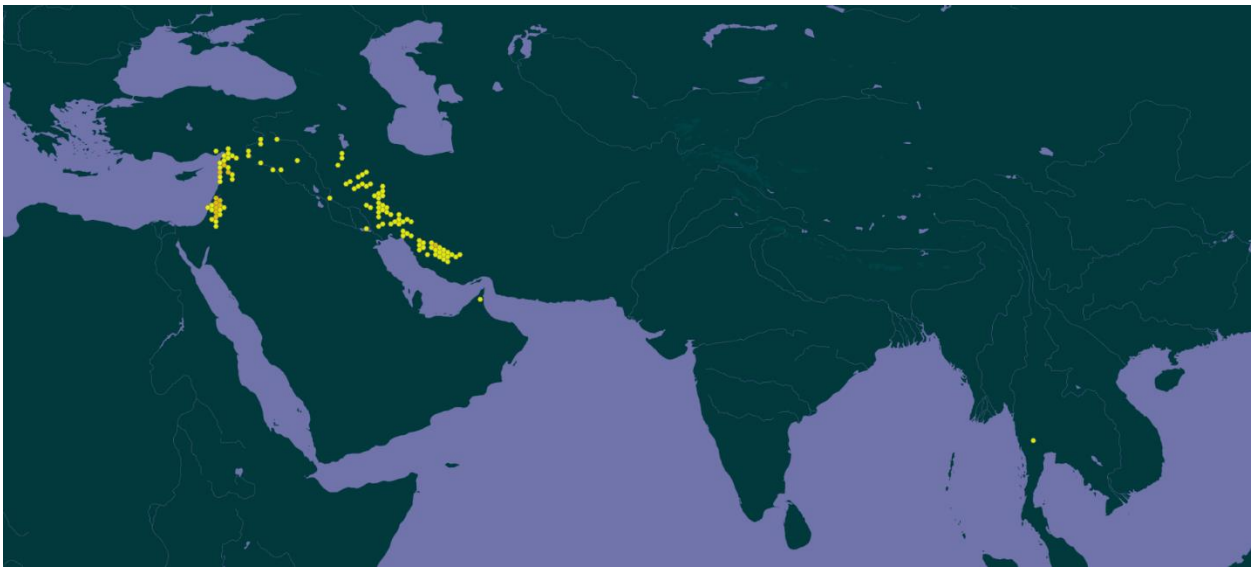

Figure 1. Known global distribution of *Garra rufa*. Locations are in the Near East and Thailand. Map from GBIF Secretariat (2019).

GBIF Secretariat (2019) shows *Garra rufa* as present in Thailand, however, this observation was made through a citizen science project and the accompanying information does not indicate an established population. The location in Thailand was not used to select source points for climate matching.

There were no georeferenced observations available for Afghanistan.

5 Distribution Within the United States

No records of *Garra rufa* in the wild in the United States were found.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for the contiguous United States was low across the majority of eastern and middle sections of the contiguous United States. The areas west of the Rocky Mountains had high matches with patches of medium match in Colorado, Montana, and New Mexico. The Pacific Northwest had a low match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.119, high (scores 0.103 and greater are classified as high). Most States had low individual Climate 6 scores except for Arizona, California, Idaho, Nevada, Oregon, Utah, and Washington, which had high individual climate scores, and Colorado, Montana, and New Mexico, which had medium individual climate scores.

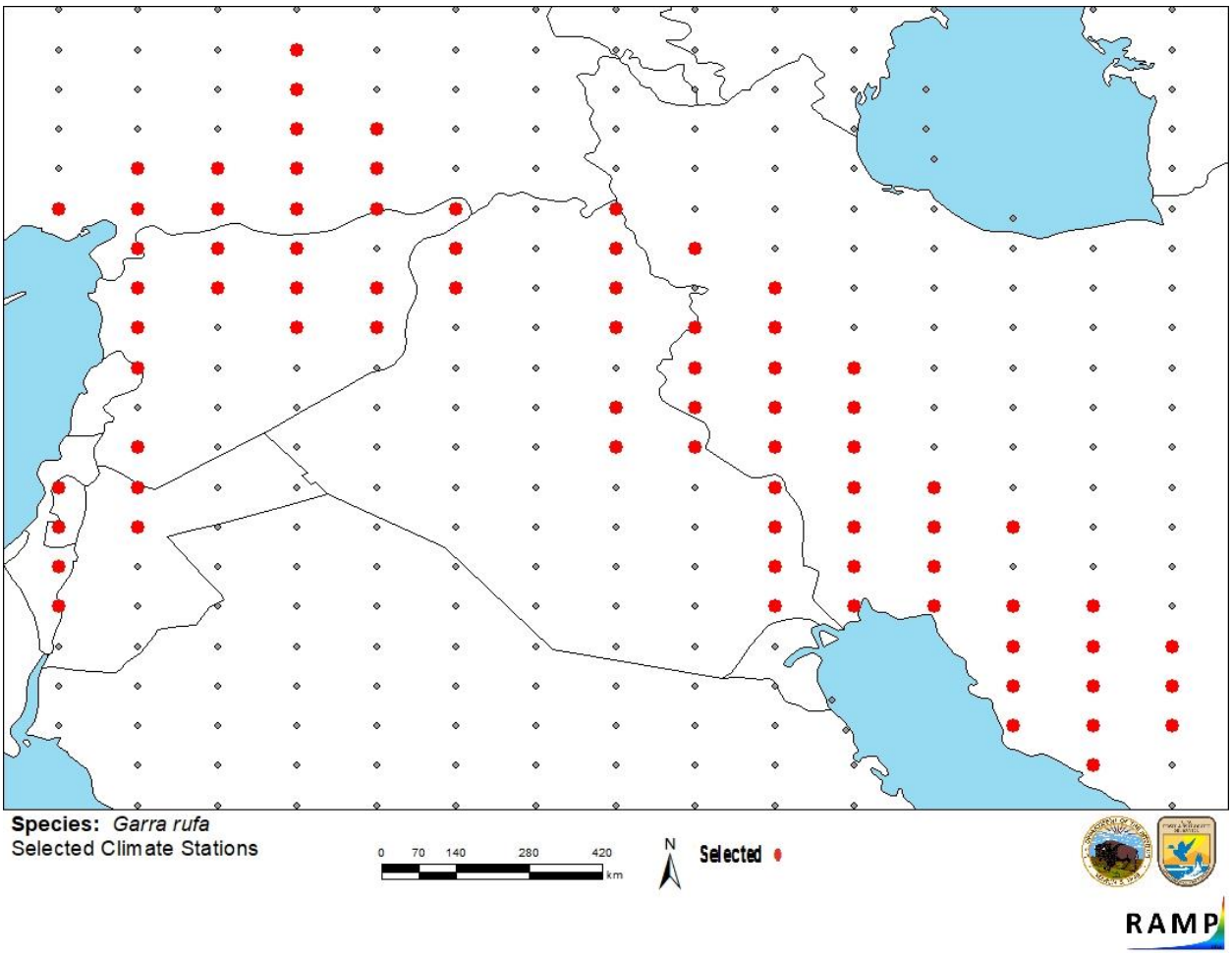

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in Near East selected as source locations (red; Iran, Iraq, Israel, Jordan, Lebanon, Syria, and Turkey) and non-source locations (gray) *Garra rufa* climate matching. Source locations from GBIF Secretariat (2019). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

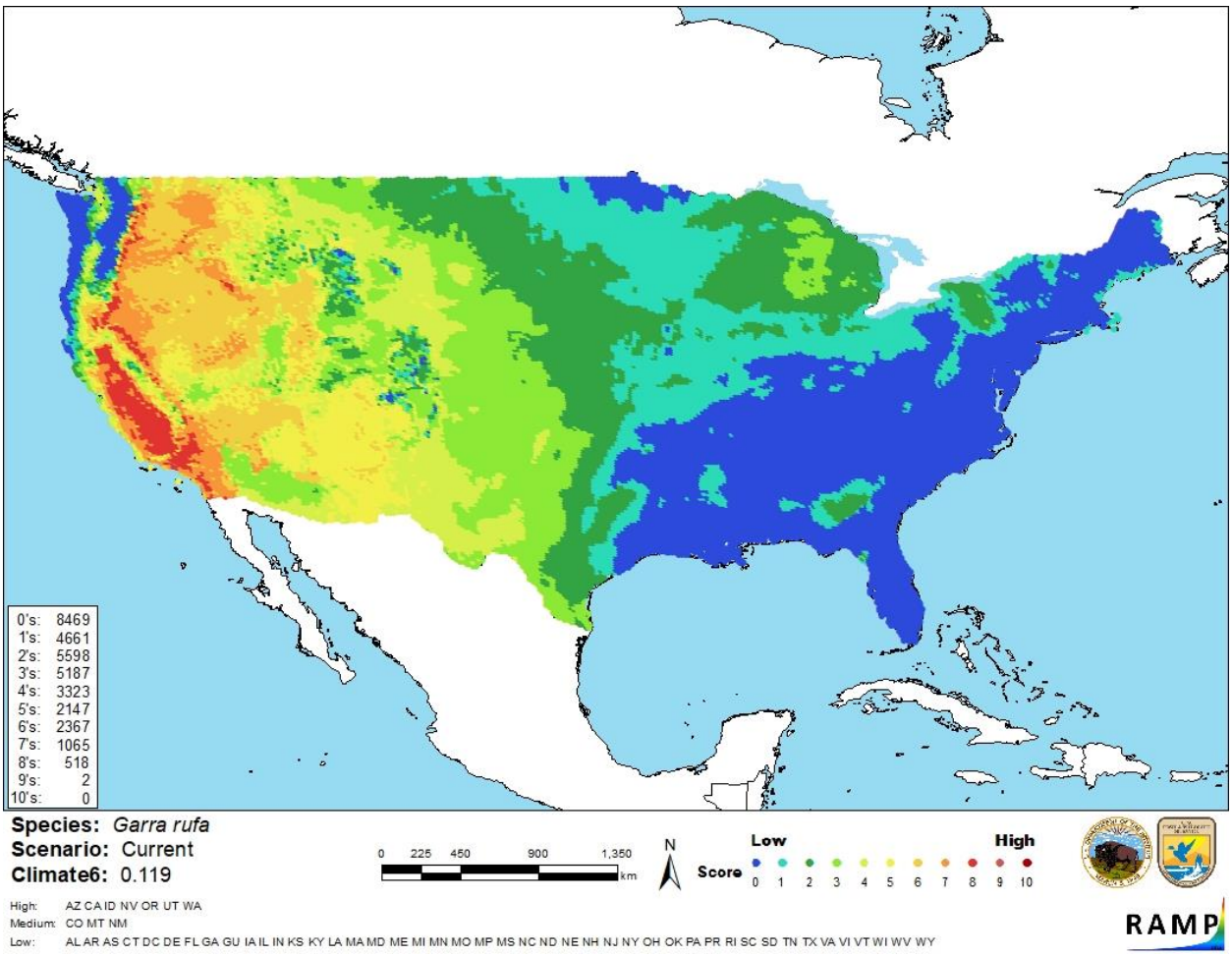

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Garra rufa* in the contiguous United States based on source locations reported by GBIF Secretariat (2019). 0 = Lowest match, 10 = Highest match.

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

Biological and ecological information is available for *Garra rufa.* No records of introduction to the wild were found for this species but *G. rufa* is heavily used in the spa industry. More than one record of trade information was found from scientifically defensible sources. Wildgoose (2012) states that in 2011 *Garra rufa* was at times imported at a rate of over 35,000 fish per week into the United Kingdom for the fish spa trade and fish spas opened in the United States in 2008 and around the world years prior. Verner-Jeffreys et al. (2012) stated that the weekly rate

was 15,000-20,000. If even the lowest rate of import (15,000/week) is extrapolated to estimate total volume of trade since 2008 it would be over 8 million individuals. The distribution of the species is well represented in the climate match. The certainty of assessment is high.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Red Garra (*Garra rufa*) is a fish native to the Near East. This small, omnivorous cyprinid is used in the fish-spa industry to exfoliate human skin. The history of invasiveness is low. It has not been reported as introduced or established outside the native range anywhere in the world but is considered to be in substantial trade (millions of organisms for 10 or more years). The overall climate match for the contiguous United States is high, with the majority of areas with high match west of the Rocky Mountains. Most of the East had low matches. The certainty of assessment is high. Quality information was available for this species and trade information was available from more than one scientifically defensible source. The overall risk assessment category for *Garra rufa* is uncertain due to the combination of a low history of invasiveness but a high climate match.

Assessment Elements

- **History of Invasiveness (Sec. 3): Low**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): High**
- **Remarks/Important additional information: No additional information.**
- **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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