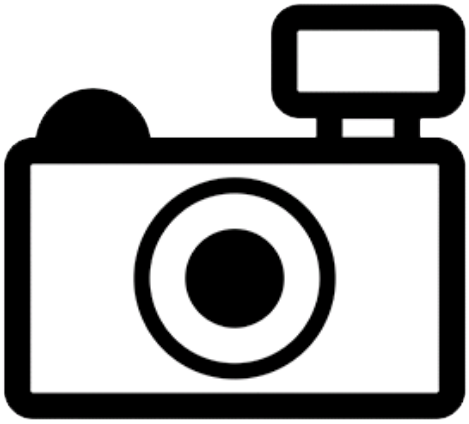
Iceland Stickleback (*Gasterosteus islandicus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, September 2011
Revised, September 2018
Web Version, 12/14/2018



No Photo Available

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"Europe: Iceland."

Status in the United States

This species has not been reported as introduced or established in the United States. There is no indication that this species is in trade in the United States.

Means of Introductions in the United States

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

Remarks

From Denys et al. (2015):

"47 [stickleback] species were described throughout the world (Eschmeyer, 2014), and have been mainly considered to be synonyms to the species present in Western Europe, *G. aculeatus* and *Gasterosteus gymnurus* Cuvier, 1829 (Kottelat, 1997). Four other species are currently considered valid: *Gasterosteus wheatlandi* Putnam, 1867, *Gasterosteus islandicus* Sauvage, 1874, *Gasterosteus crenobiontus* Bacescu and Mayer, 1956 (extinct), and *Gasterosteus nipponicus* Higuchi et al., 2014, […]."

"*G. islandicus* is endemic to Iceland, and is recognizable by its notch in pelvic girdle (Kottelat and Freyhof, 2007). […] As some populations possibly belonging to this species were found in Norway and Finland (in sympatry with *G. aculeatus*; Kottelat and Freyhof, 2007), the presence of the notch in pelvic girdle might also be a polymorphic character. More investigations are needed in order to clarify this species delineation."

From Froese and Pauly (2018):

"Some populations in Norway and northern Finland with low scute number possibly refer to this species."

From Penczak (1964):

"The three-spined stickleback of Iceland was first investigated and described as a new species — *Gasterosteus islandicus*, by Sauvage in 1874. In consequence of revision of the genus *Gasterosteus* L. by Bertin, 1925; Tagliani, 1926; Berg, 1932 and other authors, the Palaearctic three-spined stickleback is considered to belong to only one species — *Gasterosteus aculeatus* Linnaeus. According to that conception the name *Gasterosteus islandicus* was placed in the synonymy."

"The author had the opportunity of examining a certain number of sticklebacks specimens from Iceland. Exact examination of this material has convinced him that *Gasterosteus islandieus* Sauvage ought to be classified as a subspecies, […]"

According to Fricke et al. (2018), *Gasterosteus islandicus* is currently considered its own valid species.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From GBIF Secretariat (2018):

"Kingdom Animalia
Phylum Chordata
Class Actinopterygii
Order Gasterosteiformes

Family Gasterosteidae
Genus *Gasterosteus* Linnaeus, 1758
Species *Gasterosteus islandicus* Sauvage, 1874"

From Fricke et al. (2018):

"Current status: Valid as *Gasterosteus islandicus* Sauvage 1874. Gasterosteidae."

Size, Weight, and Age Range

From Penczak (1964):

"The total length of the measured specimens was 35-62 mm, the body length 31-35 mm, the weight 0,5-2,3 g."

From Froese and Pauly (2018):

"Max length : 5.5 cm SL male/unsexed; [Kottelat and Freyhof 2007]"

Environment

From Froese and Pauly (2018):

"Freshwater; benthopelagic."

Climate/Range

From Froese and Pauly (2018):

"Temperate"

Distribution Outside the United States

Native

From Froese and Pauly (2018):

"Europe: Iceland."

Introduced

This species has not been reported as introduced or established outside of its native range.

Means of Introduction Outside the United States

This species has not been reported as introduced or established outside of its native range.

Short Description

From Denys et al. (2015):

"[…] *G. islandicus* has a deep notch on the anterior margin of the pelvic girdle (vs. straight or rounded for the other taxa) (Kottelat and Freyhof, 2007)."

From Penczak (1964):

"The sticklebacks from Iceland are all similar to each other and at the same time quite different from the sticklebacks of European continent."

"In general there are only 5 lateral bony plates, and they lie separated from one another. Four of them are the largest and they lie below the first and second dorsal spine. In some specimens may be one, two or three small plates in front or behind the large plates. The keel on the tail is lacking in all examined specimens."

"The number of dorsal plates varies from four to seven, there are six in most cases. They are small and do not touch each other by the margin, except the second and the third. There are three or four dorsal spines."

"The pelvic girdle is comparatively small, some of its elements are poorly developed and its ventral suture is scarcely visible. The oral margin of the pelvis is deeply excised."

"The dorsal spines have smooth or slightly serrate edges at the base. The first dorsal spine is situated behind the base of the pectoral fin, the second just above or behind the pelvic wing, the third at a certain distance behind the end of the median plate. The rays of the dorsal and anal fins are articulated and very often unbranched. The base of the dorsal fin originates in most cases just opposite the middle, between the end of the median plate and the anal opening. The anal fin originates just below the fifth or sixth ray of the dorsal fin. The pectoral fin is composed of articulated and unbranched rays and its longest ray extends to half the length of the median plate. The pelvic fin is composed of one thin spine, the edges of which are slightly serrated at the base, and of one soft ray joined to the first one with the membrane. This spine is roughly twice, as long as the soft ray."

Biology

From Froese and Pauly (2018):

"Adults inhabit streams and lakes [Kottelat and Freyhof 2007]. Males build, guard and aerate the nest where the eggs are deposited [Breder and Rosen 1966]."

From Freyhof and Kottelat (2008):

"Morphological differences are reported in several lakes between individuals inhabiting different substrates (mud, lava), especially in Lake Thingvalla."

Human Uses
No information available.

Diseases
No information available. No OIE-reportable diseases have been documented for this species.

Threat to Humans
From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions
This species has not been reported as introduced or established outside of its native range.

4 Global Distribution

No georeferenced occurrences were available for this species (GBIF Secretariat 2018).

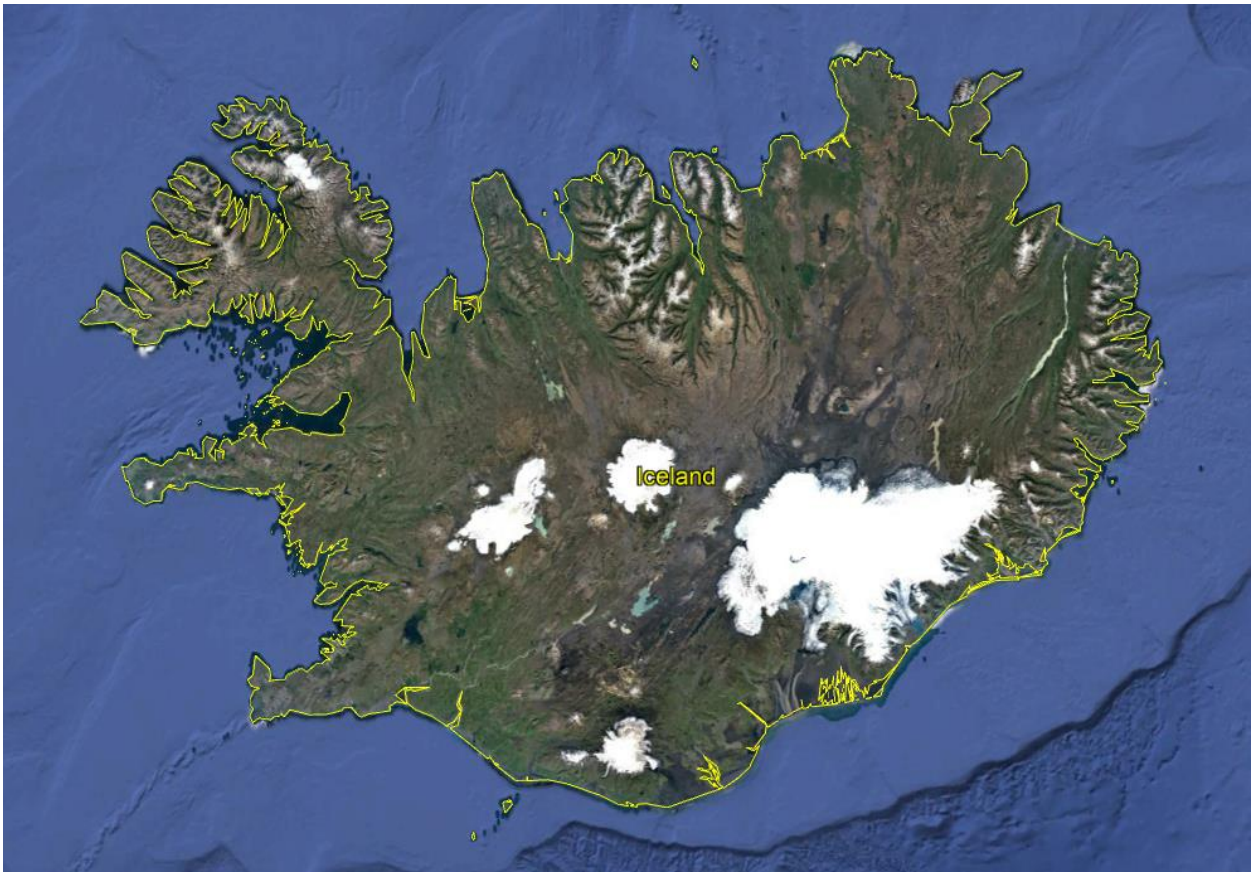


Figure 1. Map of Iceland, the known global distribution of *Gasterosteus islandicus*. Map made with Google Earth Pro 7.3.1.4507 (Google LLC, Mountain View, California).

5 Distribution Within the United States

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

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.0, which is a low climate match. A Climate 6 score of 0.005 or below indicates a low climate match. The match was generally very low across the entire contiguous United States. There were small, isolated areas of medium-low climate match in the western United States.

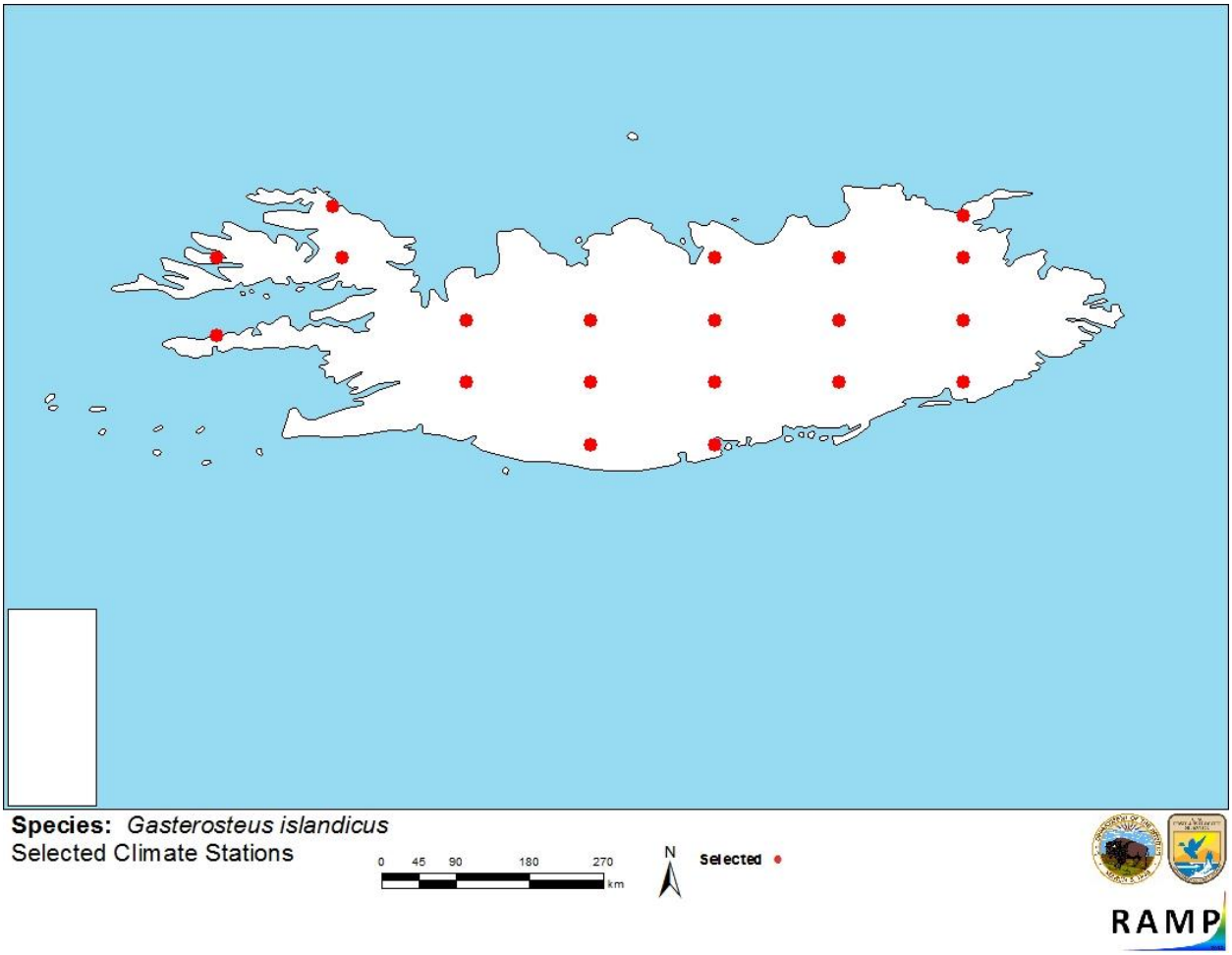


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Gasterosteus islandicus* climate matching. Source locations based on description of range from Froese and Pauly (2018). Because No georeferenced occurrence points were available, all climate stations in Iceland were selected.

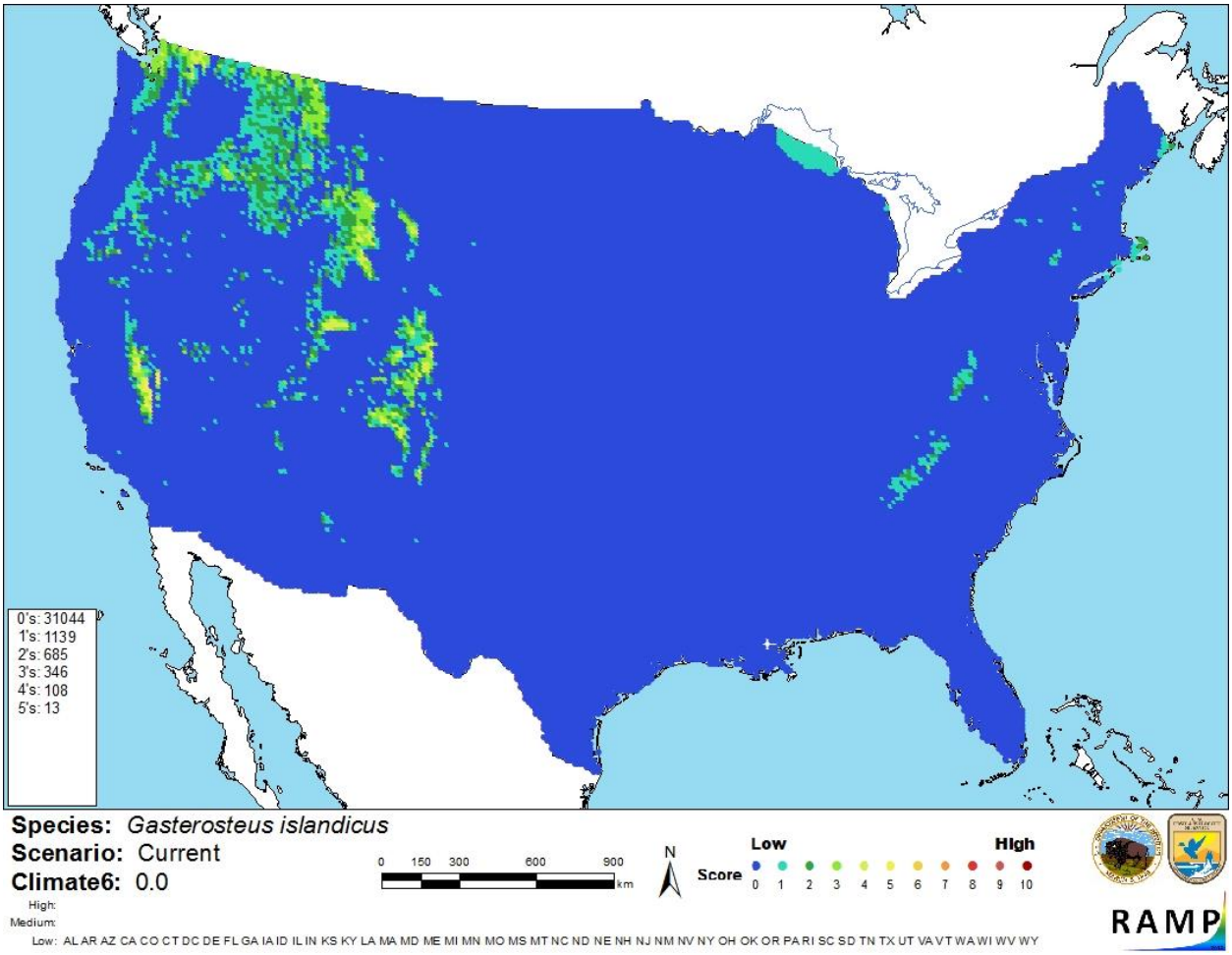


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Gasterosteus islandicus* in the contiguous United States based on description of range reported by Froese and Pauly (2018). 0= Lowest match, 10=Highest match.

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

There is limited information available about the biology of *Gasterosteus islandicus*. This is a highly variable species, so there is some uncertainty in discerning this species from other sticklebacks. Because it has not been reported as introduced or established outside of its native range, no information is available on potential negative impacts of its introduction to the contiguous United States. The climate matching analysis used source locations across Iceland

because no georeferenced occurrences were available for conducting a more accurate match. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Gasterosteus islandicus, Iceland Stickleback, is a stickleback species native to Iceland. It was previously considered a subspecies of *G. aculeatus* but is currently recognized as its own valid species by Fricke et al. (2018). *G. islandicus* has never been reported as introduced or established outside of its native range, therefore history of invasiveness is uncetain. This species has a low climate match with the contiguous United States. Further information on invasiveness, taxonomy, and distribution is needed to adequately assess the risk this species poses to the contiguous United States, so the certainty of this assessment is low. The overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): Uncertain**
- **Climate Match (Sec. 6): Low**
- **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.

Denys, G. P. J., M. F. Geiger, H. Persat, P. Keith, and A. Dettai. 2015. Invalidity of *Gasterosteus gymnurus* (Cuvier, 1829) (Actinopterygii, Gasterosteidae) according to integrative taxonomy. Cybium 39(1):37-45.

Freyhof, J., and M. Kottelat. 2008. *Gasterosteus islandicus*. The IUCN Red List of Threatened Species 2008: e.T135666A4174551. Available: http://www.iucnredlist.org/details/135666/0. (September 2018).

Fricke, R., W. N. Eschmeyer, and R. van der Laan, editors. 2018. Catalog of fishes: genera, species, references. Available: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (September 2018).

Froese, R., and D. Pauly, editors. 2018. *Gasterosteus islandicus* (Sauvage, 1874). FishBase. Available: https://www.fishbase.de/summary/Gasterosteus-islandicus.html. (September 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Gasterosteus islandicus*, Sauvage, 1874. Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/4286347. (September 2018).

Penczak, T. 1964. Three-spined stickleback from Iceland—*Gasterosteus aculeatus islandicus* Sauvage. Annales Zoologici 22(20):441-448.

Sanders, S., C. Castiglione, and M. H. Hoff. 2014. Risk Assessment Mapping Program: RAMP. U.S. Fish and Wildlife Service.

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.

Berg, L. S. 1949. Ryby presnych vod SSSR i sopredel'nych stran. Moskva.

Bertin, L. 1925. Recherches bionomiques, biométriques et systématiques sur les épinoches (Gastérostéidés). Annales de l'Institut océanographique 2:1.

Breder, C. M., and D. E. Rosen. 1966. Modes of reproduction in fishes. T. F. H. Publications, Neptune City, New Jersey.

Eschmeyer, W. N., editor. 2014. Catalog of fishes: genera, species, references. Available: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp.

Kottelat, M. 1997. European freshwater fishes. An heuristic checklist of the freshwater fishes in Europe (exclusive of former USSR), with an introduction for non-systematists and comments on nomenclature and conservation. Biologia Bratislava 52(suppl. 5):1-271.

Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin.

Tagliani, G. 1926. Sulla variabilità di alcuni caratteri quantitativi di *Gasterosteus aculeatus* L. del fiume Sarno (Campania) con una esposizione riassuntiva dei principali processi aritmetici statistico- biometrici. Archivio Zoologico Italiano11.