

# Harlequin Rasbora (*Trigonostigma heteromorpha*)

## Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2016

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## 1 Native Range and Status in the United States

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### Native Range

From Vidthayanon (2012):

“Recorded throughout the Malay Peninsula (Thailand and Malaysia) and Singapore. Records from Indonesia (Sumatra) refer to another species.”

### Status in the United States

No records of *Trigonostigma heteromorpha* in the wild in the United States were found. This species is in trade in the United States.

According to Chapman et al. (1997), 133,910 individuals of *T. heteromorpha* (listed under *Rasbora heteromorpha*) were imported to the United States in October 1992 for the aquarium trade. Chapman et al. (1994) listed *T. heteromorpha* (listed under *Rasbora heteromorpha*) as comprising 1.5% of ornamental freshwater fish imports in 1971 and 0.9% of imports in 1992.

From Aqua Imports (2019):

“Harlequin Rasbora (*Trigonostigma heteromorpha*) – Group of 10 Fish \$29.99”

## Means of Introductions in the United States

No records of *Trigonostigma heteromorpha* in the United States were found.

## Remarks

Information searches were conducted using the valid name *Trigonostigma heteromorpha* and the synonym *Rasbora heteromorpha* (Fricke et al. 2019).

## 2 Biology and Ecology

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### Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2019):

“**Current status:** Valid as *Trigonostigma heteromorpha* (Duncker 1904).”

From ITIS (2016):

“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 *Trigonostigma*  
Species *Trigonostigma heteromorpha* (Duncker, 1904)”

## **Size, Weight, and Age Range**

From Froese and Pauly (2016):

“Max length: 5.0 cm TL male/unsexed; [Lim and Ng 1990]”

## **Environment**

From Vidthayanon (2012):

“Found in small forested streams, typically with moderate current and soft, acidic, water.”

From Froese and Pauly (2016):

“Freshwater; benthopelagic; pH range: 5.0 - 7.0; dH range: 5 - 12.”

## **Climate/Range**

From Froese and Pauly (2016):

“Tropical; 22°C - 25°C [Riehl and Baensch 1991; assumed to be recommended aquarium temperature]”

## **Distribution Outside the United States**

### **Native**

From Vidthayanon (2012):

“Recorded throughout the Malay Peninsula (Thailand and Malaysia) and Singapore. Records from Indonesia (Sumatra) refer to another species.”

### **Introduced**

Froese and Pauly (2016) list an introduction of *Trigonostigma heteromorpha* to Spain but the underlying source for this report, Maceda-Veiga et al. (2013) only lists *T. heteromorpha* as present in pet and aquarium stores in Europe but not in the wild.

Xiong et al. (2015) lists *T. heteromorpha* as present in China and introduced through the aquarium trade but does not specify if this species is found in the wild or not.

## **Means of Introduction Outside the United States**

From Froese and Pauly (2016):

“Reason: ornamental”

## Short Description

From Froese and Pauly (2016):

“Color pattern reddish, pinkish or orange body with a conspicuous black stripe from below dorsal-fin origin to middle of caudal-fin base and usually broadened anteriorly so as to have a triangular or hatched shape. Incomplete lateral line reduced to 6-9 pores. No barbels. Branched anal rays, 5 [Kottelat and Witte 1999].”

## Biology

From Froese and Pauly (2016):

“Found in primary peat swamps in [groups] larger than 100 fish [Vidthayanon 2002]. Feeds on worms, crustaceans and insects [Mills and Vevers 1989]. Eggs spawned at the underside of broad leaves and similar structures [Kottelat and Witte 1999].”

“Inhabits forest streams [Lim and Ng 1990].”

## Human Uses

From Vidthayanon (2012):

“Popular in the aquarium trade. Individuals in trade are both from the wild and from cultivated stock. There are several cultivated varieties (H.H. Ng pers. comm. 2011).”

From Froese and Pauly (2016):

“One of the most frequently found species in the pet and aquarium stores [Maceda-Veiga et al. 2013].”

Papavlasopoulou et al. (2014) lists *Trigonostigma heteromorpha* as present in 80% of aquarium stores in Greece. Maceda-Veiga et al. (2013) lists *T. heteromorpha* as present in 95.4% of general pet stores and 100% of aquarium stores in southwestern Europe.

According to Chapman et al. (1997), 133,910 individuals of *T. heteromorpha* (listed under *Rasbora heteromorpha*) were imported to the United States in October 1992 for the aquarium trade. Chapman et al. (1994) listed *T. heteromorpha* (listed under *Rasbora heteromorpha*) as comprising 1.5% of ornamental freshwater fish imports in 1971 and 0.9% of imports in 1992.

From Aqua Imports (2019):

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\$29.99”

## Diseases

No records of OIE reportable diseases (OIE 2019) were found.

From Froese and Pauly (2016):

“Fin-rot Disease (late stage), Bacterial diseases

Fin Rot (early stage), Bacterial diseases

Bacterial Infections (general), Bacterial diseases

Nematode Infection (general), Parasitic infestations (protozoa, worms, etc.)”

## Threat to Humans

From Froese and Pauly (2016):

“Harmless”

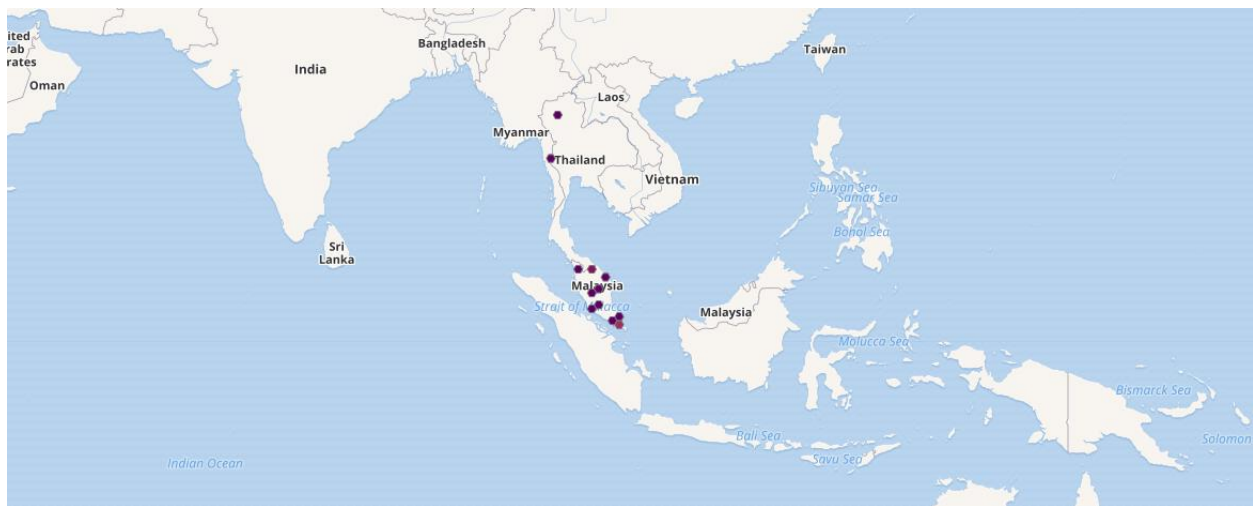
## 3 Impacts of Introductions

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No records of impacts of *Trigonostigma heteromorpha* introductions were found.

## 4 Global Distribution

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**Figure 1.** Known global distribution of *Trigonostigma heteromorpha*. Observations are located in Thailand, Malaysia, and Singapore. Map from GBIF Secretariat (2019). The two northern locations in Thailand were not used to select source points for the climate match. The southern one is the result of an aquarium specimen. The northern point was collected in 1972 and there has been no other report of the species that far north since.

The reports of introductions to Spain and China could not be confirmed to be introductions to the wild, no georeferenced observations were available from those areas and therefore were not used to select source points for the climate match.

## 5 Distribution Within the United States

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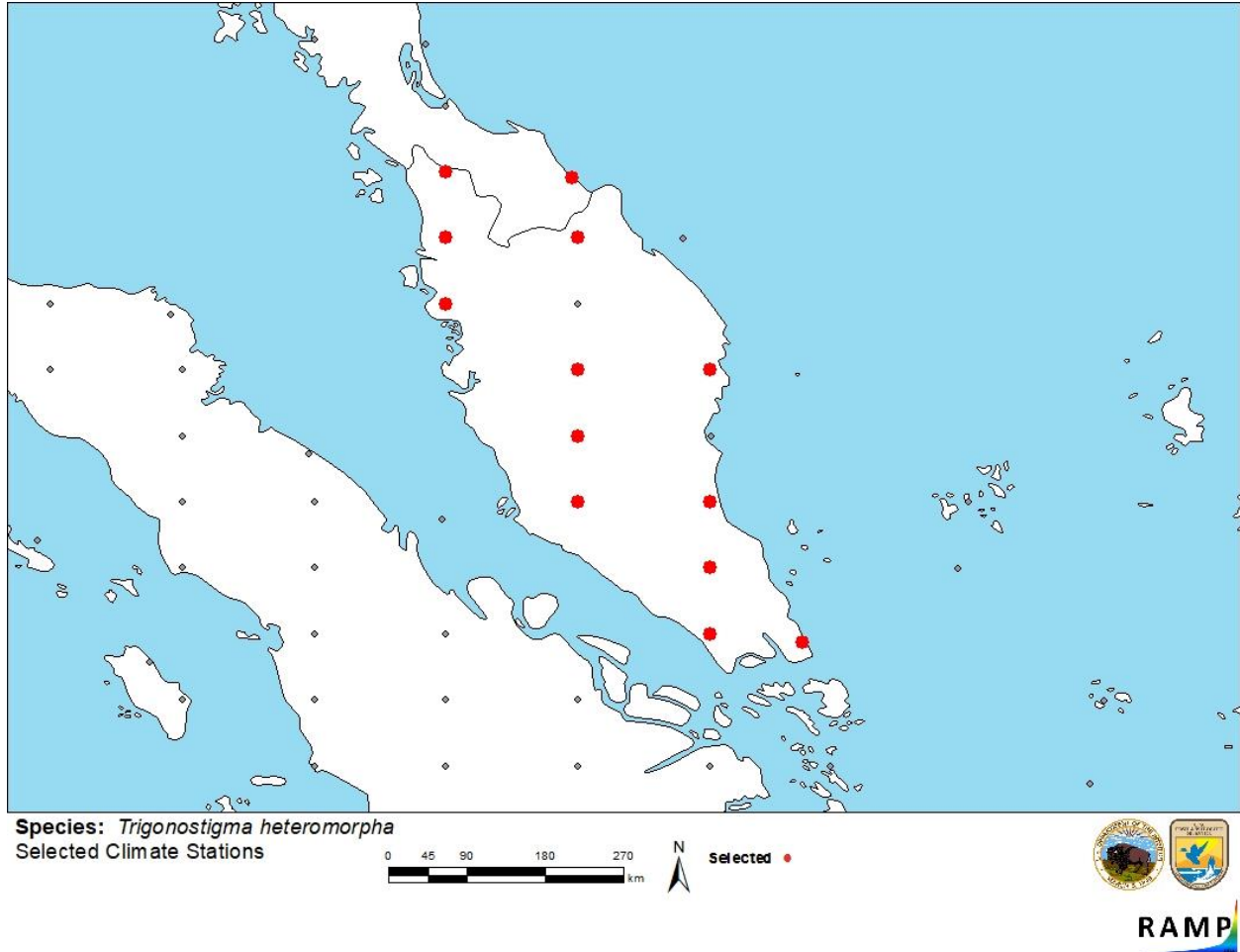
No records of *Trigonostigma heteromorpha* in the United States were found. BISON lists an occurrence of *T. heteromorpha* in Alabama (Auburn University Museum DiGIR Provider 1978). The details of the specimen record indicate that the specimen was purchased at a local pet shop and not collected from the wild.

## 6 Climate Matching

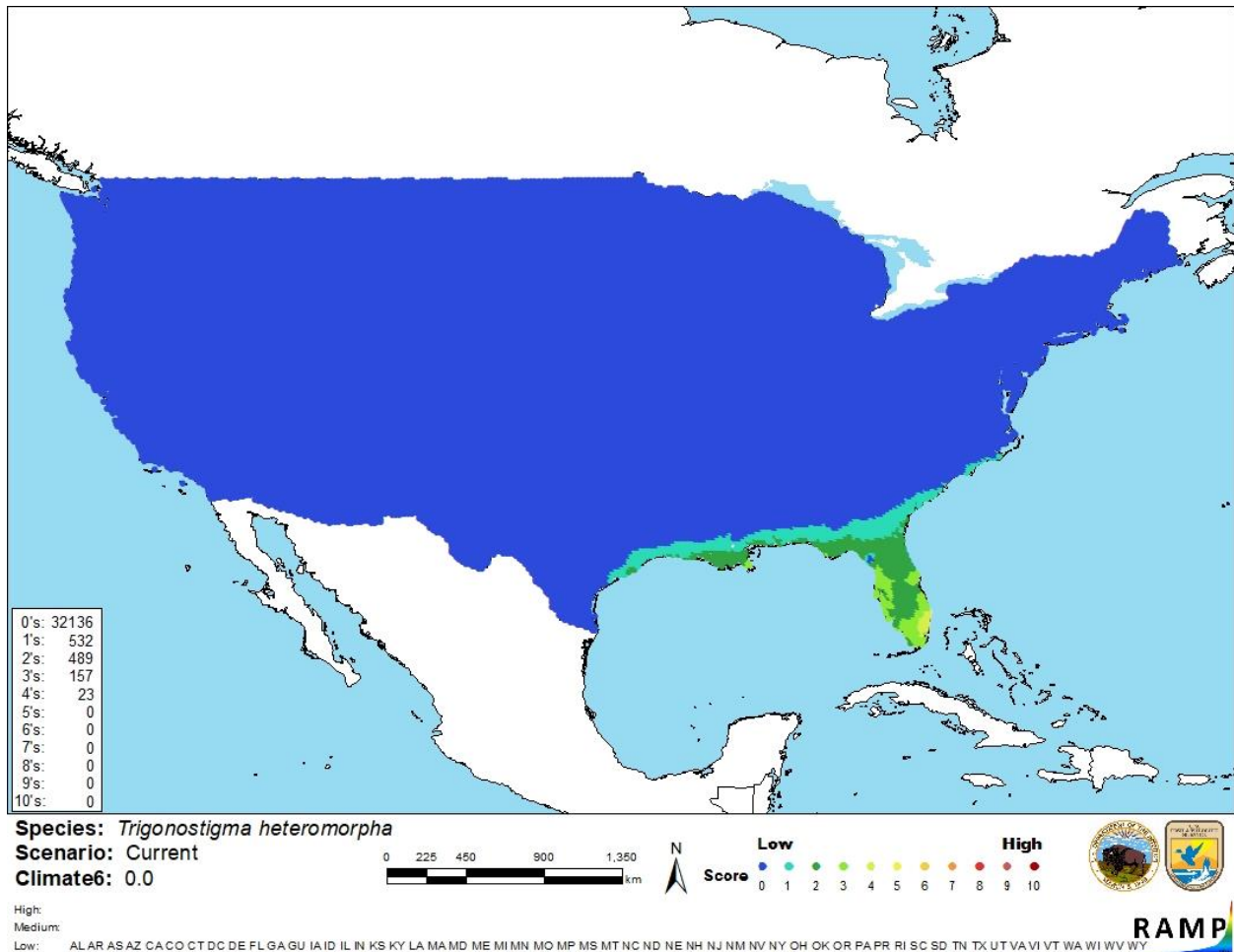
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### Summary of Climate Matching Analysis

The climate match for *Trigonostigma heteromorpha* was low across most of the contiguous United States with a small area of medium match in southern Florida. There were no areas of high match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.000, low. (Scores between 0.000 and 0.005, inclusive, are classified as low.) All states had low individual Climate 6 scores.



**Figure 2.** RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red; Thailand, Malaysia; Singapore) and non-source locations (grey) for *Trigonostigma heteromorpha* 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 *Trigonostigma heteromorpha* 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
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
$\geq 0.103$	High

## 7 Certainty of Assessment

The certainty of assessment is high. There was adequate quality biological information available. There are no confirmed records of introductions to the wild in nonnative areas. A detailed trade history was found for the species providing enough information to make a determination for history of invasiveness.



## 8 Risk Assessment

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### Summary of Risk to the Contiguous United States

Harlequin Rasbora (*Trigonostigma heteromorpha*) is a fish native to Thailand, Malaysia and Singapore. *T. heteromorpha* is very popular in the aquarium trade worldwide with significant presence in trade in the United States and Europe. The history of invasiveness for *T. heteromorpha* is low. There are no verified records of introduction to the wild. Extrapolating just from the trade information available for the United States, there has been a trade volume of more than 76 million individuals in the last 50 years; this number does not account for any international trade in the species. The climate match is low for the contiguous United States. There was a small area of medium match in southern Florida. The certainty of assessment is high. The overall risk assessment category is low.

### Assessment Elements

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

## 9 References

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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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- Xiong, W., X. Sui, S.-H. Liang, and Y. Chen. 2015. Non-native freshwater fish species in China. *Reviews in Fish Biology and Fisheries* 25(4):651–687.

## 10 References Quoted But Not Accessed

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**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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