Stinging Catfish (*Heteropneustes fossilis*)
Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2017
Web Version, 1/14/2018

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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2016):

"Asia: Pakistan and Sri Lanka to Myanmar."

From Jha and Rayamajhi (2010):

"Bangladesh; India (Andaman Is., Bihar, Darjiling, Uttaranchal, Uttar Pradesh, West Bengal); Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Sri Lanka; Thailand"

Status in the United States

This species has not been reported as introduced or established 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 Jha and Rayamajhi (2010):

"Synonym(s):
Clarisilurus kemratensis (non Fowler, 1937)
Heteropneustes microps (non Günther, 1864)
Heteropneustes microps (Günther, 1864)
Saccobranchus fossilis (Bloch, 1794)
Saccobranchus microcephalus Günther, 1864
Saccobranchus singio (Hamilton, 1822)
Silurus biserratus Swainson, 1839
Silurus fossilis Bloch, 1794
Silurus singio Hamilton, 1822"

From Eschmeyer et al. (2017):

"*Heteropneustes microps* […] Current status: Synonym of *Heteropneustes fossilis* (Bloch 1794)."

From Chakraborty and Ghosh (2014):

"*H. fossilis* and *H. microps* were confirmed to represent 2 separate species."

From Sridhar and Haniffa (1999):

"*H. microps* differs from *H. fossilis* in having a longer anal fin which is confluent with the caudal fin, but in *H. fossilis* the anal and caudal fins are separated by a distinct notch."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2017):

"Kingdom Animalia

Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Siluriformes
Family Heteropneustidae
Genus *Heteropneustes*
Species *Heteropneustes fossilis* (Bloch, 1794)"

"Current Standing: valid"

Size, Weight, and Age Range

From Froese and Pauly (2016):

"Max length : 31.0 cm TL male/unsexed; [Afzal Khan et al. 2012]."

Environment

From Froese and Pauly (2016):

"Freshwater; brackish; demersal; pH range: 6.0 - 8.0; dH range: ? - 30; depth range ? - 1m [Ali et al. 2016]"

"[…] 21°C - 25°C [Baensch and Riehl 1985; assumed to be recommended aquarium water temperature]"

"Adults found mainly in ponds, ditches, swamps and marshes, but sometimes occur in muddy rivers. Can tolerate slightly brackish water."

Climate/Range

From Froese and Pauly (2016):

"Tropical; […] 33°N - 5°N, 64°E - 97°E"

Distribution Outside the United States

Native

From Froese and Pauly (2016):

"Asia: Pakistan and Sri Lanka to Myanmar."

From Jha and Rayamajhi (2010):

“Bangladesh; India (Andaman Is., Bihar, Darjiling, Uttaranchal, Uttar Pradesh, West Bengal); Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Sri Lanka; Thailand”

Introduced

From Jha and Rayamajhi (2010):

“Iran, Islamic Republic of; Iraq”

From Ali et al. (2016):

“[…] we confirm the occurrence of *H. fossilis* in the waters of Al-Khabur River, Al-Hasaka, Syria, which may indicate a range extension through the freshwater systems of the Levantine.”

Means of Introduction Outside the United States

From Ali et al. (2016):

“The idea behind introducing this species into Iraq was to control the snail *Bulinus truncatus*, a vector for the human parasite causing schistosomiasis, but which proved to be ineffectual (Jawad, 2003).”

Short Description

From Hossain et al. (2013):

“Body yellow or dark purplish-brown in above and lighter in ventral side, extended backward mouth, pectoral spine attached to rays by membrane with 3-4 antrorse serrae along inner edge at anterior tip, and separated anal-caudal fin by a distinct notch”

Biology

From Froese and Pauly (2016):

“Omnivorous. Breed in confined waters during the monsoon months, but can breed in ponds, derelict ponds and ditches when sufficient rain-water accumulates. Oviparous, distinct pairing possibly like other members of the same family [Breder and Rosen 1966].”

“Eggs are deposited in a depression usually excavated by both parents in mud, in shallow water. Parents guard the eggs and young until they can fend for themselves which lasts for about one month [Pethiyagoda 1991].”

From Jha and Rayamajhi (2010):

“Its air-breathing apparatus enables it to exist in almost any kind of water. Generally, during the dry season singi lives in semiliquid and semi-dry mud, and even when the mud dries up they take

their bodies to the bottom of fissures and crevices formed by the cracking mud. Fertilised eggs are adhesive, demersal and spherical in form."

Human Uses

From Froese and Pauly (2016):

"Fisheries: highly commercial; aquaculture: commercial; aquarium: commercial."

From Jha and Rayamajhi (2010):

"A fish of high economic importance. It lives in large shoals in suitable localities and is extensively fished on account of the reported invigorating qualities of its flesh. The fish which attains a length of 30 cm, is in great demand because of its medicinal value in India. In the Calcutta markets the fish is sold in large quantities and is kept alive; boat-loads of living fish are brought from the deltaic districts and the Sunderbans. In the summer months (April-June) about 90% of live fish in the markets in India consists of this fish and *Clarias*."

Diseases

From Froese and Pauly (2016):

"Fish louse Infestation 1, Parasitic infestations (protozoa, worms, etc.)
Intestinal Ligulosis, Parasitic infestations (protozoa, worms, etc.)
Dactylogyrus Gill Flukes Disease, Parasitic infestations (protozoa, worms, etc.)
Yellow Grub, Parasitic infestations (protozoa, worms, etc.)
Contracaecum Disease, Parasitic infestations (protozoa, worms, etc.)
Clinostomum Infestation (metacercaria), Parasitic infestations (protozoa, worms, etc.)
Orientocreadium Infestation, Parasitic infestations (protozoa, worms, etc.)
Gnathostoma Infestation, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 1, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Disease, Parasitic infestations (protozoa, worms, etc.)
Euclinostomum Infestation, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 5, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Disease 2, Parasitic infestations (protozoa, worms, etc.)
Genarchopsis Infestation 2, Parasitic infestations (protozoa, worms, etc.)
Macrolecithus Disease, Parasitic infestations (protozoa, worms, etc.)
Palaeorchis Disease, Parasitic infestations (protozoa, worms, etc.)
Allocreadium Infestation 1, Parasitic infestations (protozoa, worms, etc.)
Procamallanus Infection 6, Parasitic infestations (protozoa, worms, etc.)
Lytocestus Disease (*Lytocestus* sp.), Parasitic infestations (protozoa, worms, etc.)
Pseudocaryophyllaeus Infestation 1, Parasitic infestations (protozoa, worms, etc.)
Pseudocaryophyllaeus Disease, Parasitic infestations (protozoa, worms, etc.)
Ascaridia Disease, Parasitic infestations (protozoa, worms, etc.)
Allocreadium Infestation 7, Parasitic infestations (protozoa, worms, etc.)
Aphallus Disease, Parasitic infestations (protozoa, worms, etc.)
Euclinostomum Disease, Parasitic infestations (protozoa, worms, etc.)
Eumasenia Disease, Parasitic infestations (protozoa, worms, etc.)

Macvicaria Infestation 2, Parasitic infestations (protozoa, worms, etc.)
Neopecoelina Infestation, Parasitic infestations (protozoa, worms, etc.)
Neopecoelina Disease, Parasitic infestations (protozoa, worms, etc.)
Opegaster Infestation 2, Parasitic infestations (protozoa, worms, etc.)
Philopinna Disease, Parasitic infestations (protozoa, worms, etc.)
Bialovarium Disease, Parasitic infestations (protozoa, worms, etc.)
Lernaeocera Disease (*Lernaeocera* sp.), Parasitic infestations (protozoa, worms, etc.)"

No OIE-reportable diseases have been noted.

Threat to Humans

From Froese and Pauly (2016):

"Venomous fish, from its pectoral spines [Vidthayanon et al. 2005]."

"Traumatogenic [Halstead 1980]."

From Ali (2016):

"In addition, this species is considered dangerous to humans, as the pectoral fin spine is very strongly serrated and connected to a poisonous gland (Bhimachar, 1944; Zakaria, 1964; Whitear et al., 1991). Several cases of human envenomation are on record for this species, and the poison *H. fossilis* poison can be fatal to humans (Coad, 1979; Berra, 2001)."

3 Impacts of Introductions

From Jawad (2003):

"The diet of *H. fossilis* is similar to that of the cyprinid *B. sharpeyi*, but the competion [*sic*] between the two species is less than that between *B. sharpeyi* and the common carp, probably because of the great difference in their ecological niches. *H. fossilis* is well established in the freshwater system in Iraq and it would be very difficult at this stage to get rid of it."

From Coad (2014):

"[…] eradicated *Barbus* (= *Arabibarbus*) *grypus* eggs along the Tigris (F. Kedairy, in litt. 21 December 2005)."

"Zakaria (1964) reported severe swelling involving the whole arm from a hand sting in Iraq. The swelling and pain recede after about a day but the puncture wound can take about two weeks to heal and some pain can be felt when applying pressure to the wound site up to six weeks later. Caras (1964) (probably based on a report in Farsi in Game and Nature, Tehran, ca. 1961) recorded a diminutive black fish found in the Shatt al Arab which reputedly killed 28 people with a venomous bite (sic). Death was said to be swift. This was presumably a garbled report on this species. Verbal and newspaper reports from Tehran (V. D. Vladykov, in litt. 26 August 1961)

maintain that this species could cause death to cattle and humans although Vladykov (in litt. 30 September 1963) considered fatal cases 'not well proved'."

"Numbers around Baghdad 30 years ago were so high that 'you could not swim without being stung by one. Rather painful' (F. Kedairy, in litt. 21 December 2005)."

4 Global Distribution

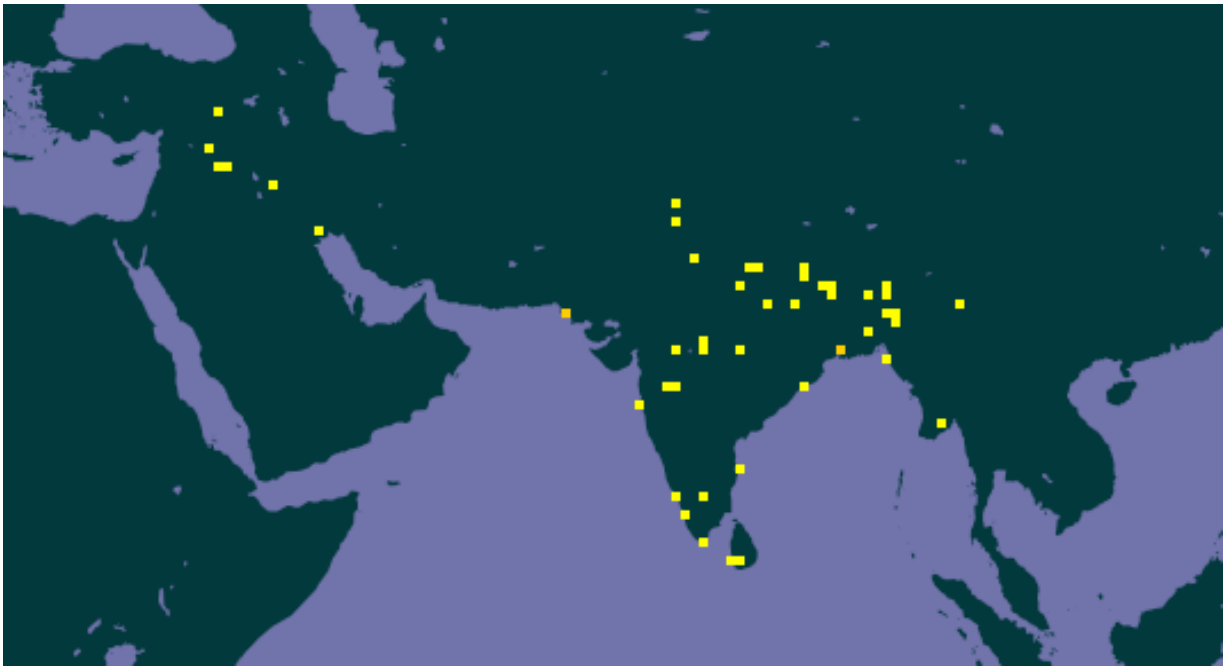

Figure 1. Known global established locations of *Heteropneustes fossilis*. Map from GBIF (2016). Location in Australia and Turkey that were reported in GBIF (2016) were excluded from climate matching due to inaccuracy. GBIF (2016) included no georeferenced occurrences from the range of *H. fossilis* in Thailand or Laos.

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 match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high in central California and southern Nevada. Medium matches were located in the Desert Southwest, southwestern Florida, and southern Texas. The climate match was low throughout the remainder of the contiguous U.S. Climate 6 proportion indicated that the contiguous U.S. is a medium climate match overall. Proportions indicating a medium climate match are those greater than 0.005 and less than 0.103; the Climate 6 proportion for *Heteropneustes fossilis* was 0.019.

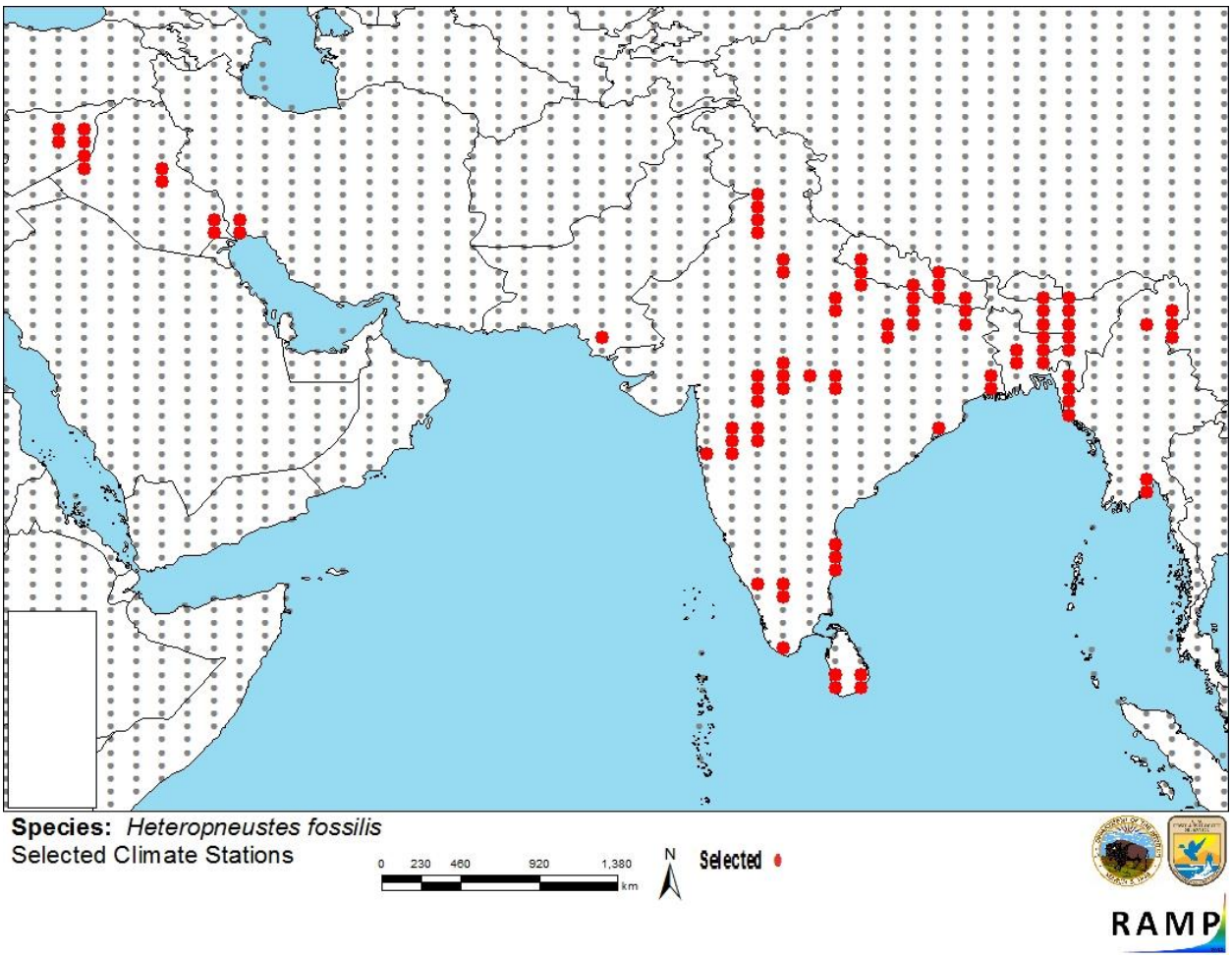

Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations in southern and western Asia selected as source locations (red) and non-source locations (gray) for *Heteropneustes fossilis* climate matching. Source locations from GBIF (2016).

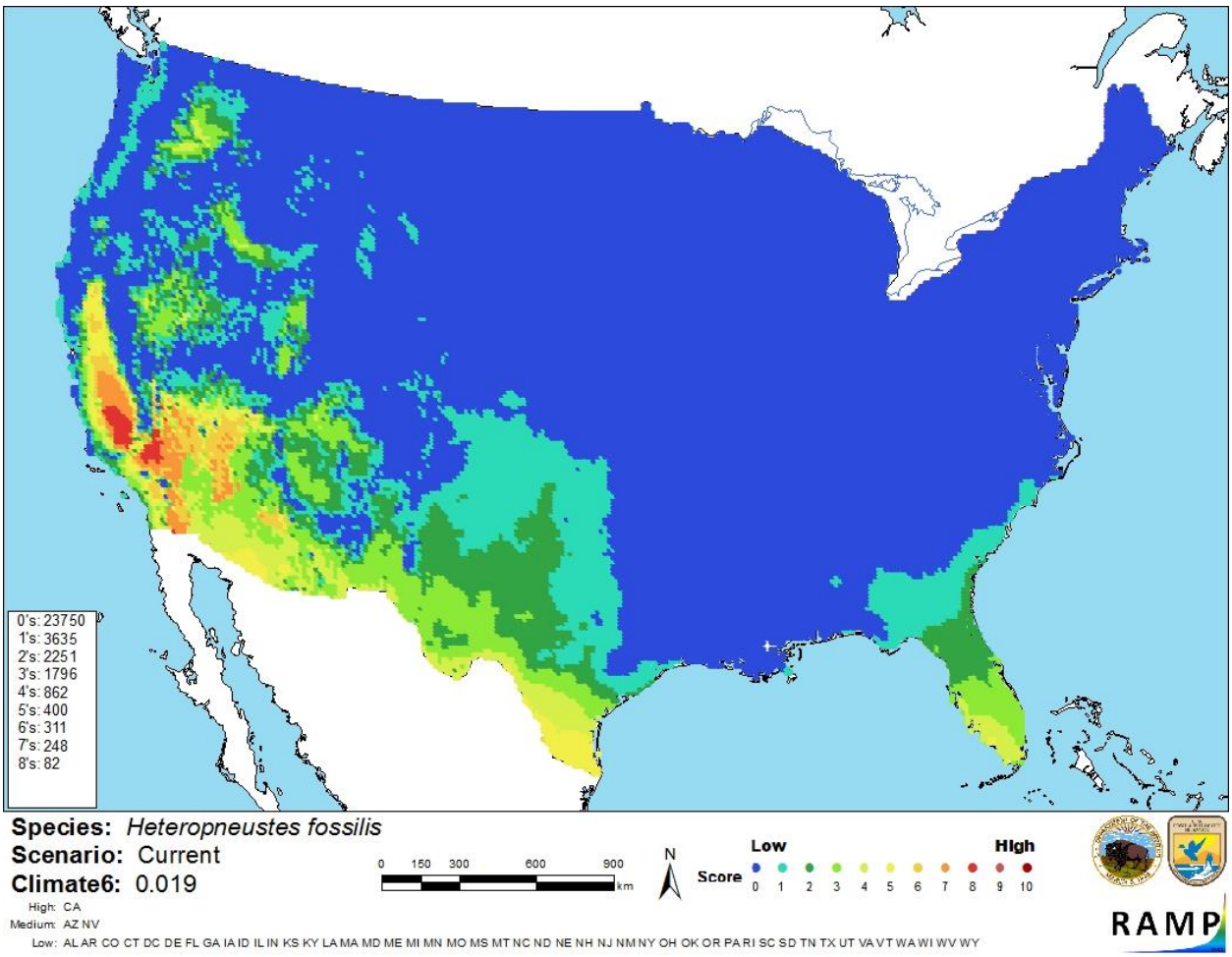

Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Heteropneustes fossilis* in the contiguous United States based on source locations reported by GBIF (2016). 0= Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

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
≥ 0.103	High

7 Certainty of Assessment

The biology and ecology of *Heteropneustes fossilis* are well known. While the taxonomic status of *H. fossilis* is secure, there is uncertainty around whether *H. microps* should actually be included within the species *H. fossilis*. Some information is available on health and ecological impacts of introduction of this species to the Middle East, but more information would be required to have high certainty on impacts. Certainty of this assessment is medium.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Heteropneustes fossilis is a catfish native to South Asia and Southeast Asia. This species has become established in Iraq, where it was transported for snail control, and Iran. It has also been recorded in Syria. In Iraq, impacts of introduction include predation of native fish eggs, competition with native fish species, and human health concerns over the ability of *H. fossilis* to cause injury through its sting. *H. fossilis* has a medium climate match with the United States. Overall risk assessment category is high.

Assessment Elements

- **History of Invasiveness (Sec. 3): High**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Medium**
- **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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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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