

Mrigal (*Cirrhinus cirrhosus*)

Ecological Risk Screening Summary

Web Version – 10/31/2012



Photo: Thai Department of Fisheries From EOL (2014)

1 Native Range, and Status in the United States

Native Range

From Froese and Pauly (2011):

“Asia: native to large rivers in the Indian subcontinent (Rainboth 1996). Has been so widely transported in connection to aquaculture that its natural distribution can no longer be determined (Roberts 1997).”

Status in the United States

There are no currently known nonindigenous occurrences within the United States.

Means of Introductions in the United States

There are no currently known means of introduction within the United States.

Remarks

There is conflicting information on the correct scientific name for this species. Fishbase (Froese and Pauly 2011) lists numerous synonyms for *Cirrhinus cirrhosus* and based on the Catalog of Fishes (Eshmayer 2012) following Menon (1999), reports that “The species *Cirrhinus mrigala* (Hamilton, 1822) is considered as valid.” However, ITIS (2011) lists *Cirrhinus cirrhosis* as valid. More studies on are needed.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2011):

Kingdom Animalia
 Phylum Chordata
 Subphylum Vertebrata
 Superclass Osteichthyes
 Class Actinopterygii
 Subclass Neopterygii
 Infraclass Teleostei
 Superorder Ostariophysi
 Order Cypriniformes
 Superfamily Cyprinoidea
 Family Cyprinidae
 Genus *Cirrhinus*
 Species *Cirrhinus cirrhosis* [see Remarks (Sec. 1) above]

Current Taxonomic Standing: valid

Size, Weight, Age

From Froese and Pauly (2011):

“Max length: 100.0 cm SL male/unsexed; (Roberts 1997); common length: 40.0 cm TL male/unsexed; (Pethiyagoda 1991); max. published weight: 12.7 kg (Talwar and Jhingran 1991)”

Environment

From Froese and Pauly (2011):

“Benthopelagic; potamodromous (Riede 2004); freshwater; brackish; depth range 5 - ? m (Talwar and Jhingran 1991)”

Climate/Range

From Froese and Pauly (2011): “Tropical; 28°N - 7°N”

Distribution Outside the United States

From Froese and Pauly (2011):

“Asia: native to large rivers in the Indian subcontinent (Rainboth 1996). Has been so widely transported in connection to aquaculture that its natural distribution can no longer be determined (Roberts 1997).”

Froese and Pauly (2011) also report that *Cirrhinus mrigala* has been introduced to Pakistan, Japan, Mauritius, Malaysia, Zimbabwe, Russia, Philippines, Lao, Thailand, Cambodia, Sri Lanka, China, Vietnam, Bhutan, and Nigeria.

Means of Introduction Outside the United States

From Froese and Pauly (2011): “Introduced almost exclusively for aquaculture.”

Short description

From Froese and Pauly (2011):

“Dorsal spines (total): 0; Dorsal soft rays (total): 12-15; Vertebrae: 39. Body plain greyish; 12-15 branched dorsal rays (Kottelat 2001).”

Biology

From Froese and Pauly (2011):

“Inhabits fast flowing streams and rivers (Menon 1999). Can tolerate high levels of salinity. Juveniles are omnivorous to about 5 cm TL, adults are almost entirely herbivorous. Feeds on plankton, but also grazes on algae. Spawning occurs in marginal areas of the water body with a depth of 50-100 cm over a sand or clay substrate. A 6 kg female can lay a million eggs (of 1 mm diameter) (Pethiyagoda 1991). Widely cultured in India but fails to breed naturally in ponds, thus induced breeding is done. Fishery harvests 40 cm fish weighing 1000 g and of about 3 years. A very active fish that thrives in ponds but spawns in swift rivers. Fingerlings are in great demand for stocking ponds between July and November (Talwar and Jhingran 1991).”

Human uses

From Froese and Pauly (2011):

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

Diseases

The following list of parasitic infestations and diseases is taken directly from Fishbase (Froese and Pauly 2011) and more details on each entry can be found there. None of the diseases are OIE-reportable (OIE 2012).

“Ectoparasites, urceolariid ciliates and *S. ferax* fungus (see Impacts of Introductions)
White spot Disease, Parasitic infestations (protozoa, worms, etc.)
Cryptobia Infestation, Parasitic infestations (protozoa, worms, etc.)
White spot Disease, Parasitic infestations (protozoa, worms, etc.)
Fish louse Infestation 1, “Parasitic infestations (protozoa, worms, etc.)
Dactylogyrus Gill Flukes Disease, Parasitic infestations (protozoa, worms, etc.)
Trichodinosis, Parasitic infestations (protozoa, worms, etc.)
Sporozoa-infection (*Myxobolus* sp.), Parasitic infestations (protozoa, worms, etc.)
Ichthyophthirius Disease, Parasitic infestations (protozoa, worms, etc.)
Neascus Disease, Parasitic infestations (protozoa, worms, etc.)
Myxobolus Infection 3, Parasitic infestations (protozoa, worms, etc.)”

Threat to humans

From Froese and Pauly (2011): “Harmless”

3 Impacts of Introductions

The fishes *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala* were collected from fish farms in Thatta and Hyderabad districts of Sindh, Pakistan, during May-July 1988, and found to be infested with *Argulus indicus* and *A. japonicus*, (argulid ectoparasites) recorded for the first time from Pakistan. Infestation by *A. indicus* was slight, while *A. japonicus* was profuse on the juveniles of these fish species. (Jafri and Ahmed 1991)

Tripartiella species (Urceolariid ciliates) were found on the gills of cultured Indian and exotic carp in West Bengal, India. The structure, measurements, affinities, seasonal incidence and pathogenicity of *T. copiosa* from *Labeo rohita* and *Cyprinus carpio*, *T. bulbosa* from *Cirrhinus mrigala* and *Catla catla* and *T. obtusa* from *Ctenopharyngodon idella* are described. *T. obtusa* and *T. copiosa* are recorded for the first time from India. (Das and Halda 1987)

Results of studies showed that injury lowered the resistance of fish to *S. ferax* and that symptoms were nearly identical on various host spp. with respect to behaviour of the infected fish and the appearance of the fungal tufts on the body of the host. Infection has been recorded on *Labeo rohita*, *Cirrhinus mrigala*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix* and *Catla*

catla. Pathogenicity was experimentally established on *Colisa fasciatus*, *C. mrigala* and *Puntius sophore* (Srivastava and Srivastava 1977).

Cirrhinus mrigala were introduced into Laos with probably some adverse ecological effects. Originally brought from Thailand, India, they were used for aquaculture but established a wild population through natural reproduction. There are also probably some adverse socioeconomic effects. (FAO 2011)

4 Global Distribution



Figure 1 (above). Map with known distribution of *C. cirrhosus* shown. Map from Google Earth (2011).

5 Distribution within the United States

No known distribution within the United States

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2010; 16 climate variables; Euclidean Distance) was high in Florida and Medium in areas of the Southwest and in Florida and the South Atlantic coast and low in the Northeast, Northwest and the rest of the Southeast. Climate 6 match indicated that the Continental U.S. has a medium climate match. The range for a medium climate match is 0.005 - 0.103 and the climate match of *C. cirrhosus* is 0.064.

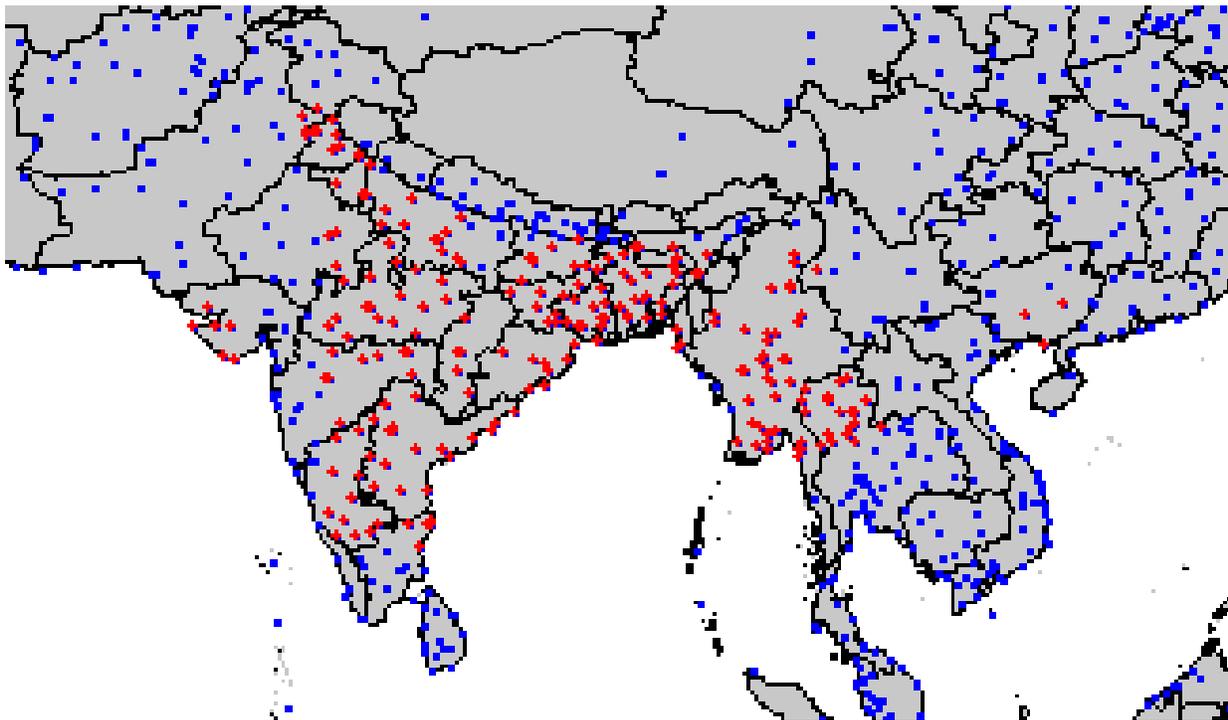


Figure 2 (above). CLIMATCH (Australian Bureau of Rural Sciences 2010) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *C. cirrhosus* climate matching. Source locations from Froese and Pauly (2011). Only locations with established populations were used.

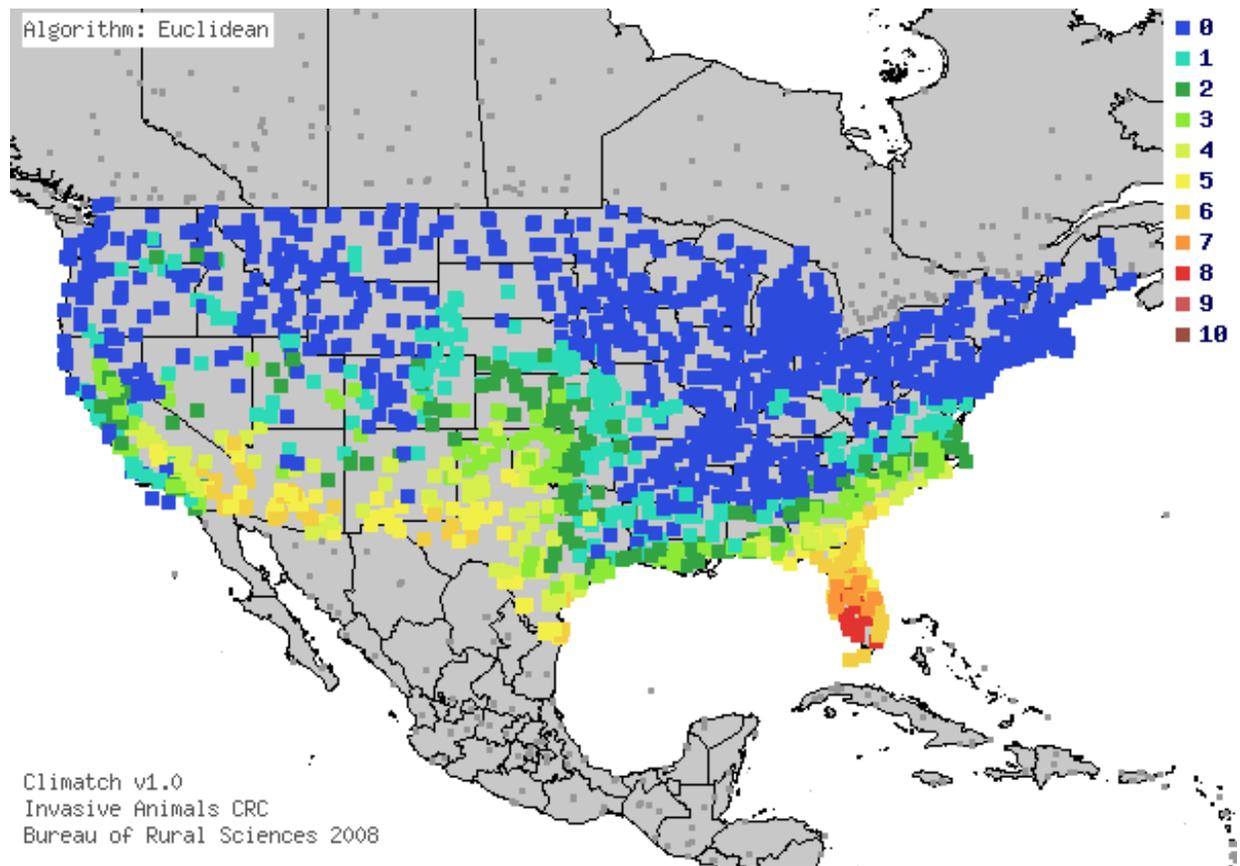


Figure 3 (above). Map of CLIMATCH (Australian Bureau of Rural Sciences 2010) climate matches for *C. cirrhosus* in the continental United States based on source locations reported by Froese and Pauly (2011). 0= Lowest match, 10=Highest match.

Table 1 (below). CLIMATCH (Australian Bureau of Rural Sciences 2010) climate match scores

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	996	255	199	147	143	92	87	24	15	0	0
Climate 6 Proportion = 0.064 (Medium)											

7 Certainty of Assessment

Peer-reviewed literature on the biology, ecology, and distribution associated with *Cirrhinus cirrhosus* as well as information on its potential invasiveness is extremely limited. More information and research on this species will be needed to strengthen the certainty of this assessment. The risk level is therefore uncertain, and the certainty of this risk is low.

8 Risk Assessment

Summary of Risk to the Continental United States

C. cirrhosus is a heavily aquacultured species native to South Asia. Introductions have occurred in many other areas in Asia and wild populations have been established. While there are numerous parasites and diseases associated with this species, no adverse impacts have been reported due to the establishment of this species. At least one source suggests that there are some potential impacts that *C. cirrhosus* could have as an introduced species. Climate match for this species is medium with the United States. The risk presented by this species is listed as uncertain.

Assessment Elements

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

Australian Bureau of Rural Sciences. 2011. CLIMATCH. Available:
<http://adl.brs.gov.au:8080/Climatch> (Accessed August 2011).

Das, M. K. and D.P. Haldar. 1987. Urceolariid ciliates of the genus *Tripartiella* invading gills of freshwater cultured carp in India. *Archiv für Protistenkunde*. 134(2-3):169-178.

Encyclopedia of Life (EOL). 2014. *Cirrhinus cirrhosus*. Available:
http://eol.org/data_objects/27135832. (September 2014).

Eschmeyer, W. N. (ed). 2012. *Catalog of Fishes*. California Academy of Sciences, Department of Ichthyology. Available:
<http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (Accessed October 26, 2012).

FAO. 2011. Food and Agriculture Organization of the United Nations. Available:
http://www.fao.org/fishery/culturedspecies/Cirrhinus_mrigala/en (Accessed August 2011).

- Froese, R. and D. Pauly (Eds.). 2011. *Cirrhinus cirrhosus*. FishBase. Available:
<http://www.fishbase.org/summary/Cirrhinus-mrigala.html> (Accessed August 2011).
- GBIF. 2011. Global Biodiversity Information Facility. Available:
<http://data.gbif.org/species/13584262/> (Accessed August 2011).
- Google Inc. 2011. Google Earth (Version 6.0.3.2197) [Software].
Available:<http://www.google.com/intl/en/earth/index.html> (Accessed August 2011).
- ITIS. 2011. *Cirrhinus cirrhosis*. Integrated Taxonomic Information System. Available:
http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=688892 (Accessed August 2011).
- Jafri, S. I. H., and S.S. Ahmed. 1991. A new record of ectoparasitic crustaceans (*Branchiura: Argulidae*) from major carps in Sindh, Pakistan. Pakistan Journal of Zoology. 23(1):11-13.
- OIE. 2012. OIE Listed Diseases, World Organisation for Animal Health. Available:
<http://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2011> (Accessed October 23, 2012).
- Srivastava, G.C. and R.C. Srivastava. 1977. Host range of *Saprolegnia ferax* (Gruith) Thuret on certain fresh water teleosts. Current Science 1977 Vol. 46 No. 3 pp. 87

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.

- Kottelat, M. 2001. Fishes of Laos. WHT Publications Ltd., Colombo 5, Sri Lanka. 198 p.
- Menon, A.G.K. 1999. Check list - fresh water fishes of India. Rec. Zool. Surv. India, Misc. Publ., Occas. Pap.175: 366
- Pethiyagoda, R. 1991. Freshwater fishes of Sri Lanka. The Wildlife Heritage Trust of Sri Lanka, Colombo. 362 p.
- Rainboth, W.J. 1996. Fishes of the Cambodian Mekong. FAO Species Identification Field Guide for Fishery Purposes. FAO, Rome, 265 p.

Riede, K. 2004. Global register of migratory species - from global to regional scales. Final Report of the R&D-Projekt 808 05 081. Federal Agency for Nature Conservation, Bonn, Germany. 329 p.

Roberts, T.R. 1997. Systematic revision of the tropical Asian labeon cyprinid fish genus *Cirrhinus*, with descriptions of new species and biological observations on *C. lobatus*. Nat. Hist. Bull. Siam Soc. 45:171-203.

Talwar, P.K. and A.G. Jhingran. 1991. Inland fishes of India and adjacent countries. A.A. Balkema, Rotterdam. 1:541 p.