Japanese White Crucian Carp (*Carassius cuvieri*)
Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, October 2012
Revised, December 2018
Web Version, 7/29/2019

Photo: OpenCage. Licensed under Creative Commons BY-SA 2.5. Available: https://www.cabi.org/ISC/datasheet/90565. (December 4, 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"[In Japan:] Recorded from Lake Biwa [Fisheries Management Division of the Shiga Prefecture Agriculture and Fisheries Department 2007]."

From NIES (2018):

"[Natural range:] Biwako-Yodogawa River System, Japan"

Status in the United States

There were no records found of *Carassius cuvieri* in the wild or in trade in the United States.

This species is already listed as prohibited for live specimens in Vermont (Vermont Fish and Wildlife Regulations 2011).

Means of Introductions in the United States

There were no records found of *Carassius cuvieri* in the wild in the United States.

Remarks

This ERSS is an update of one originally published in 2012.

From Kim and Kim (2009):

"Possible hybrids between *C. auratus* and *C. cuvieri* were quite common in the waters of Korea recently, […]"

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2018):

"**Current status:** Valid as *Carassius cuvieri* Temminck & Schlegel 1846."

From ITIS (2018):

"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 *Carassius*
Species *Carassius cuvieri*"

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Max length : 35.0 cm SL male/unsexed; [Shao and Lim 1991]"

Environment

From Froese and Pauly (2018):

"Freshwater; demersal."

From CABI (2018):

"*C. cuvieri* is primarily a freshwater fish, preferring slow running water at lower and middle reaches."

Climate/Range

From Froese and Pauly (2018):

"Temperate"

Distribution Outside the United States

Native

From Froese and Pauly (2018):

"[In Japan:] Recorded from Lake Biwa [Fisheries Management Division of the Shiga Prefecture Agriculture and Fisheries Department 2007]."

From NIES (2018):

"[Natural range:] Biwako-Yodogawa River System, Japan"

Introduced

From Froese and Pauly (2018):

"[In China:] Recorded from Bosten lake [Walker and Yang 1999]."

"[In South Korea:] Recorded from the Han, Nakdong, Kum, Youngsan and Sumjin rivers [Jang et al. 2002]."

"[In Taiwan:] Introduced from Japan."

FAO (2018) lists *Carassius cuvieri* as established in the wild in China.

From NIES (2018):

"Introduction to Kasumigaura Lake [Japan] was in 1930-1931."

From Abdissa and Yalew (2011):

"Out of the seven fish order[s] found in the Amhara region [Ethiopia] the cyprinidae fish families account 56% species which are entirely indigenous with the exception of two exotic species of *Carassius cuvieri* (Temminck & Schlegel, 1846) […]"

Means of Introduction Outside the United States

From CABI (2018):

"The species was introduced to Korea from Japan in 1972 and intentionally released to rivers and reservoir as a food source (Jang et al., 2002). In South Korea, religious practises present a secondary dispersal route; during the Buddhist ceremony of "life-releasing", introduced species - such as *C. cuvieri* – are often released to new habitats (Jang et al., 2002)."

From NIES (2018):

"Deliberate: For fishery and sports fishing (often recognized as "Hera-buna" in sports fishing)."

Short Description

From CABI (2018):

"The head is large and broadly triangular, the snout short and blunt. The eye is moderately large, with the interorbital space broad. The mouth is arched and slightly oblique, with thick lips. There are no barbels present. The body is compressed, belly rounded, body depth high; the dorsal profile is conspicuously arched and the caudal peduncle is thick and short. Scales are cycloid and large; the lateral is line complete. Lateral line scale count: 29-33; dorsal fin rays: IV, 15-18; pelvic fin rays: 1+8; anal fin rays: III, 4-5; last simple dorsal and anal ray serrated posteriorly. Dorsal fin base long. Dorsal fin origin above pelvic fin origin; pectoral fin end reaches pelvic fin origin; pectoral and pelvic fins at lower side of body; caudal fin forked (Shen 1993; Chen and Fang 1999)."

Biology

From CABI (2018):

"However, it can be found in lakes, ponds, canals, and backwaters of rivers (Shen, 1993)."

"In their native range, *C. cuvieri* spawn from April to July, primarily in and around emergent vegetation during flooding after a heavy rain. The larvae remain in the vegetation until their juvenile stage (Yamamoto [et al.] 2006)."

"This is a polyphagic species feeding on a wide range of food, including plants, diatoms, crustacean and aquatic insects."

"*C. cuvieri* will shoal with other species of the genus *Carassius* (Yamamoto [et al.] 2006)."

Human Uses

From Froese and Pauly (2018):

"Aquaculture: commercial"

From CABI (2018):

"*C. cuvieri* is a common food fish in its native and introduced range (Shen, 1993)."

Diseases

Epizootic ulcerative syndrome is an OIE-reportable disease (OIE 2019).

From CABI (2018):

"*C. cuvieri* has been identified as an intermediate host of the parasite *Clinostomum complanatum*."

From Ogawa (2011):

"[…] and a leech, *Limnotrachelobdella sinensis*, infecting crucian carps, *Carassius cuvieri* […]"

From Kwon et al. (1997):

"The infection [epizootics of ulcerative disease with atypical *Aeromonas salmonicida*] was also observed in Gengorobuna (deep bodied) crucian carp, *Carassius cuvieri*, and fancy-carp, *Cyprinus carpio* (Yoshimizu et al., 1997)."

Threat to Humans

From CABI (2018):

"*C. cuvieri* has been identified as an intermediate host of the parasite *Clinostomum complanatum*. This parasite is the causative agent in four of the nine human cases of *Clinostomum* infection reported in Japan; the consumption of infected fish is the pathway of infection to humans (Aohagi et al., 1992)."

3 Impacts of Introductions

From Kim and Kim (2009):

"*C. auratus* has lost is dominancy rapidly in the fight against *C. cuvieri* for habitat and food."

"Shift of dominant species in these waters from *C. auratus* to *C. cuvieri* is driven by the facts that the two *Carassius* species share habitat and feedstuff to large extent with preference to *C. cuvieri* in population growth. Genetic disturbance possibly caused by hybridization between the two species has raised concern with regard to conservation of *C. auratus*."

This species is already listed as prohibited for live specimens in Vermont (Vermont Fish and Wildlife Regulations 2011).

4 Global Distribution

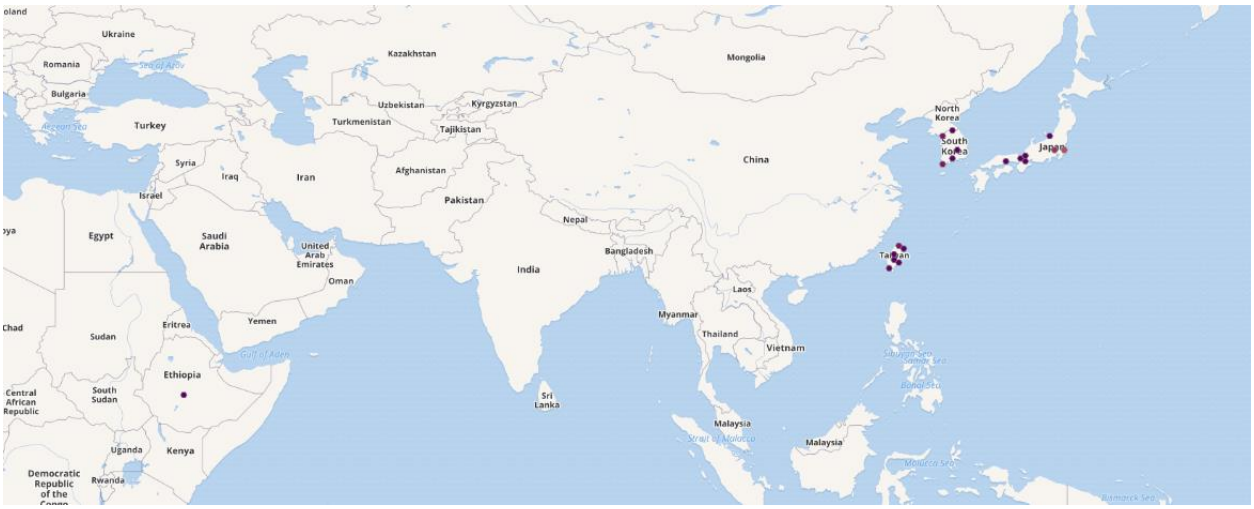

Figure 1. Known global distribution of *Carassius cuvieri*. Locations are in South Korea, Taiwan, Japan, and Ethiopia. Map from GBIF Secretariat (2018).

5 Distribution Within the United States

There were no records found of *Carassius cuvieri* in the wild in the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Carassius cuvieri* was high along the southern Atlantic Coast, much of Florida, the southern Appalachian Mountains, and a band of area from New Jersey in the east to Ohio, and then to northeast Texas. There were also small pockets of high match along the middle Pacific Coast. Most of the west had a low climate match along with the interior of the south and New England. Everywhere else had a medium match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for the contiguous United States was 0.107, high (scores 0.103 and greater are classified as high). The following states had high individual climate scores: Florida, Georgia, Illinois, Indiana, Kansas, Maryland, Missouri, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Virginia, and West Virginia.

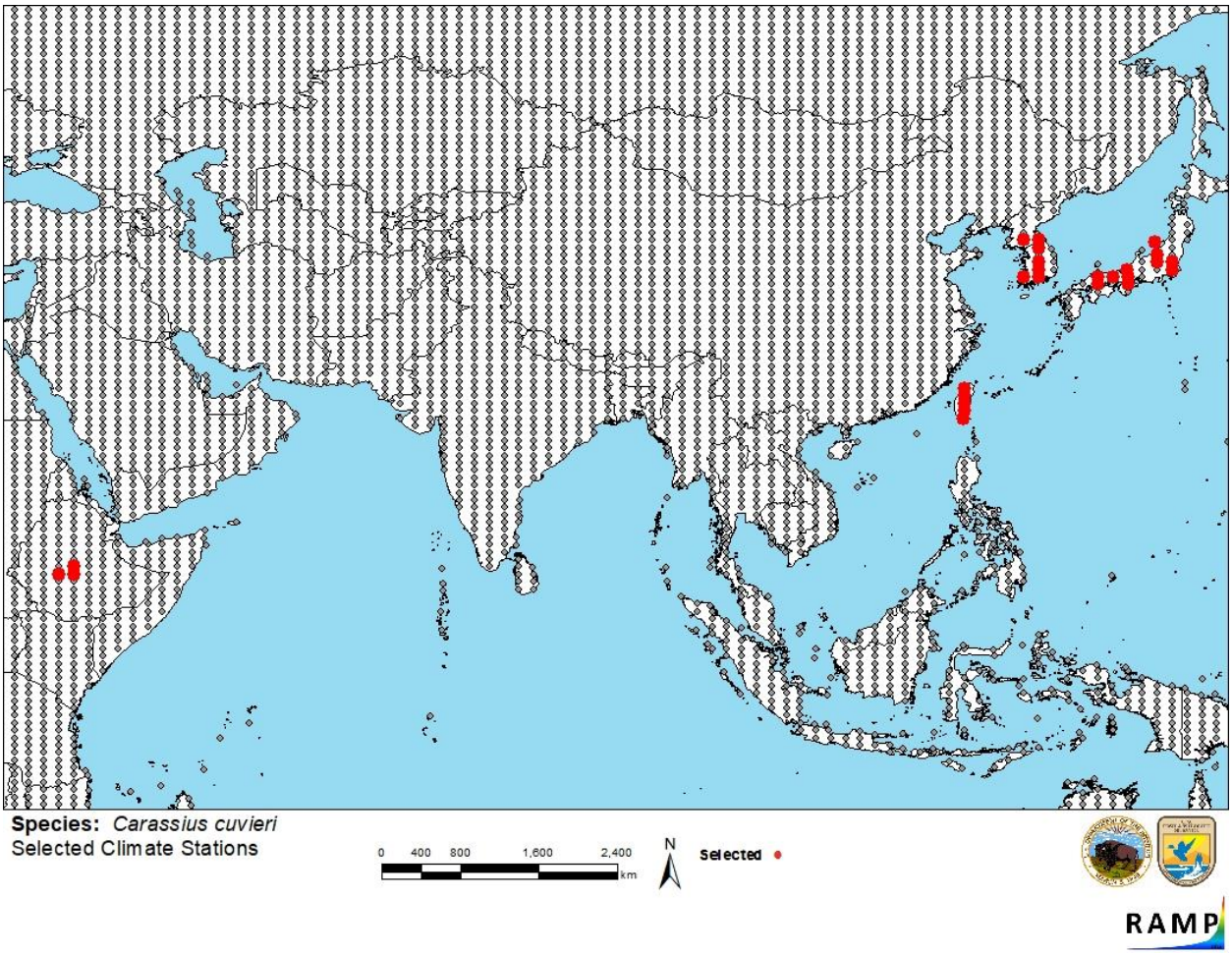

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations in eastern Africa and Asia selected as source locations (red; Ethiopia, Taiwan, Japan, South Korea) and non-source locations (gray) for *Carassius cuvieri* climate matching. Source locations from GBIF Secretariat (2018). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

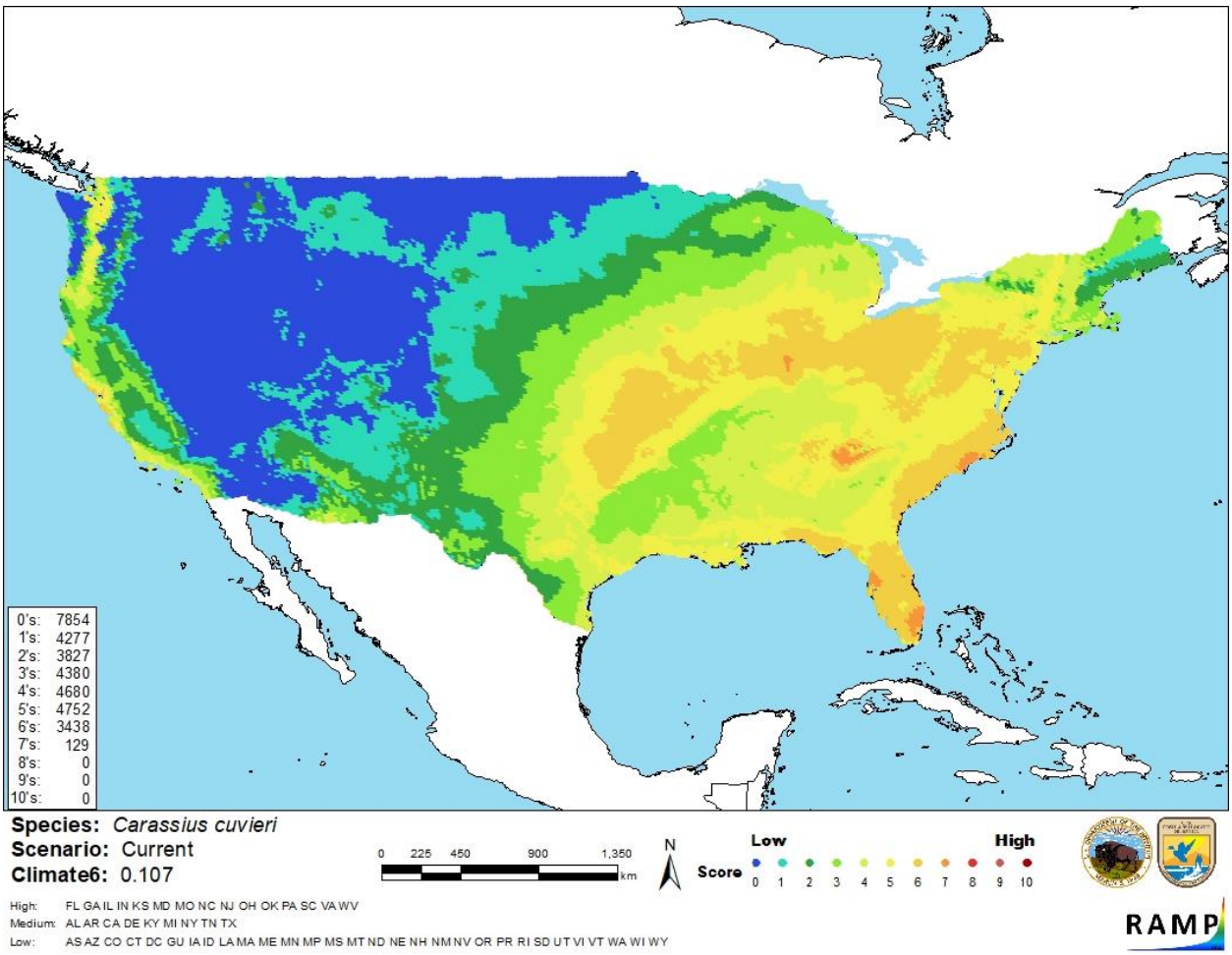

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *Carassius cuvieri* in the contiguous United States based on source locations reported by GBIF Secretariat (2018). Counts of climate match scores are tabulated on the left. 0 = Lowest match, 10 = Highest match.

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

The certainty of assessment for *Carassius cuvieri* is medium. There is information about the biology and ecology of the species. The global distribution seems to be well documented. Records of introductions were found. Some information on impacts of introduction was available it came from a research poster conveying presumably scientifically defensible work but there was no indication where the poster was presented and no paper could be found on the same piece of research.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Japanese White Crucian Carp (*Carassius cuvieri*) are native to Lake Biwa in Japan. *C. cuvieri* has been introduced deliberately and unintentionally outside of its native range in Japan, China, Korea, and Ethiopia. Established wild populations have resulted from these introductions. It is used as a food fish and sport fish in both the native range and the introduced range. *C. cuvieri* can be an intermediate host for *Clinostomum complanatum* which then infect humans. The history of invasiveness is None Documented. There is some information on impacts of introductions but the information is not conclusive. It was introduced into Korean freshwaters and may have resulted in a reduction of the native goldfish, *Carassius auratus*. The climate match is high. Areas of high match area spread out across the east of the contiguous United States and in small areas along the Pacific Coast. The certainty of assessment is medium. The information on impacts of introduction is not of a high enough quality or quantity for the certainty to be classified as high. The overall risk assessment is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information:** Epizootic ulcerative syndrome is an OIE-reportable disease; host of *Clinostomum complanatum*, a causative agent of human disease.
- **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.

Abdissa, B., and A. Yalew. 2011. Freshwater fishes of the Amhara Region, Ethiopia. Pages 136-163 *in* B. Lemma and A. Getahun, editors. Impacts of climate change and population on tropical aquatic resources. Proceedings of the Third International Conference of the Ethiopian Fisheries and Aquatic Sciences Association. AAU Printing Press, Addis Ababa, Ethiopia.

CABI. 2018. *Carassius cuvieri* (Japanese crucian carp) [original text by R. Britton]. *In* Invasive Species Compendium. CAB International, Wallingford, U.K. Available: https://www.cabi.org/ISC/datasheet/90565. (December 2018).

FAO (Fisheries and Agriculture Organization of the United Nations). 2018. Database on introductions of aquatic species. FAO, Rome. Available: http://www.fao.org/fishery/introsp/search/en. (December 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. (December 2018).

Froese, R., and D. Pauly, editors. 2018. *Carassius cuvieri* Temminck and Schlegel, 1846. FishBase. Available: https://www.fishbase.de/summary/Carassius-cuvieri.html. (December 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Carassius cuvieri* Temminck and Schlegel, 1846. Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/2366641. (December 2018).

ITIS (Integrated Taxonomic Information System). 2018. *Carassius cuvieri* Temminck and Schlegel, 1846. Integrated Taxonomic Information System, Reston, Virginia. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=688849#null. (December 2018).

Kim, J. M., and S. W. Kim. 2009. Conservation of *Carassius auratus* against hybridization with *Carassius cuvieri* in Korea. National Institute of Environmental Research, Division of Ecosystem Assessment, research poster, Incheon, Republic of Korea.

Kwon, M. G., J.-Y. Lee, S. Park, T. Iida, I. Hirono, and T. Aoki. 1997. RAPD analysis of atypical *Aeromonas salmonicida* isolated in Japan. Fish Pathology 32(2):109–115.

NIES (National Institute for Environmental Studies). 2018. *Carassius cuvieri*. *In* Invasive species of Japan. National Research and Development Agency, National Institute for Environmental Studies, Tsukuba, Japan. Available: http://www.nies.go.jp/biodiversity/invasive/DB/detail/50540e.html. (December 2018).

Ogawa, K. 2011. Significant and emerging parasitic diseases of finfish. Pages 3–12 *in* M. G. Bondad-Reantaso, J. B. Jones, F Corsin, and T. Aoki, editors. Diseases in Asian aquaculture VII. Asian Fisheries Society, Selangor, Malaysia.

OIE (World Organisation for Animal Health). 2019. OIE-listed diseases, infections and infestations in force in 2019. Available: http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2019/. (July 2019).

Sanders, S., C. Castiglione, and M. Hoff. 2018. Risk assessment mapping program: RAMP, version 3.1. U.S. Fish and Wildlife Service.

Vermont Fish and Wildlife Regulations. 2011. Rule establishing a list for prohibited, restricted and unrestricted fish species, 10 V.S.A. App. § 121.

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.

Aohagi, Y., T. Shibahara, N. Machida, Y. Yamaga, and K. Kagota. 1992. *Clinostomum complanatum* (Trematoda: Clinostomatidae) in five new fish hosts in Japan. Journal of Wildlife Diseases 28(3):467–469.

Chen, I., and L. Fang. 1999. The freshwater and estuarine fishes of Taiwan. National Museum of Marine Biology and Aquarium, Pingtung, China.

Fisheries Management Division of the Shiga Prefecture Agriculture and Fisheries Department. 2007. Shiga's fisheries (Fiscal Year 2007). Pages 77–79 *in* Shiga no Suisan (Heisei 19 Nendo).

Jang, M. H., J. G. Kim, S. B. Park, K. S. Jeong, G. I. Cho, and G. J. Joo. 2002. The current status of the distribution of introduced fish in large river systems of South Korea. International Review of Hydrobiology 87(2-3):319–328.

Shao, K. T., and P. L. Lim. 1991. Fishes of freshwater and estuary. Encyclopedia of field guide in Taiwan, volume 31. Recreation Press, Taipei, Taiwan. (In Chinese.)

Shen, S. C., editor. 1993. Fishes of Taiwan. National Taiwan University, Department of Zoology, Taipei.

Walker, K. F., and H. Z. Yang. 1999. Fish and fisheries in western China. FAO Fisheries Technical Paper 385:237–278.

Wildlife Survey Group in Shiga Prefecture, editor. 2005. Red data book of Shiga Prefecture. Sunrise Press, Shiga, Japan.

Yamamoto, T., Y. Kohmatsu, and M. Yuma. 2006. Effects of summer drawdown on cyprinid fish larvae in Lake Biwa, Japan. Limnology 7:75–82.