

Leopard Mandarin Fish (*Siniperca scherzeri*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2022
Revised, April 2022
Web Version, 4/14/2023

Organism Type: Fish

Overall Risk Assessment Category: Uncertain



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1 Native Range and Status in the United States

Native Range

From Huckstorf (2012):

“*Siniperca scherzeri* has an East Asia distribution. Its distribution area ranges most Pacific river drainages from the Korean Peninsula in the North to northern Vietnam in the south (Gao 1991, Kim 1997, Bang 2001, Kottelat 2001).”

From Zhang et al. (2009):

“Spotted mandarin fish *Siniperca scherzeri* Steindachner is a Sinipercinae native to East Asia, mainly distributed in China, Korea and Vietnam (Zhou et al., 1988; Li, 1991).”

Status in the United States

No records of *Siniperca scherzeri* in the wild in the United States were found. Although individuals were not in stock during this assessment, *S. scherzeri* may be for sale in the United States (e.g., Predatory Fins 2022).

From Alabama DCNR (2019):

“No person, firm, corporation, partnership, or association shall possess, sell, offer for sale, import, bring, release, or cause to be brought or imported into the State of Alabama any of the following live fish or animals: [...] Any species of Chinese perch (*Siniperca* spp.);”

Means of Introductions in the United States

No records of *Siniperca scherzeri* in the wild in the United States were found.

Remarks

According to Froese and Pauly (2022), *Siniperca scherzeri* is known by the common names Golden Mandarin Fish and Leopard Mandarin Fish. Zhang et al. (2009) use the common name Spotted Mandarin Fish.

Additional information for *Siniperca scherzeri* was found during this assessment in languages other than English.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to Fricke et al (2022), *Siniperca scherzeri* Steindachner 1892 is the current valid name for this species.

From ITIS (2022):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii

Order Perciformes
Suborder Percoidei
Family Percichthyidae
Genus *Siniperca*
Species *Siniperca scherzeri* Steindachner 1892

Size, Weight, and Age Range

From Froese and Pauly (2022):

“Max length : 37.4 cm TL [total length] male/unsexed; [Lee et al. 2015] common length : 16.9 cm SL male/unsexed; [Nichols 1943]; max. published weight: 607.30 g [Shao et al. 2016]”

Environment

From Froese and Pauly (2022):

“Freshwater; brackish; benthopelagic”

Climate

From Froese and Pauly (2022):

“Temperate”

Distribution Outside the United States

Native

From Huckstorf (2012):

“*Siniperca scherzeri* has an East Asia distribution. Its distribution area ranges most Pacific river drainages from the Korean Peninsula in the North to northern Vietnam in the south (Gao 1991, Kim 1997, Bang 2001, Kottelat 2001).”

From Zhang et al (2009):

“Spotted mandarin fish *Siniperca scherzeri* Steindachner is a Sinipercinae native to East Asia, mainly distributed in China, Korea and Vietnam (Zhou et al., 1988; Li, 1991).”

Introduced

No records of introductions were found for *Siniperca scherzeri*.

Means of Introduction Outside the United States

No records of introductions were found for *Siniperca scherzeri*.

Short Description

From Froese and Pauly (2022):

“Body long; circular backside, not very ridgy. Big mouth, lower jaw protruding. Rounded dark spots on the head, operculum and body sides [Zhang et al. 2009].”

From He et al (2020):

“[...] have only 4–9 gill rakers, fewer than other fishes [...].”

Biology

From He et al (2020):

“Mandarin fishes feed solely on live fry of other fish [...].”

From Huckstorf (2012):

“Inhabits fresh and brackish waters. Its prey is small fishes, shrimp and aquatic insects.”

Human Uses

From Zang et al (2009):

“It is a valuable commercial fish consumed all year round in Korea and China and there is an increasing demand due to its good taste and high medical value”

From Yang et al (2012):

“Recently, the population of *S. scherzeri* has diminished due to over-fishing and greater anthropogenic interference in their habitat (Liang 1996) which might lead to the degeneration of the genetic resources of the wild population.”

From Luo et al. (2015):

“Because of its widespread, fast growth, and enjoyable taste, *S. scherzeri* has become an important economic aquaculture species in many East Asia countries. In China, *S. scherzeri* artificial breeding technology has advanced in recent years (Luo et al., 2014). Selective breeding programs are also underway, which has promoted the development of golden mandarin fish in the aquaculture industry.”

From Huckstorf (2012):

“It used as food in some subsistence fisheries and also as an ornamental fish.”

Diseases

No information was found associating *Siniperca scherzeri* with any diseases listed by the World Organisation of Animal Health (OIE 2021).

From Kim et al. (2018):

“An outbreak of a *Megalocytivirus* infection was found in the golden mandarin fish *Siniperca scherzeri* during September and October 2016, in Korea. Phylogeny and genetic diversity based on the major capsid protein (MCP) and adenosine triphosphatase (ATPase) genes showed a new strain. Designated as GMIV [golden mandarin fish iridovirus], this strain derived from the golden mandarin fish was suggested to belong to the red sea bream iridovirus (RSIV)-subgroup I.”

According to Poelen et al. (2014), *Siniperca scherzeri* is a host of golden mandarin fish iridovirus and the following parasites: *Ancyrocephalus mogurndae*, *Dollfustrema hefeiensis*, *Dollfustrema vaneyi*, *Exorchis equistoma*, *Exorchis petalovaris*, *Hexaspiroon spinibarbi*, *Paralecithochirium leptobotiae*, and *Proisorhynchus sinipercae*.

Threat to Humans

No information on threats to humans was found for *Siniperca scherzeri*.

3 Impacts of Introductions

No records of introductions were found for *Siniperca scherzeri*; therefore, there is no information on impacts of introduction.

From NIES (2022):

“Import, transport and keeping are prohibited by the Invasive Alien Species Act [Japan]”

The importation, possession, or trade of *S. scherzeri* is prohibited in Alabama (Alabama DCNR 2019; see Section 1 for detailed information).

4 History of Invasiveness

Siniperca scherzeri is in trade within the United States as an ornamental fish. Possession of this species is prohibited in Alabama. However, no information was found quantifying the number individuals traded, nor any records of introductions. Thus, the history of invasiveness is classified as No Known Nonnative Population.

5 Global Distribution

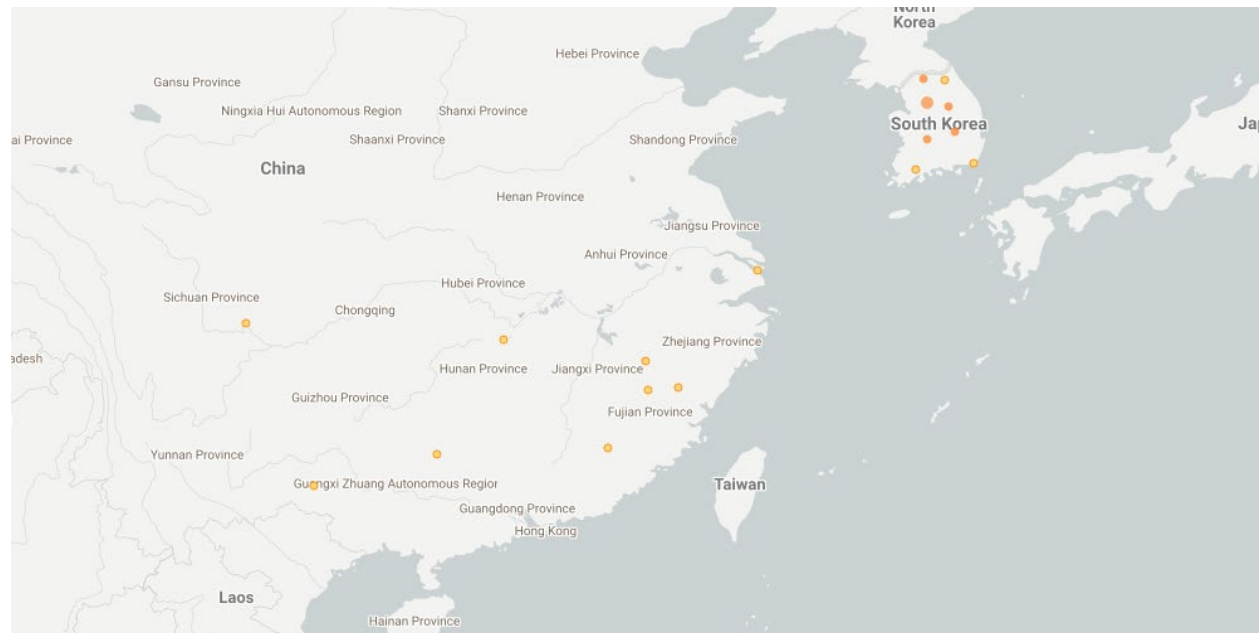


Figure 1. Known global distribution of *Siniperca scherzeri*. Observations are reported from South Korea and eastern mainland China. Map from GBIF Secretariat (2022). Georeferenced points were not available for the species' range in Vietnam.

6 Distribution Within the United States

No records of *Siniperca scherzeri* in the wild in the United States were found.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Siniperca scherzeri* was high along the mid and southern Atlantic Coast from Virginia to Florida, and in a small, isolated portion of the interior contiguous United States from eastern Oklahoma to southwestern Missouri. Medium matches were found throughout much of the interior portion of the United States including Midwest, Southeast, and Mid-Atlantic regions. The climate match was low in the Northeast, northern Midwest, and generally in the Rocky Mountains and west. The Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous U.S. was 0.093, Medium (scores between 0.005 and 0.103, exclusive, are classified as Medium). The following States had High individual climate scores: Florida, Georgia, Kansas, Maryland, Missouri, North Carolina, Oklahoma, South Carolina, and Virginia. Alabama, Arkansas, Delaware, Iowa, Illinois, Kentucky, Louisiana, Mississippi, Tennessee, Texas, and West Virginia had Medium individual scores. All other States had Low individual scores.

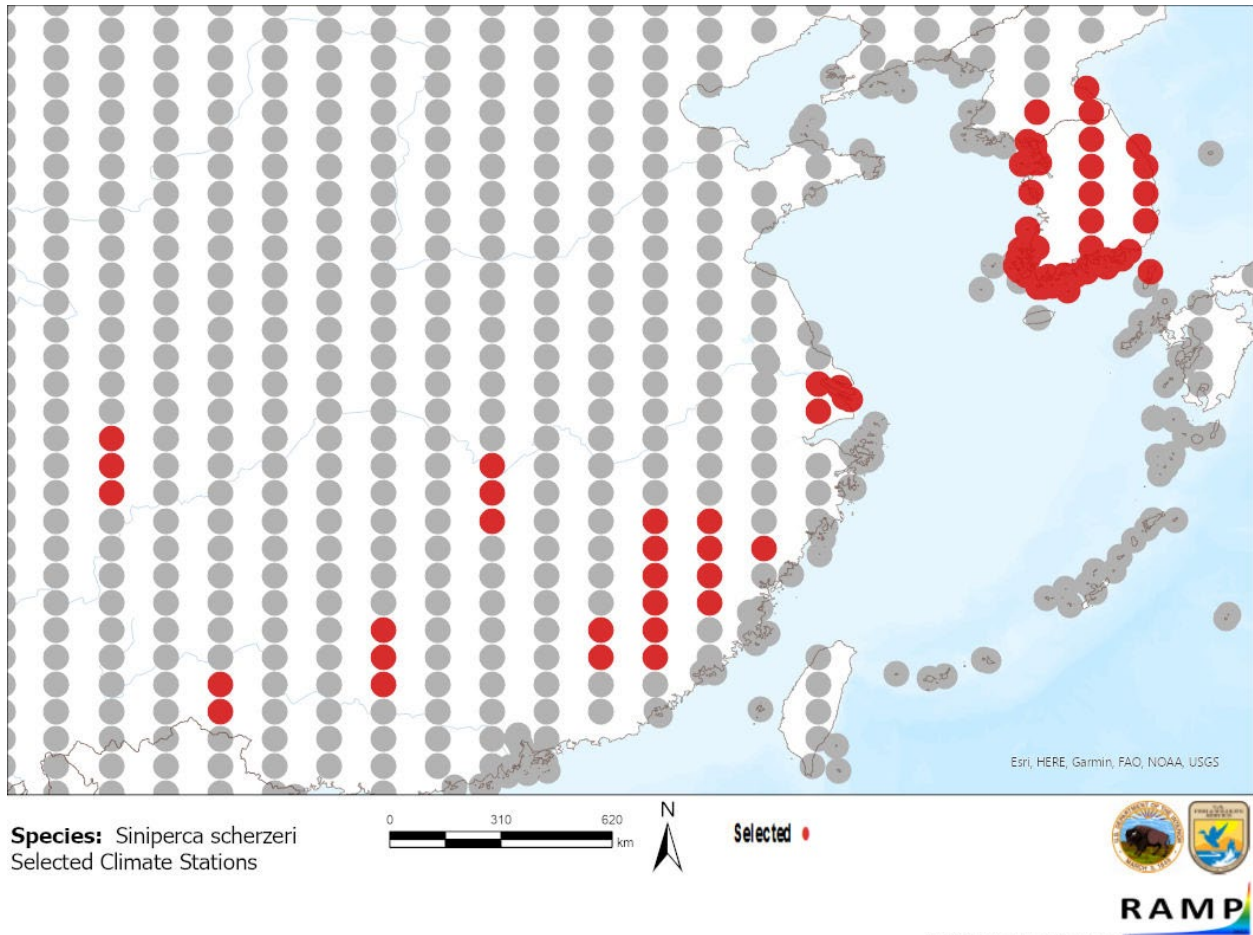


Figure 2. RAMP (Sanders et al. 2021) source map showing weather stations in eastern Asia selected as source locations (red; South Korea, North Korea, China) and non-source locations (gray) for *Siniperca scherzeri* climate matching. Source locations from GBIF Secretariat (2022). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

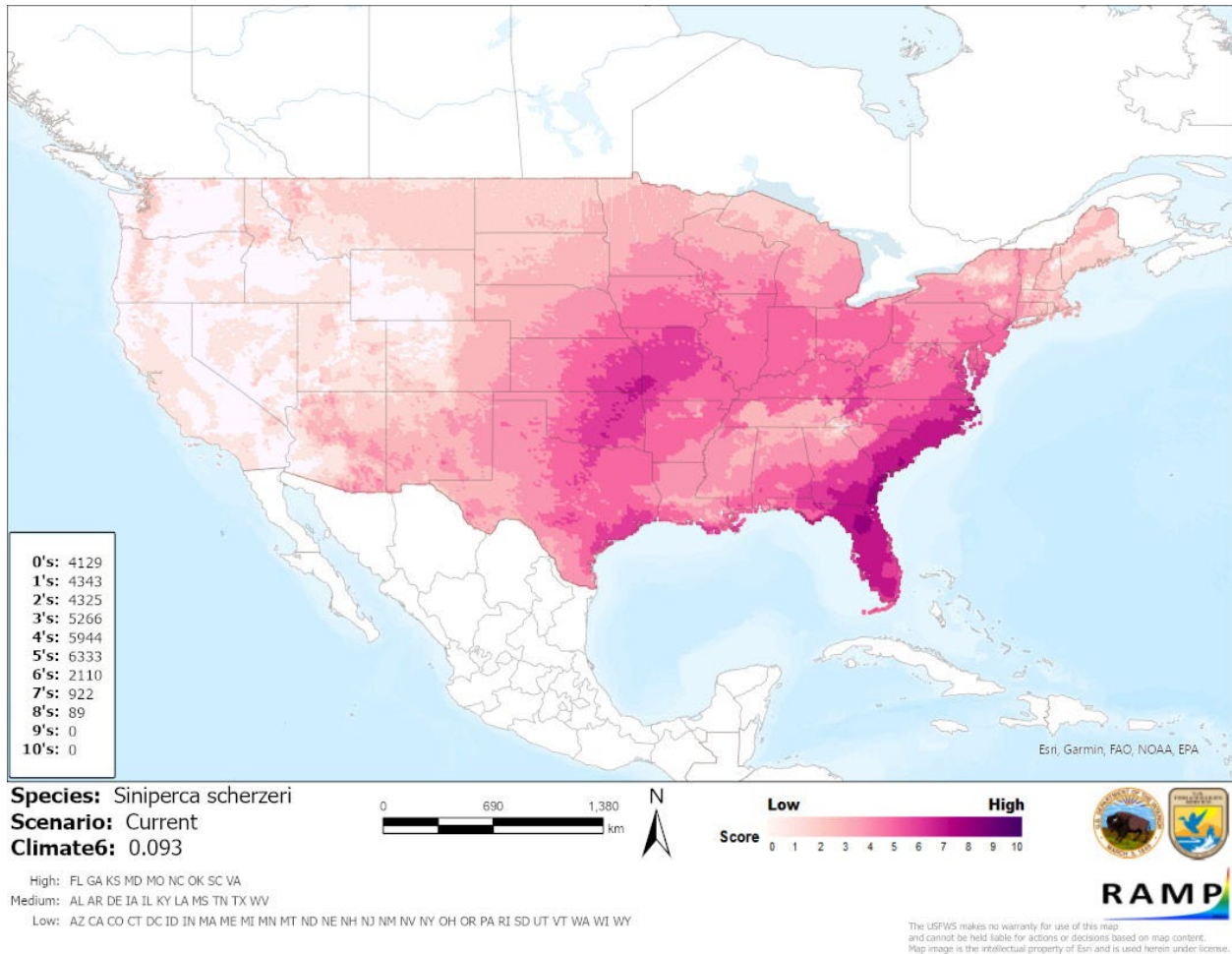


Figure 3. Map of RAMP (Sanders et al. 2021) climate matches for *Siniperca scherzeri* in the contiguous United States based on source locations reported by GBIF Secretariat (2022). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

The certainty of assessment for *Siniperca scherzeri* is Low. Biological and ecological information for this species was available. Information on the species' presence in the aquarium and aquaculture industries was found but without information specifying the volume or duration of trade. No records of introduction were found, thus impacts of introduction are unknown.

9 Risk Assessment

Summary of Risk to the Contiguous United States

The Leopard Mandarin Fish (*Siniperca scherzeri*) is a freshwater fish native to much of eastern Asia. This species is a popular game fish in its native range and is used in aquaculture both for food and the aquarium trade. It is in trade within the United States, although possession is regulated in Alabama. However, there are no records quantifying the number individuals traded. The species is also prohibited in Japan. No records of introductions were found, resulting in a history of invasiveness classification of No Known Nonnative Population. The overall climate match for the contiguous United States was Medium with high matches found mainly along the southern Atlantic Coast. The certainty of assessment is Low due to a lack of information regarding the history of invasiveness. The overall risk posed by *S. scherzeri* to the contiguous United States is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population**
- **Overall Climate Match Category (Sec. 7): Medium**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information: None**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

Alabama [DCNR] Department of Conservation and Natural Resources. 2019. Restrictions on possession, sale, importation and/or release of certain animals and fish. Alabama Department of Conservation and Natural Resources Administrative Code, Chapter 220-2-.26.

Fricke R, Eschmeyer WN, van der Laan R, editors. 2022. Catalog of fishes: genera, species, references. California Academy of Science. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (January 2022).

Froese R, Pauly D, editors. 2022. *Siniperca scherzeri* Steindachner, 1892. FishBase. Available <https://www.fishbase.de/summary/55171> (January 2022).

GBIF Secretariat. 2022. GBIF backbone taxonomy: *Siniperca scherzeri* Steindachner, 1892. Copenhagen: Global Biodiversity Information Facility. Available: <https://www.gbif.org/species/2380457> (April 2022).

- He S, Li L, Lv LY, Cai WJ, Dou YQ, Li J, Tang SJ, Chen X, Zhang Z, Xu J, Zhang YP, Yin Z, Wuertz S, Tao YX, Kuhl H, Liang XF. 2020. Mandarin fish (*Siniperca*) genomes provide insights into innate predatory feeding. *Communications Biology* 3:361.
- Huckstorf V. 2012. *Siniperca scherzeri*. The IUCN Red List of Threatened Species 2012: e.T166159A1116001. Available: <https://www.iucnredlist.org/species/166159/1116001> (January 2022).
- [ITIS] Integrated Taxonomic Information System. 2022. *Siniperca scherzeri* Steindachner, 1892. Reston, Virginia: Integrated Taxonomic Information System. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=641913#null (April 2022).
- Kim KI, Hwang SD, Cho MY, Jung SH, Kim YC, Jeong HD. 2018. A natural infection by the red sea bream iridovirus-type *Megalocytivirus* in the golden mandarin fish *Siniperca scherzeri*. *Journal of Fish Diseases* 41:1229–1233.
- Luo XN, Yang M, Liang XF, Jin K, Lv LY, Tian CX, Yuan YC, Sun J. 2015. Genetic diversity and genetic structure of consecutive breeding generations of golden mandarin fish (*Siniperca scherzeri* Steindachner) using microsatellite markers. *Genetics and Molecular Research* 14:11348–11355.
- [NIES] National Institute for Environmental Studies. 2022. *Siniperca scherzeri*. Invasive species of Japan. Tsukuba, Japan: National Research and Development Agency, National Institute for Environmental Studies. Available: <https://www.nies.go.jp/biodiversity/invasive/DB/detail/51020e.html> (April 2022).
- [OIE] World Organisation for Animal Health. 2021. Animal diseases. Available: <https://www.oie.int/en/what-we-do/animal-health-and-welfare/animal-diseases/> (January 2022).
- Poelen JH, Simons JD, Mungall CJ. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. *Ecological Informatics* 24:148–159.
- Predatory Fins. 2022. Leopard Mandarin perch (*Siniperca scherzeri*). Available: <https://www.predatoryfins.com/products/leopard-mandarin-perch-siniperca-scherzeri> (January 2022).
- Sanders S, Castiglione C, Hoff M. 2021. Risk Assessment Mapping Program: RAMP. Version 4.0. U.S. Fish and Wildlife Service.
- Yang M, Liang XF, Tian CX, Gul Y, Dou YQ, Cao L, Yu R. 2012. Isolation and characterization of fifteen novel microsatellite loci in golden mandarin fish (*Siniperca scherzeri*) Steindachne. *Conservation of Genetics Resources* 4:599–601.

Zhang H, Fan W, Zhang J. 2009. A new fish record in the Yangtze estuary: slender Mandarin fish *Siniperca roulei*. *Zoological Research* 30:109–112.

11 Literature Cited in Quoted Material

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.

Bang IC, Nam YK, Hwan NC. 2001. Cytogenetic analysis of three centropomid species in Korea. *Journal of Korean Fish* 34:17–20.

Gao G. 1991. Serranidae. Pages 363–371 in Pan J-H, Zhong L, Zheng C-Y, Wu HL, Liu JH, editors. *The freshwater fishes of Guangdong Province*. Guangzhou, China: Guangdong Science and Technology Press.

Kim IS. 1997. *Illustrated encyclopedia of fauna and flora of Korea*. Sejong City, South Korea: Ministry of Education.

Kottelat M. 2001. *Freshwater fishes of northern Vietnam. A preliminary check-list of the fishes known or expected to occur in northern Vietnam with comments on systematics and nomenclature*. Washington DC: The World Bank.

Lee J-W, Yoon J-D, Kim J-H, Park S-H, Baek S-H, Yu J-J, Jang M-H, Min J-I. 2015. Length-weight relationships for 18 freshwater fish species from the Nakdong River in South Korea. *Journal of Applied Ichthyology* 31:576–577.

Li SZ. 1991. Geographic distribution of the Sinipercinae fishes. *Zoological Research* 26:40–44. (In Chinese with English abstract.)

Liang XF. 1996. Study on mandarin fish and its culture home and abroad. *Fisheries Science and Technology Information* 23:13–17. (In Chinese.)

Luo XN, Liang XF, Zhou Yi, Yuan YC. 2014. A review of research progress of aquaculture biology in spotted Mandarin fish *Siniperca scherzeri*. *Fisheries Science* 33:56–62.

Nichols JT. 1943. *The freshwater fishes of China. Natural history of Central Asia: Volume IX*. New York: The American Museum of Natural History.

Shao J, Li JY, Zhang H, Lin DQ, Xie X, Wu JM, Wei QW. 2016. Length-weight and length-length relationships of four endemic fish species from the middle reaches of the Yangtze River basin, China. *Journal of Applied Ichthyology* 32:1329–1330.

Zhou CW, Yang Q, Cai DL. 1988. On the classification and distribution of the Sinipercinae fishes (Family Serranidae). *Zoological Research* 9:113–26. (In Chinese.)