Pearl Gourami (*Trichopodus leerii*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, February 2011
Revised, November 2018
Web Version, 9/11/2019

Photo: Frank M. Greco. Licensed under Creative Commons BY. Available: http://www.fishbase.org/photos/UploadedBy.php?autoctr=12418&win=uploaded. (November 13, 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018a):

"Asia: Malay Peninsula [Malaysia], Thailand and Indonesia (Sumatra and Borneo)."

"[In Thailand:] Known from Bangkok and Prachuap Khiri Khan [Monkolprasit et al. 1997]."

From Vidthayanon (2012):

"The species has been recorded from central Thailand (the lower Chao Phraya drainage around Bangkok; Bleeker 1865, Hora 1923, Smith 1945), however there are no recent records of the species from this area, and populations in central Thailand may have been extirpated (C. Vidthayanon pers. comm. 2012)."

Status in the United States

According to Nico (2018), *Trichopodus leerii* was introduced in Florida in 1974 and in Hawaii in 1940.

From Nico (2018):

"Failed in both Florida and Hawaii."

T. leerii is in trade in the United States.

From Arizona Aquatic Gardens (2018):

"Pearl Gourami Fish [*Trichopodus leerii*, listed as *Trichogaster leerii*] […] $7.88"

Means of Introductions in the United States

From Nico (2018):

"In Florida, probable release or escape from fish farm (Courtenay et al. 1974). Hawaii record based on failed introduction of unknown number of fish released on island of Oahu from Asia in 1940 (Maciolek 1984)."

Remarks

Information searches were conducted using the valid name *Trichopodus leerii* and the synonym *Trichogaster leerii*.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From Fricke et al. (2018):

"**Current Status:** Valid as *Trichopodus leerii* (Bleeker 1852)."

From Froese and Pauly (2018b):

"Animalia (Kingdom) > Chordata (Phylum) > Vertebrata (Subphylum) > Gnathostomata (Superclass) > […] Actinopterygii (Class) > Perciformes (Order) > Anabantoidei (Suborder) > Osphronemidae (Family) > Luciocephalinae (Subfamily) >*Trichopodus* (Genus) > *Trichopodus leerii* (Species)"

Size, Weight, and Age Range

From Froese and Pauly (2018a):

"Max length : 12.0 cm TL male/unsexed; [Kottelat et al. 1993]"

Environment

From Froese and Pauly (2018a):

"Freshwater; benthopelagic; pH range: 6.0 - 8.0; dH range: 5 - 19. […]; 24°C - 28°C [assumed to be recommended aquarium temperature] [Riehl and Baensch 1991]"

"Found in lowland swamps with acidic water [Vidthayanon 2002]."

From Ortega et al. (2007):

"[…], *Trichogaster leerii* has adapted to the small, blackwater, almost polluted Moronacocha Lagoon in the Amazonian plain [in Peru]."

Climate/Range

From Froese and Pauly (2018a):

"Tropical; […]"

Distribution Outside the United States

Native

From Froese and Pauly (2018a):

"Asia: Malay Peninsula [Malaysia], Thailand and Indonesia (Sumatra and Borneo)."

"[In Thailand:] Known from Bangkok and Prachuap Khiri Khan [Monkolprasit et al. 1997]."

From Vidthayanon (2012):

"The species has been recorded from central Thailand (the lower Chao Phraya drainage around Bangkok; Bleeker 1865, Hora 1923, Smith 1945), however there are no recent records of the species from this area, and populations in central Thailand may have been extirpated (C. Vidthayanon pers. comm. 2012)."

Introduced

From Froese and Pauly (2018a):

"Reported [as introduced] from Lake Mainit [Philippines] [Mercene 1997]."

"[In Taiwan:] Species recorded in the wild, also available in pet stores in the country [Liang et al. 2006]."

Froese and Pauly (2018a) list *Trichopodus leerii* as established in Taiwan.

FAO (2018) reports that *Trichopodus leerii* (under the name *Trichogaster leerii*) is established through natural reproduction in the Philippines and in Colombia.

Ishikawa and Tachihara (2014) list an introduction of *T. leerii* to Okinawa-jima Island, Japan, between 1981 and 1990. This did not result in an established population.

From Ortega et al. (2007):

"This species was introduced from its native southeastern Asian still-water habitat into Lima and Iquitos [Peru] (Department of Loreto) during the 1970s for the aquarium trade. However, there is already a population adapted to the polluted waters of the Moronacocha Lagoon in Iquitos (Department of Loreto; 0340' S, 7315' W)."

Means of Introduction Outside the United States

FAO (2018) lists the means of introduction to the Philippines as aquaculture and to Colombia as ornamental trade.

From Ortega et al. (2007):

"This species was introduced […] into Lima and Iquitos [Peru] (Department of Loreto) during the 1970s for the aquarium trade."

Short Description

From Paepke (2009):

"*Trichopodus leerii* (BLEEKER, 1852) only has the black longitudinal band which can develop into a black spot on the caudal peduncle. Instead of the oblique bars, this species possesses a mosaic of light silvery spots which are dark-outlined and stretch over the whole body, the dorsal fin, anal fin and caudal fin. In the males, each ray in the posterior part of the anal fin terminating in a short silvery filament; breast, ventral fins and the front part of the anal fin are of a strong brick-red […]."

Biology

From Froese and Pauly (2018a):

"Occurs in swamps and streams, usually among dense vegetation [Kottelat and Widjanarti 2005]."

"Male guards the bubble nest."

Human Uses

From Vidthayanon (2012):

"The species is popular in the aquarium trade, although it is thought that a significant proportion of the stock in trade is from captive-bred sources as wild specimens are very sensitive to transport, and therefore expensive."

From Froese and Pauly (2018a):

"Reared in captivity [in Thailand] for the ornamental fish trade [Ukkatawewat 2005]."

From Ng and Tan (1997):

"Category I are the so-called `bread-and-butter' species, those which are very popular in the trade and are caught and exported in large numbers. Examples of wild-caught bread-and-butter species from Southeast Asia are the clown loach (*Botia macracanthus*), eel-loaches (*Pangio* spp.), chocolate gourami (*Sphaerichthys osphromenoides*), pearl gourami (*Trichogaster leerii*), […]"

According to Sule et al. (2016), *Trichopodus leerii* is also used as a food fish in Malaysia.

T. leerii is in trade in the United States.
From Arizona Aquatic Gardens (2018):

"Pearl Gourami Fish [*Trichopodus leerii*, listed as *Trichogaster leerii*] […] $7.88"

From Ortega et al. (2007):

"Several introduced species have served as the bases for economical enterprises. *Trichogaster leerii*, which has established in the almost polluted Moronacocha Lagoon [Iquitos, Peru], was incorporated into the ornamental aquarium-fish trade in Iquitos […]"

Diseases

No records of OIE reportable diseases (OIE 2019) were found for *Trichopodus leerii*.

From Froese and Pauly (2018a):

"Fin-rot Disease (late stage), Bacterial diseases
Costia Disease, Parasitic infestations (protozoa, worms, etc.)
Dactylogyrus Gill Flukes Disease, Parasitic infestations (protozoa, worms, etc.)
Fin Rot (early stage), Bacterial diseases
Skin Fungi (*Saprolegnia* sp.), Fungal diseases
Bacterial Infections (general), Bacterial diseases
Cauliflower Disease, Viral diseases
Ichthyobodo Infection, Parasitic infestations (protozoa, worms, etc.)
Hidden Viral Infection, Viral diseases
Fish tuberculosis (FishMB), Bacterial diseases
Viral Diseases (general), Viral diseases"

Poelen et al. (2014) lists infectious spleen kidney necrosis virus (also known as dwarf gourami iridovirus) and *Trianchoratus leerium* as diseases of *Trichopodus leerii*.

Yanong and Waltzek (2010) list *T. leerii* as susceptible to megalocytivirus.

Broutin et al. (2012) list *T. leerii* as a host for *Mycobacterium marinum*.

From Jeong et al. (2008):

"Clinical ISKNV [infectious spleen and kidney necrosis virus] infection occurred naturally in 3 species, pearl [*Trichopodus leerii*], dwarf and silver gourami, […]"

Threat to Humans

From Froese and Pauly (2018a):

"Harmless"

3 Impacts of Introductions

From Nico (2018):

"The impacts of this species are currently unknown, as no studies have been done to determine how it has affected ecosystems in the invaded range. The absence of data does not equate to lack of effects. It does, however, mean that research is required to evaluate effects before conclusions can be made."

From Ortega et al. (2007):

"Several introduced species have served as the bases for economical enterprises. *Trichogaster leerii*, which has established in the almost polluted Moronacocha Lagoon [Iquitos, Peru], was incorporated into the ornamental aquarium-fish trade in Iquitos […]"

4 Global Distribution

Figure 1. Known global distribution of *Trichopodus leerii*. Locations are in Malaysia and Indonesia (islands of Sumatra and Borneo) Map from GBIF Secretariat (2018).

GBIF Secretariat (2018) also displayed a location in Vancouver, Canada. This observation was not used as a source point for the climate match. There are no other records that indicate any collection of this species in Canada and the record information indicates that coordinates were assigned by software and not the collector of the specimen. This location was not included in Figure 1 since it was far from the other known locations and its inclusion would reduce the resolution at which those locations could be shown.

The location of an established wild population in Peru is given in Ortega et al. (2007) and the location of Lake Mainit in the Philippines (Forese and Pauly 2018a) was used to select source points for the climate match.

T. leerii is established in Taiwan (Froese and Pauly 2018a) and Colombia (FAO 2018) but no georeferenced observations were available from those locations to use as source points in the climate match.

5 Distribution Within the United States

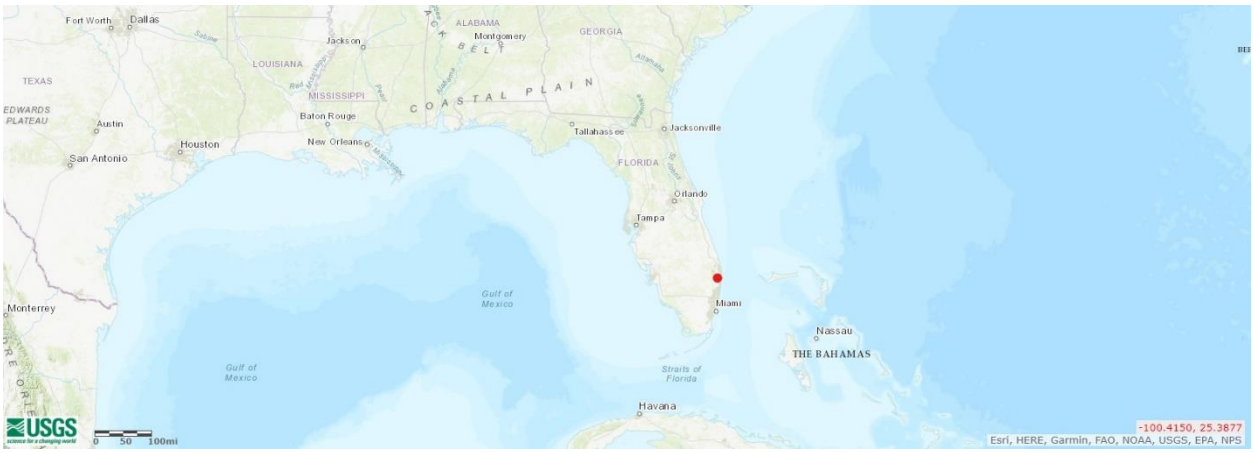

Figure 2. Location of the *Trichopodus leerii* introduction in Florida. Map from Nico (2018).

Figure 3. Location of the *Trichopodus leerii* introduction in Hawaii. Location is on the island of Oahu. Map from Nico (2018).

The locations in Figures 2 and 3 do not represent established wild populations (Nico 2018) and were not used to select source points for the climate match.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Trichopodus leerii* was low across the entire contiguous United States. There were no areas of high or medium match. The Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) for 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.

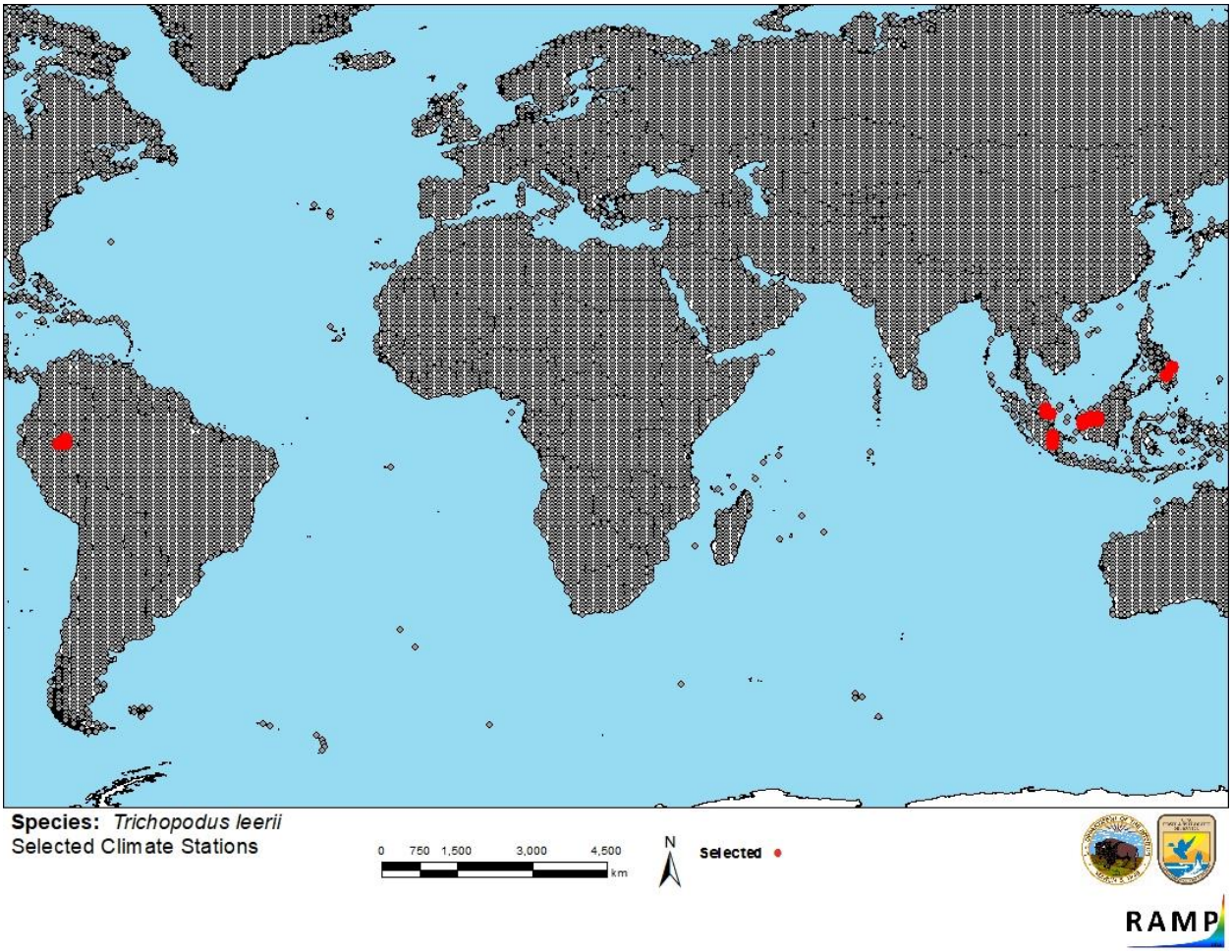

Figure 4. RAMP (Sanders et al. 2018) source map showing weather stations in Southeast Asia and South America selected as source locations (red; Peru, Malaysia, Indonesia, Philippines) and non-source locations (gray) for *Trichopodus leerii* climate matching. Source locations from Ortega et al. (2007) and 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.

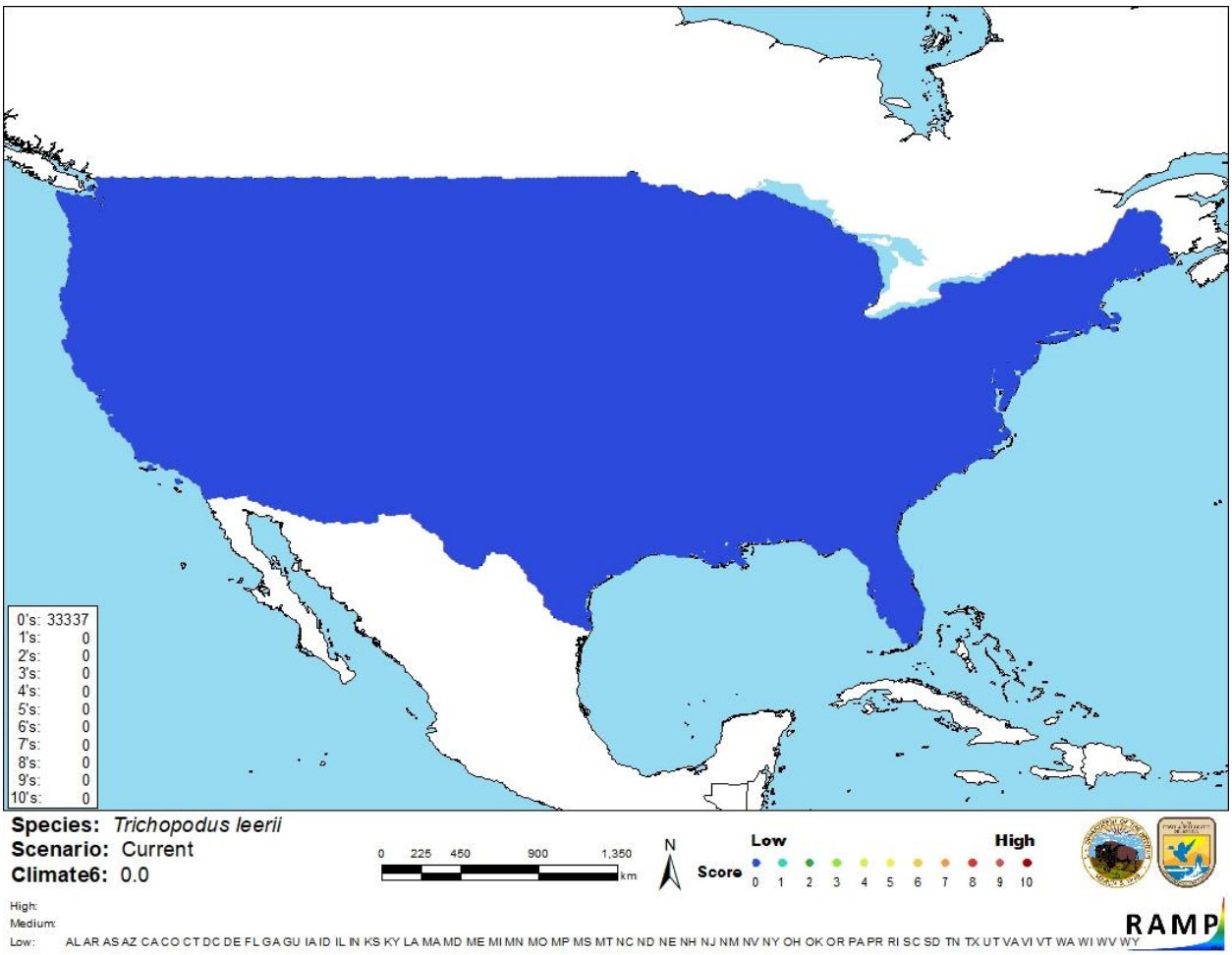

Figure 5. Map of RAMP (Sanders et al. 2018) climate matches for *Trichopodus leerii* in the contiguous United States based on source locations reported by Ortega et al. (2007) and GBIF Secretariat (2018). 0 = Lowest match, 10 = Highest match.

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 is low. There is information available about *Trichopodus leerii* but some key parts are missing. There were no georeferenced observations available for multiple locations where non-native established wild populations have been reported, and scientific studies of impacts were not found for areas where *T. leerii* has established.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Pearl Gourami (*Trichopodus leerii*) is a species of small freshwater fish native to Southeastern Asia, specifically the Malay Peninsula and the islands of Sumatra and Borneo. It is also considered native to Thailand but is most likely extirpated. It is a very popular fish in the ornamental trade and used as a food source in Malaysia. There is some captive breeding for the ornamental trade. The history of invasiveness is None Documented. There are records of introductions and some resulted in established wild populations. No information on ecological impacts was found. A single record of beneficial economic impact was found. The climate match is low. The entire contiguous United States had a low climate match. However, georeferenced observations were not available for established wild populations in two countries, contributing to uncertainty of the climate match. The certainty of assessment is low because both georeferenced locations and studies of impacts to native species were not found for established populations. The overall risk assessment is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Low**
- **Certainty of Assessment (Sec. 7): Low**
- **Remarks/Important additional information:** Introductions have occurred in Hawaii and Florida but failed to establish a population.
- **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.

Arizona Aquatic Gardens. 2018. Pearl Gourami fish. Available: https://www.azgardens.com/product/pearl-gourami-fish/. (November 2018).

Broutin, V., A.-L. Bañuls, A. Aubry, N. Keck, M. Choisy, J.-F. Bernardet, C. Michel, J.-C. Raymond, C. Libert, A. Barnaud, P. Stragier, F. Portaels, D. Terru, C. Belon, O. Dereure, C. Guttierez, M. L. Boschiroli, P. Van De Perre, E. Cambau, and S. Godreuil. 2012. Genetic diversity and populations structure of *Mycobacterium marinum*: new insights into host and environmental specificities. Journal of Clinical Microbiology JCM-01274.

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. (November 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. (November 2018).

Froese, R., and D. Pauly, editors. 2018a. *Trichopodus leerii* (Bleeker, 1852). FishBase. Available: http://www.fishbase.org/summary/Trichopodus-leerii.html. (November 2018).

Froese, R., and D. Pauly, editors. 2018b. *Trichopodus leerii*. *In* World Register of Marine Species. Available: http://www.marinespecies.org/aphia.php?p=taxdetails&id=1021741. (November 2018).

GBIF Secretariat. 2018. GBIF backbone taxonomy: *Trichopodus leerii* (Bleeker, 1852). Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/7623402. (November 2018).

Ishikawa, T., and K. Tachihara. 2014. Introduction history of non-native freshwater fish in Okinawa-jima Island: ornamental aquarium fish pose the greatest risk for future invasions. Ichthyology Research 61:17–26.

Jeong, J. B., H. Y. Kim, L. J. Jun, J. H. Lyu, N. G. Park, J. K. Kim, and H. D. Jeong. 2008. Outbreaks and risks of infectious spleen and kidney necrosis virus disease in freshwater ornamental fishes. Diseases of Aquatic Organisms 78:209–215.

Ng, P. K. L., and H. H. Tan. 1997. Freshwater fishes of Southeast Asia: potential for the aquarium fish trade and conservation issues. Aquarium Sciences and Conservation 1:9–90.

Nico, L. 2018. *Trichopodus leerii* (Bleeker, 1852). U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=331. (November 2018).

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/. (September 2019).

Ortega, H., H. Guerra, and R. Ramírez. 2007. The introduction of nonnative fishes into freshwater systems of Peru. Pages 247–278 *in* T. M. Bert, editor. Ecological and genetic implications of aquaculture activities. Springer, Dordrecht, Netherlands.

Poelen, J. H., J. D. Simons, and C. J. Mungall. 2014. Global Biotic Interactions: an open infrastructure to share and analyze species-interaction datasets. Ecological Informatics 24:148–159.

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

Sule, H. A., A. Ismail, and M. N. A. Amal. 2016. A review of the ichthyofauna of Malaysian peat swamp forest. Pertanika Journal of Tropical Agricultural Science 39(4):421–458.

Vidthayanon, C. 2012. *Trichopodus leerii*. The IUCN Red List of Threatened Species 2012: e.T187958A1839297. Available: https://www.iucnredlist.org/species/187958/1839297. (November 2018).

Yanong, R. P. E., and T. B. Waltzek. 2010. Megalocytivirus infections in fish, with emphasis on ornamental species. Florida Cooperative Extension Service, Publication FA182, University of Florida, Gainesville.

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.

Bleeker, P. 1852 Diagnostische beschrijvingen van nieuwe of weinig bekende vischsoorten van Sumatra. Tiental I - IV. Natuurkundig Tijdschrift voor Nederlandsch Indië 3:569–608.

Bleeker. 1865. [Source material did not give full citation for this reference.]

Courtenay, W. R., Jr., H. F. Sahlman, W. W. Miley, II, and D. J. Herrema. 1974. Exotic fishes in fresh and brackish waters of Florida. Biological Conservation 6(4):292–302.

Hora. 1923. [Source material did not give full citation for this reference.]

Kottelat, M., A. J. Whitten, S. N. Kartikasari, and S. Wirjoatmodjo. 1993. Freshwater fishes of Western Indonesia and Sulawesi. Periplus Editions, Hong Kong.

Kottelat, M., and E. Widjanarti. 2005. The fishes of Danau Sentarum National Park and the Kapuas Lakes area, Kalimantan Barat, Indonesia. Raffles Bulletin of Zoology Supplement 13:139–173.

Liang, S.-H., L.-C. Chuang, and M.-H. Chang. 2006. The pet trade as a source of invasive fish in Taiwan. Taiwania 51(2):93–98.

Maciolek, J. A. 1984. Exotic fishes in Hawaii and other islands of Oceania. Pages 131–161 *in* W. R. Courtenay, Jr. and J. R. Stauffer, Jr., editors. Distribution, biology, and management of exotic fishes. The Johns Hopkins University Press, Baltimore, Maryland.

Mercene, E. C. 1997. Freshwater fishes of the Philippines. Pages 81–105 *in* R. Guerrero III, A. Calpe, and L. Darvin, editors. Aquatic biology research and development in the Philippines. Proceedings of the First National Symposium, 1995, Los Baños, Laguna, Philippines. PCAMRD Book Series 20.

Monkolprasit, S., S. Sontirat, S. Vimollohakarn, and T. Songsirikul. 1997. Checklist of fishes in Thailand. Office of Environmental Policy and Planning, Bangkok, Thailand.

Riehl, R., and H. A. Baensch. 1991. Aquarien atlas. Band. 1. Melle: Mergus, Verlag für Natur- und Heimtierkunde, Germany.

Smith. 1945. [Source material did not give full citation for this reference.]

Ukkatawewat, S. 2005. The taxonomic characters and biology of some important freshwater fishes in Thailand. National Inland Fisheries Institute, Department of Fisheries, Ministry of Agriculture, Bangkok, Thailand.

Vidthayanon, C. 2002. Peat swamp fishes of Thailand. Office of Environmental Policy and Planning, Bangkok, Thailand.