

Banded Cichlid (*Heros severus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, Web Version – 1/5/2018



Photo: Jose Figueroa Martinez. Licensed under Creative Commons BY 3.0 Unported. Available: <https://commons.wikimedia.org/wiki/File:Severum32.jpg>.

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2016):

“South America: Orinoco River basin, in the upper Orinoco River drainage in Colombia and Venezuela; Amazon River basin, in the upper Negro River basin [Brazil].”

From Nico et al. (2016):

“Native Range: Tropical America. Upper Orinoco and Negro River basins in Brazil, Colombia, and Venezuela (Kullander 2003).”

Status in the United States

From Nico et al. (2016):

“This species has been recorded from several sites in Miami-Dade County, Florida, including Tamiami Canal just west of Miami, Snapper Creek (C-2 Canal), and L-31W Canal on the border of Everglades National Park (Shafland 1996; Shafland et al. 2008; Kline et al. 2013; Nico, unpublished data; museum specimen). A single specimen was taken from Oak Lake in Lincoln, Nebraska, in 1999 (S. Schainost, Nebraska Game and Parks Commission, pers. comm.). Nine specimens (tentatively identified as this species) was [sic] taken during rotenone treatment of Rogers Spring, a warm spring near Overton and a tributary to Lake Mead, Clark County, Nevada, on 8 December 1963 (Courtenay and Deacon 1982; Hubbs and Deacon 1964; museum specimens).”

“Based on recent collections, this species is apparently established in Florida (Shafland et al. 2008; Nico, personal communication). Extirpated from Nevada (Courtenay and Deacon 1982, 1983; Deacon and Williams 1984; Courtenay and Stauffer 1990). Contrary to statements that the species is possibly established (e.g., Courtenay and Hensley 1979; Page and Burr 1991), no additional *Heros severus* have been seen or taken at Rogers Spring since eradication efforts in 1963 (Courtenay and Deacon 1983).”

“The statement by Page and Burr (1991) that the species is "apparently established in Rogers Spring" appears erroneous. The rotenone treatment of Rogers Spring in 1963 was undertaken to rid the site of introduced species; until that time, it was not known that *H. severus* was even present (Hubbs and Deacon 1964).”

Means of Introductions in the United States

From Nico et al. (2016):

“Means of Introduction: Probable aquarium release.”

From FAO (2014):

“Introducer: Private sector
Reasons of Introduction: 1) ornamental”

Remarks

No additional remarks.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2014):

“Synonyms: *Cichlasoma severum* (Heckel, 1840)

Kingdom Animalia

Subkingdom Bilateria

Infrakingdom Deuterostomia

Phylum Chordata

Subphylum Vertebrata

Infraphylum Gnathostomata

Superclass Osteichthyes

Class Actinopterygii

Subclass Neopterygii

Infraclass Teleostei

Superorder Acanthopterygii

Order Perciformes

Suborder Labroidei

Family Cichlidae

Genus *Heros* Heckel, 1840

Species *Heros severus* Heckel, 1840”

From Eschmeyer et al. (2017):

“*severus*, *Heros* Heckel [J. J.] 1840:362 [Annalen des Wiener Museums der Naturgeschichte v. 2[...]] Maribitanos, Río Negro, Venezuela. Holotype (unique): NMW 17638. See Staeck & Schindler 2015[...] for comments on a unique holotype. •Valid as *Cichlasoma severum* (Heckel 1840) -- (Lee et al. 1980:769[...], Page & Burr 1991:333[...], Minckley & Marsh 2009:263[...]). •Valid as *Heros severus* Heckel 1840 -- (Fuller et al. 1999:432[...], Lasso & Machado-Allison 2000:114[...], Kullander in Reis et al. 2003:636[...], Nelson et al. 2004:153[...], Scharpf 2009:8[...], Page & Burr 2011:611[...], Page et al. 2013:156[...], Sarmiento et al. 2014:128, 189[...], Staeck & Schindler 2015:129, 133[...]). **Current status:** Valid as *Heros severus* Heckel 1840. Cichlidae: Cichlinae.”

Size, Weight, and Age Range

From Froese and Pauly (2016):

“Max length: 20.0 cm SL male/unsexed; [Lee et al. 1980]; common length: 13.5 cm TL male/unsexed; [Hugg 1996]”

From Nico et al. (2016):

“Size: 20 cm SL (Kullander 2003).”

Environment

From Froese and Pauly (2016):

“Freshwater; brackish; benthopelagic; pH range: 5.0 - 6.5; dH range: ? - 6. [...]; 23°C - 29°C [assumed to be recommended aquarium water temperature] [Stawikowski and Werner 1998]”

Climate/Range

From Froese and Pauly (2016):

“Tropical; [...]”

Distribution Outside the United States

Native

From Froese and Pauly (2016):

“South America: Orinoco River basin, in the upper Orinoco River drainage in Colombia and Venezuela; Amazon River basin, in the upper Negro River basin [Brazil].”

From Nico et al. (2016):

“Native Range: Tropical America. Upper Orinoco and Negro River basins in Brazil, Colombia, and Venezuela (Kullander 2003).”

Introduced

From FAO (2014):

“*Heros severus* introduced to Philippines”

From Ng and Tan (2010):

“Recorded from: BD [Bedok Reservoir, Singapore]”

Means of Introduction Outside the United States

From FAO (2014):

“Introducer: unknown

Reasons of Introduction: 1) ornamental”

From Ng and Tan (2010):

“It is likely that the single individual of this species obtained from the Bedok Reservoir represents the isolated discard of an aquarium fish.”

Short Description

From Nico et al. (2016):

“In general, cichlids (Cichlidae) are superficially similar to sunfishes and black basses (*Lepomis* and *Micropterus*; family Centrarchidae). Cichlids may be distinguished from centrarchids by a single nostril on each side of the head (vs. two in centrarchids) and the presence of a discontinuous or two-part lateral line (vs. continuous in centrarchids).”

Biology

From Froese and Pauly (2016):

“Occurs in warm spring pools and their effluents. Feeds mainly on fruits, seeds, green algae and detritus. Up to 200 eggs are deposited on stones or roots and defended by both parents: larvae are taken into the mouth. Parental care can last up to 6 weeks [Stawikowski and Werner 1998].”

From Nico et al. (2016):

“Generally associated with aquatic vegetation; omnivorous, primarily consuming small benthic invertebrates and plant material (Lowe-McConnell 1969; Mérioux et al. 1998).”

From NatureServe (2014):

“Parents incubate eggs and guard young.”

“In its native habitat its diet consists mainly of fruits, seeds, green algae, and detritus (Lee et al. 1980).”

Human Uses

From Froese and Pauly (2016):

“Aquarium: commercial”

Diseases

No records of OIE reportable diseases were found.

From Froese and Pauly (2016):

“White spot Disease, Parasitic infestations (protozoa, worms, etc.)
Hole-in-the-Head Disease, Parasitic infestations (protozoa, worms, etc.)
Bacterial Infections (general), Bacterial diseases”

Poelen et al. (2014) list *Sciadicleithrum* sp., *Oligogonotylus manteri*, *Gussevia alioides*, *G. arilla*, *G. dispar*, *G. disparoides*, *G. longihaptor*, *G. tucunarensis*, *G. undulata*, *Proteocephalus* sp., *Proteocephalus microcephalus*, *Sciadocephalus megalodiscus*, *Procamallanus* sp.,

Pronamphistoma cichlasomae, and *Clinostomum* sp. as parasites of *Heros severus*. [Strona et al. 2013]

Threat to Humans

From Froese and Pauly (2016):

“Harmless”

3 Impacts of Introductions

From Nico et al. (2016):

“Impact of Introduction: Unknown.”

“Concern has been expressed that if *H. severus* survived in Nevada, it, like other introduced species, would compete with local or native fish fauna and sport fish, and that if the cichlid became established in Lake Mead, it potentially would compete with native sunfish for spawning sites (Hubbs and Deacon 1964; Courtenay and Hensley 1979).”

4 Global Distribution

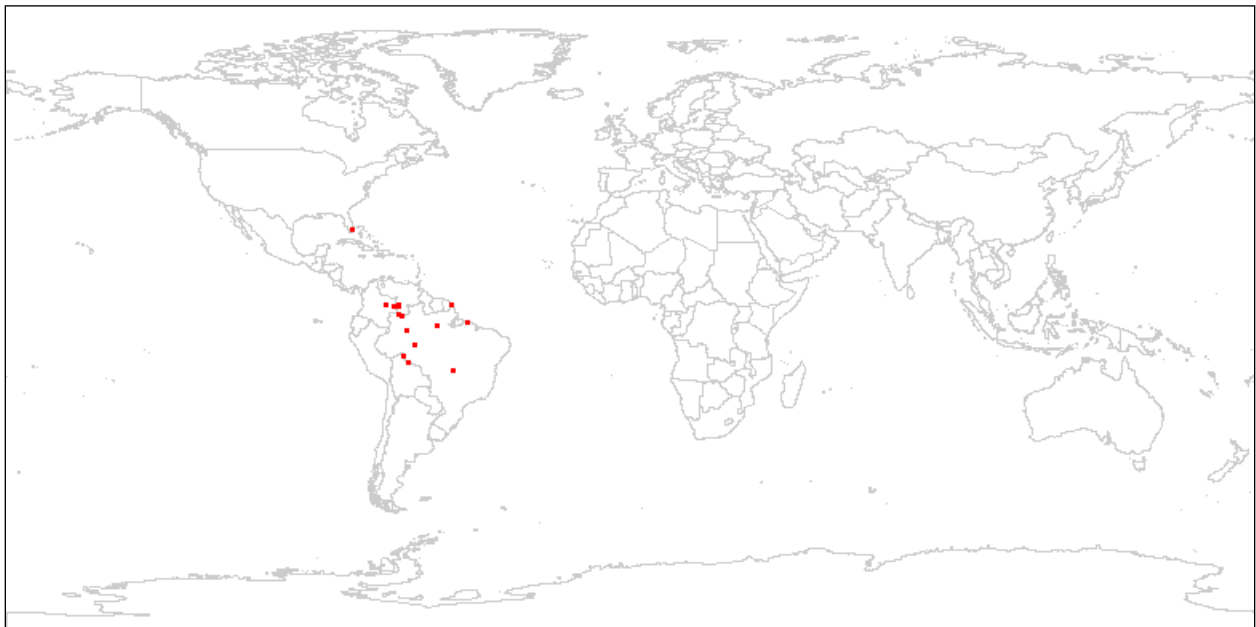


Figure 1. Known global distribution of *Heros severus*. Map from Froese and Pauly (2016).



Figure 2. Known global distribution of *Heros severus*. Map from GBIF Secretariat (2014).

The observation in Australia is the result of a preserved specimen in a museum and was not used as a source point in the climate match. While there is a record of introduction for *Heros severus* in the Philippines (FAO 2014), no further location data was found and it could not be used as a source point for the climate match. Likewise, the single specimen found in Singapore (Ng and Tan 2010) did not represent an established population and was not used in the climate match.

5 Distribution Within the United States



Figure 3. Known United States distribution of *Heros severus*. Map from Nico et al. (2016).

The observation in Nebraska is from a single specimen, collected in 1999, with no evidence of an established population. This point was not used as a source location for the climate match.



Figure 4. Known distribution of *Heros severus* in the United States. Map from BISON (2017).

The locations in Nevada are the result of collections from Lake Mead and surrounding areas that occurred years after the rotenone treatment in 1963 (Nico et al. 2016). These records indicate that there may be an established population in the area and the locations were used as source locations for the climate match.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Heros severus* was very high in Florida, the states just east of the Rocky Mountains, and along the border with Mexico. The climate match was medium along the Gulf Coast, the southern Atlantic Coast, and much of Texas, Colorado, and Oklahoma. The match was low everywhere else. The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous U.S. was 0.170, high. The following states had individually high climate 6 scores: Arizona, California, Florida, Idaho, New Mexico, Nevada, Oregon, Texas, Utah, and Washington.

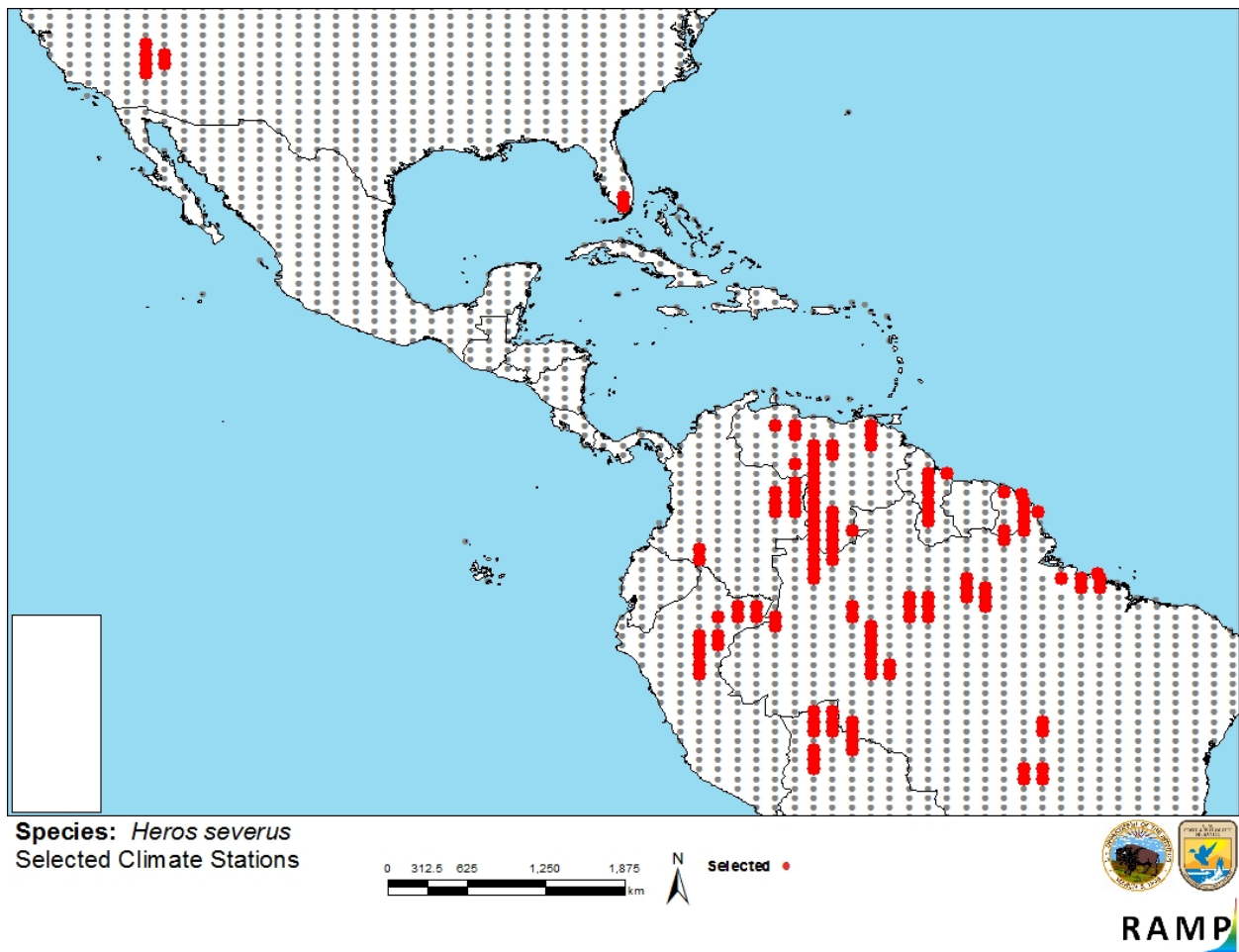


Figure 5. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (grey) for *Heros severus* climate matching. Source locations from GBIF Secretariat (2014), Froese and Pauly (2016), Nico et al. (2016), and BISON (2017).

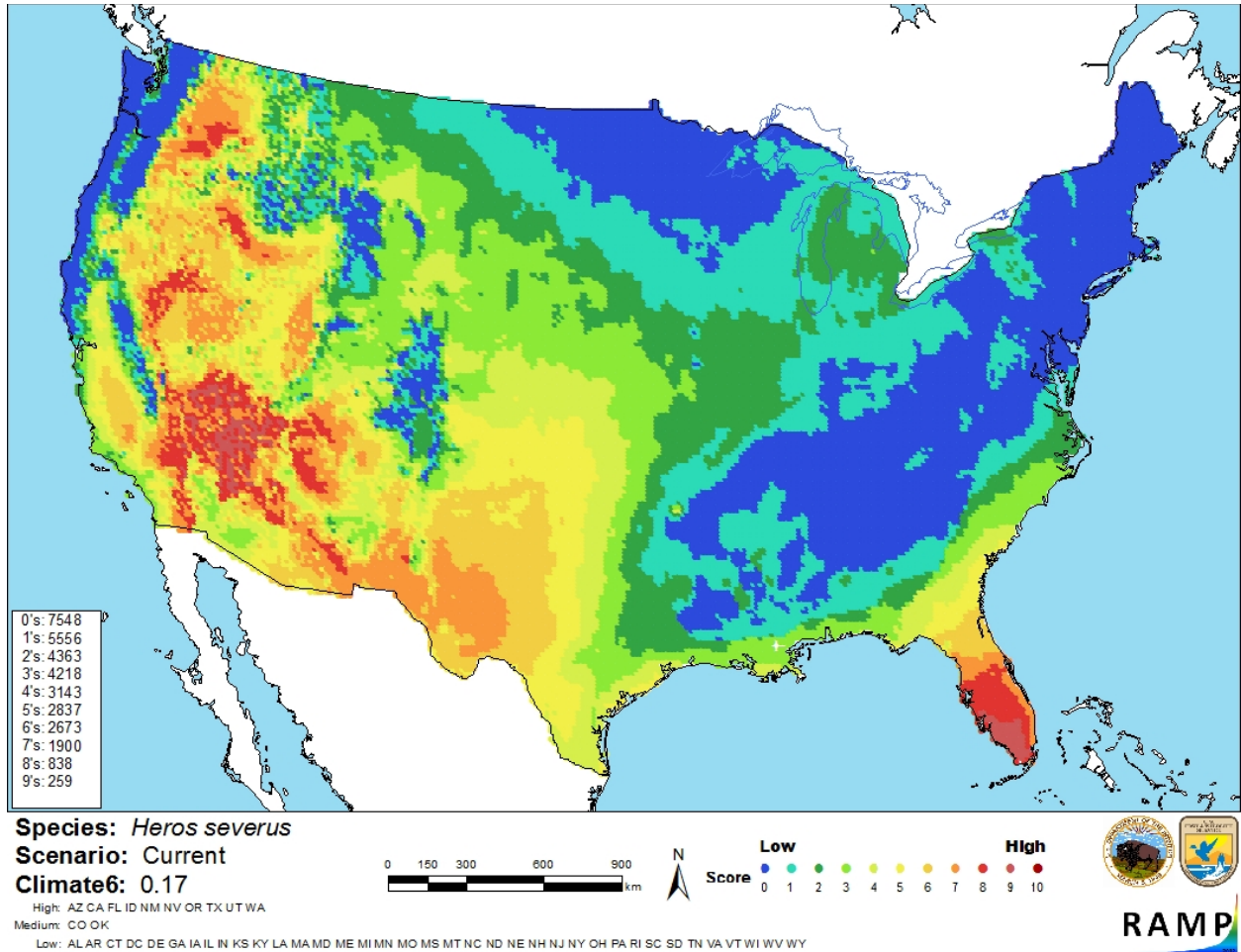


Figure 6. Map of RAMP (Sanders et al. 2014) climate matches for *Heros severus* in the continental United States based on source locations reported by GBIF Secretariat (2014), Froese and Pauly (2016), Nico et al. (2016), and BISON (2017). 0 = Lowest match, 10 = Highest match.

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
$0.000 \leq X < 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

The certainty of this assessment is medium. There was adequate information available about the biology and ecology of *Heros severus*. Introductions were noted but no information on realized impacts could be found. There was no location information for a potential introduced population in the Philippines, so it was not included in the climate match. If that information could be obtained, it would result in a more refined climate match.

8 Risk Assessment

Summary of Risk to the Contiguous United States

There is an established population of *Heros severus* in Florida. The climate match indicates that there could be risk for further spread from this population into the rest of Florida and large areas in the western sections of the country. There have also been introductions in Nebraska and Nevada. The fish in Nebraska is thought to be a single aquarium release that did not result in a population. There was a small population in Nevada that was thought to be eradicated in the 1960s; however, some databases list collections of the species made in the Lake Mead area after that eradication effort. The history of invasiveness is not documented. Although there have been successful introductions, there were no records of impacts found for those populations. The climate match is high. The certainty of assessment is medium. The overall risk assessment category is uncertain. There is already a population within the United States and no information on impacts.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Medium**
- **Remarks/Important additional information** No additional remarks.
- **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.

BISON. 2017. Biodiversity Information Serving Our Nation (BISON). U.S. Geological Survey. Available: <https://bison.usgs.gov>. (February 2017).

Eschmeyer, W. N., R. Fricke, and R. van der Laan, editors. 2017. Catalog of fishes: genera, species, references. Available: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (February 2017).

FAO (Fisheries and Agriculture Organization of the United Nations). 2013. Database on introductions of aquatic species. FAO, Rome. Available: <http://www.fao.org/fishery/introsp/913/en>. (June 2014).

Froese, R., and D. Pauly, editors. 2016. *Heros severus* Heckel, 1840. FishBase. Available: <http://www.fishbase.org/summary/Heros-severus.html>. (February 2016).

- GBIF Secretariat. 2014. GBIF backbone taxonomy: *Heros severus* Heckel, 1840. Global Biodiversity Information Facility, Copenhagen. Available: <http://www.gbif.org/species/5208367>. (June 2014).
- ITIS (Integrated Taxonomic Information System). 2014. *Heros severus* Heckel, 1840. Integrated Taxonomic Information System, Reston, Virginia. Available: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=169895. (June 2014).
- NatureServe. 2014. NatureServe Explorer: an online encyclopedia of life, version 7.1. NatureServe, Arlington, Virginia. Available: <http://explorer.natureserve.org>. (June 2014).
- Ng, H. H., and H. H. Tan. 2010. An annotated checklist of the non-native freshwater fish species in the reservoirs of Singapore. *Cosmos: Journal of the Singapore National Academy of Science* 6(1):95–116.
- Nico, L., P. Fuller, and M. Neilson. 2016. *Heros severus*. U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: <http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=458>. (February 2016).
- 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. 2014. Risk assessment mapping program: RAMP. U.S. Fish and Wildlife Service.

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.

- Courtenay, W. R., Jr., and J. E. Deacon. 1982. Status of introduced fishes in certain spring systems in southern Nevada. *Great Basin Naturalist* 42(3):361–366.
- Courtenay, W. R., Jr., and J. E. Deacon. 1983. Fish introductions in the American southwest: a case history of Rogers Spring, Nevada. *Southwestern Naturalist* 28:221–224.
- Courtenay, W. R., Jr., and D. A. Hensley. 1979. Survey of introduced non-native fishes. Phase I Report. Introduced exotic fishes in North America: status 1979. Report. National Fishery Research Laboratory, U.S. Fish and Wildlife Service, Gainesville, Florida.
- Courtenay, W. R., Jr., and J. R. Stauffer, Jr. 1990. The introduced fish problem and the aquarium fish industry. *Journal of the World Aquaculture Society* 21(3):145–159.

- Deacon, J. E., and J. E. Williams. 1984. Annotated list of the fishes of Nevada. *Proceedings of the Biological Society of Washington* 97(1):103–118.
- Fuller, P. L., L. G. Nico, and J. D. Williams. 1999. Nonindigenous fishes introduced into inland waters of the United States. *American Fisheries Society, Special Publication 27*, Bethesda, Maryland.
- Heckel, J. J. 1840. Johann Natterer's neue Flussfische Brasilien's nach den Beobachtungen und Mittheilungen des Entdeckers beschrieben (Erste Abtheilung, Die Labroiden). *Annalen des Wiener Museums der Naturgeschichte* 2:325–471.
- Hubbs, C., and J. E. Deacon. 1964. Additional introductions of tropical fishes into southern Nevada. *Southwest Naturalist* 9:249–251.
- Hugg, D. O. 1996. MAPFISH georeferenced mapping database. Freshwater and estuarine fishes of North America. Life Science Software. Dennis O. and Steven Hugg, Edgewater, Maryland.
- Kline, J. L., W. F. Loftus, K. Kotun, J. C. Trexler, J. S. Rehage, J. J. Lorenz, and M. Robinson. 2013. Recent fish introductions into Everglades National Park: an unforeseen consequence of water-management? *Wetlands* (in press).
- Kullander, S. O. 2003. Family Cichlidae (Cichlids). Pages 605–654 *in* R. E. Reis, S. O. Kullander, and C. J. Ferraris, Jr, editors. Check list of the freshwater fishes of South and Central America. EDIPUCRS, Porto Alegre, Brazil.
- Lasso, C. A., and A. Machado-Allison. 2000. Sinopsis de las especies de peces de la familia Cichlidae presentes en la cuenca del Rio Orinoco. Claves, diagnosis, aspectos bioecologicos e ilustraciones. Serie Peces de Venezuela. Universidad Central de Venezuela.
- Lee, D. S., C. R. Gilbert, C. H. Hocutt, R. E. Jenkins, D. E. McAllister, and J. R. Stauffer. 1980. Atlas of North American freshwater fishes. North Carolina State Museum of Natural History.
- Lowe-McConnell, R. H. 1969. The cichlid fishes of Guyana, South America, with notes on their ecology and breeding behaviour. *Zoological Journal of the Linnean Society* 48(2):255–302.
- Mérigoux, S., D. Ponton, and B. de Mérona. 1998. Fish richness and species-habitat relationships in two coastal streams of French Guiana, South America. *Environmental Biology of Fishes* 51:25–39.
- Minckley, W. L., and P. C. Marsh. 2009. Inland fishes of the Greater Southwest. Chronicle of a vanishing biota. The University of Arizona Press.

- Nelson, J. S., E. J. Crossman, H. Espinosa Pérez, L. T. Findley, C. R. Gilbert, R. N. Lea, and J. D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico, 6th edition. American Fisheries Society, Special Publication 29, Bethesda, Maryland.
- Page, L. M., and B. M. Burr. 1991. A field guide to freshwater fishes of North America north of Mexico. The Peterson field guide series, volume 42. Houghton Mifflin, Boston.
- Page, L. M., and B. M. Burr. 2011. Peterson field guide to freshwater fishes of North America North of Mexico, 2nd edition. Freshwater fishes of North America.
- Page, L. M., H. Espinosa-Pérez, L. D. Findley, C. R. Gilbert, R. N. Lea, N. E. Mandrak, R. L. Mayden, and J. S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico, 7th edition. American Fisheries Society, Special Publication 34, Bethesda, Maryland.
- Reis, R. E., S. O. Kullander, and C. J. Ferraris, Jr., editors. 2003. Check list of the freshwater fishes of South and Central America. CLOFFSCA. EDIPUCRS, Porto Alegre, Brazil.
- Sarmiento, J., R. Bigorne, F. M. Carvajal-Vallejos, M. Maldonado, E. Leciak, and T. Oberdorff, editors. 2014. Peces de Bolivia/Bolivian fishes. IRD-Biofresh (EU).
- Scharpf, C. 2009. Annotated checklist of North American freshwater fishes, including subspecies and undescribed forms. Part V: Sciaenidae ... [through] Achiridae (plus supplemental material). American Currents 35(1):1–32.
- Shafland, P. L. 1996. Exotic fishes of Florida – 1994. Reviews in Fisheries Science 4(2):101–122.
- Shafland, P. L., K. B. Gestring, and M. S. Stanford. 2008. Florida's exotic freshwater fishes - 2007. Florida Scientist 71(3):220–245.
- Staeck, W., and I. Schindler. 2015. Description of a new *Heros* species (Teleostei, Cichlidae) from the Rio Orinoco drainage and notes on *Heros severus* Heckel, 1840. Bulletin of Fish Biology 15(1/2):121–136.
- Stawikowski, R., and U. Werner. 1998. Die Buntbarsche Amerikas, band 1. Verlag Eugen Ulmer, Stuttgart, Germany.
- Strona, G., M. L. D. Palomares, N. Bailly, P. Galli, and K. D. Lafferty. 2013. Host range, host ecology, and distribution of more than 11800 fish parasite species. Ecology 94:544.