Hypostomus pusarum (a catfish, no common name)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, January 2013
Revised, October 2018
Web Version, 7/17/2019

Photo: Costa et al. (2017). Licensed under Creative Commons (CC BY 4.0).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

"South America: coastal drainages of northern Brazil."

Status in the United States

This species has not been reported as introduced or established in the United States. However, unidentified members of the genus are established in the United States.

From Nico et al. (2018):

"Several morphologically distinct but unidentified *Hypostomus* species have been recorded as established in the United States: these included populations in Indian Springs in Nevada; Hillsborough County in Florida; and the San Antonio River and San Felipe Creek in Texas (Courtenay and Deacon 1982; Courtenay et al. 1984, 1986; Courtenay and Stauffer 1990; Page

and Burr 1991; López-Fernández and Winemiller 2005). A population of an unidentified *Hypostomus* species is firmly established in Hawaii (Devick 1991a, b). Reported from Arizona, Colorado, Connecticut, Louisiana, and Pennsylvania. Failed in Connecticut, Massachusetts, and Pennsylvania."

This species was not found for sale from U.S.-based online aquarium retailers and it does not appear to be in trade in the United States.

Means of Introductions in the United States

This species has not been reported as introduced or established in the United States. However, unidentified members of the genus are established in the United States.

From Nico et al. (2018):

"Members of this genus have been introduced through a combination of fish farm escapes or releases, and aquarium releases (Courtenay and Stauffer 1990; Courtenay and Williams 1992). In Texas, the initial introduction occurred when Hypostomus entered local streams after escaping from pool and canal systems of the San Antonio Zoological Gardens in or before 1962 (Barron 1964); the Comal County introduction was probably due to an aquarium release (Whiteside and Berkhouse 1992)."

Remarks

From Nico et al. (2018):

"The genus *Hypostomus* contains about 116 species (Burgess 1989). Highlighting the serious need for additional taxonomic and systematic work, Armbruster (1997) concluded that it is currently impossible to identify most species in the genus. Several apparently different *Hypostomus* species have been collected in the United States but not definitively identified to species level (Page and Burr 1991; Courtenay and Stauffer 1990). Distinguishing characteristics of the genus and a key to loricariid genera were provided by Burgess (1989) and Armbruster (1997). Photographs appeared in Burgess (1989) and Ferraris (1991). *Hypostomus* has officially replaced the generic name *Plecostomus*. The genus was included in the key to Texas fishes of Hubbs et al. (1991) and several identifying traits were also given by Page and Burr (1991)."

According to Fricke et al. (2018), *H. pusarum* was originally described as *Plecostomus pusarum*. Both names were used in searching for information for this report.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia

Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Siluriformes
Family Loricariidae
Subfamily Hypostominae
Genus *Hypostomus*
Species *Hypostomus pusarum* (Starks, 1913)"

"Current Standing: valid"

Size, Weight, and Age Range

From Froese and Pauly (2018):

"Max length: 20.3 cm TL male/unsexed; [Weber 2003]"

Environment

From Froese and Pauly (2018):

"Freshwater; demersal."

Climate/Range

From Froese and Pauly (2018):

"Tropical"

Distribution Outside the United States

Native

From Froese and Pauly (2018):

"South America: coastal drainages of northern Brazil."

Introduced

No introductions of this species have been reported.

Means of Introduction Outside the United States

No introductions of this species have been reported.

Short Description

From Starks (1913):

"The head to the temporal plate is contained 3 times in the length. The temporal and occipital ridges are only very slightly indicated, not nearly so well developed as in *Plecostomus plecostomus* [*Hypostomus plecostomus*]. The width of the head is from 1 to 1½ diameters of the eye less than the length of the head. The depth of the head at the point of the supraoccipital is equal to the length of the snout. The interorbital space is contained 2½ times in the head, and the length of the snout from 1¾ to 1⅘ times. The distance from the anterior nostril to the tip of the snout is equal to the interorbital space. The middle of the interorbital space is only a trifle higher than the supraorbital rim, while the intermediate space between these two points is somewhat sunken on each side. The eye, inside of the eyelids, is contained from 9 to 10 times in the head, and 3½ to 4 times in the interorbital space. The band of teeth on each side of the mandible is contained 3½ times in the interorbital space, and the width of the lower lip 2½ times. The barbel does not reach to opposite the posterior edge of the lip, and is equal to the space between the eye and the posterior nostril."

"The distance from the tip of the snout to the first dorsal spine is contained from 2⅓ to 2½ times in the length of the body. The vent is midway between the base of the caudal and the pectoral spine. The depth of the body in front of the dorsal spine is contained from 4 to 4½ times in the length, and the greatest width from 3 to 3¼ times. The caudal peduncle in front of the adipose dorsal is as wide as it is deep. The first dorsal spine is a trifle less than the length of the head, and when the fin is reclined its tip does not reach to the middle of the last ray. The last ray is equal to the length of the snout, and for a short distance near its base it is adnate to the back. The tips of the last rays broadly overlie the adipose dorsal, reaching at least to its middle. On the posterior margin the dorsal fin is convex. The length of the pectoral spine is contained from 3 to 3¼ times in the length of the body, and almost a third of its length extends past the base of the ventral. The ventrals reach well past the posterior end of the anal base, or half way or more from their base to the caudal fin. The anal has a spine and 4 soft rays, and the tips of its rays do not reach so far back as the dorsal rays, but reach half way, or nearly, from their base to the caudal. The lower caudal lobe is longer than the upper, and the lowest branched ray reaches nearly to the tip of the lower simple ray, which is scarcely filamentous at the tip. The lower simple ray is contained from 2⅓ to 2½ times in the body, the upper ray from 2⅔ to 2¾ times."

"The supraoccipital is bounded behind a single plate. Two upper rows of plates are slightly carinate, and four plates extending back from the pectoral are bluntly carinate; the carinations are scarcely evident elsewhere. The longitudinal spinules grow coarser on the caudal peduncle, and are coarser and less numerous than in *P. plecostomus*. There are 25 or 26 lateral plates; 3 between the occipital and dorsal spine, the last very narrow medially; 7 between the dorsals; 4 between the adipose dorsal spine and the caudal; 12 between the anal and the caudal. The cross lines on the belly divide the granulations into much larger plates than in *P. plecostomus*, and there is a larger naked area at the bases of the ventral fins."

"Dark spots cover the body, on the ventral as well as the dorsal surface, and the fins. Each dorsal membrane bears two rows of them."

Biology

From Starks (1913):

"Numerous specimens from 2 to 8 inches in length were collected in the little disconnected ponds and in the muddy stream at Ceara Mirim [in Rio Grande do Norte, Brazil], the boys catching them under the overhanging grassy banks in their hands and in dip-nets."

From Chellappa et al. (2009):

"Ovaries of mature females of *H. pusarum* […] showed oocytes of varying sizes in different stages of development, which is characteristic of multiple spawners. These individuals spawn more than once within a breeding cycle."

"Temporal patterns of gonadal development of the females of *H. pusarum* showed that the ovaries were mature in February-April. In the months of May and June, the gonads were in spent condition, indicating that the reproductive season extends from February to June, with breeding occurring during May and June."

From Pessoa et al. (2013):

"The Index of Alimentary Importance (IAI) shows that *H. pusarum* feeds on decomposing organic material (88.7%), filamentous micro algae and diatoms (11.3%), characterizing it as a detritivorous/herbivorous organism. Among the phytoplankton taxa encountered in the stomach contents of *H. pusarum*, eleven were prominent: *Klebsormidium* sp., *Geminella* sp., *Spirulina* sp., *Ceratium* sp., *Oscillatoria* sp., *Spirogyra* sp., *Oedogonium* sp., *Anabaena* sp., *Planktothrix* sp., *Microcystis* sp. and *Aphanocapsa* sp […]"

Human Uses

From Pessoa et al. (2013):

"It is of commercial importance and is also used by the fishing communities as a food supplement, due to the abundance of this species in freshwater ecosystems of the semiarid region of Northeastern Brazil."

Diseases

No information available. No OIE-reportable diseases have been documented in this species.

Threat to Humans

From Froese and Pauly (2018):

"Harmless"

3 Impacts of Introductions

No introductions of *H. pusarum* have been reported as introduced outside its native range so no impacts of introduction are known. However, unidentified members of the genus are established in the United States.

From Nico et al. (2018):

"The effects of these loricariid catfish is largely unknown. In Texas, Hubbs et al. (1978) reported possible local displacement of algae-feeding native fishes such as *Campostoma anomalum* by *Hypostomus*, and López-Fernández and Winemiller (2005) suggest that reductions in *Dionda diaboli* abundance in portions of San Felipe Creek are due to population increases of *Hypostomus*. Because of their abundance in Hawaii, introduced *Hypostomus*, *Pterygoplichthys*, and *Ancistrus* may compete for food and space with native stream species (Devick 1989; Sabaj and Englund 1999)."

4 Global Distribution

Figure 1. Known global distribution of *H. pusarum*, reported from northeastern Brazil. Map from GBIF Secretariat (2017). The westernmost reported occurrence was excluded from the climate matching analysis because of georeference uncertainty.

5 Distribution within the United States

There is currently no known distribution of *Hypostomus pusarum* within the United States; however, unidentified species of *Hypostomus* are established in Nevada, Florida, Texas, and Hawaii.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2018; 16 climate variables; Euclidean Distance) was low throughout the contiguous United States except in southern Texas and extreme southern Florida, where the climate match was medium. Climate 6 score indicated that the contiguous United States has a low climate match overall. Scores of 0.005 and below are classified as low match; Climate 6 score of *H. pusarum* was 0.000.

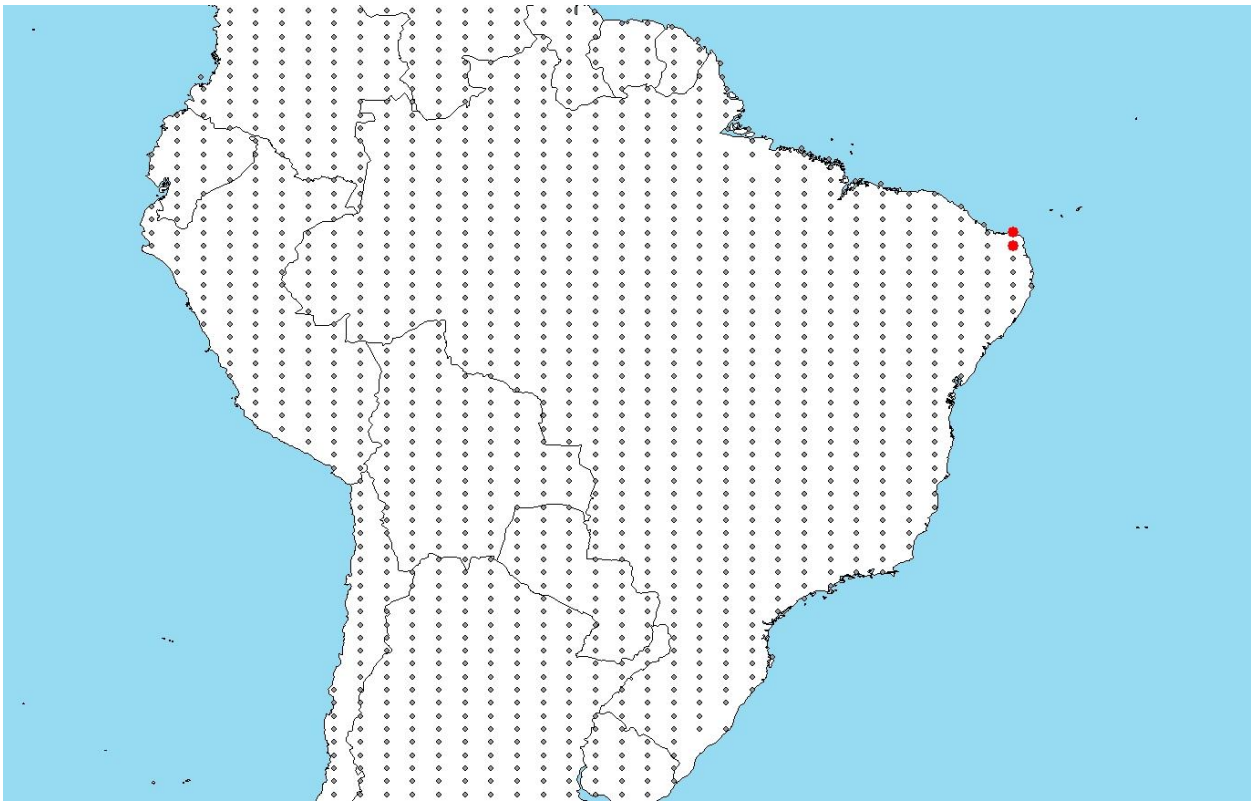

Figure 2. RAMP (Sanders et al. 2018) source map showing weather stations selected as source locations (red; Brazil) and non-source locations (gray) for *H. pusarum* climate matching. Source locations from GBIF Secretariat (2017).

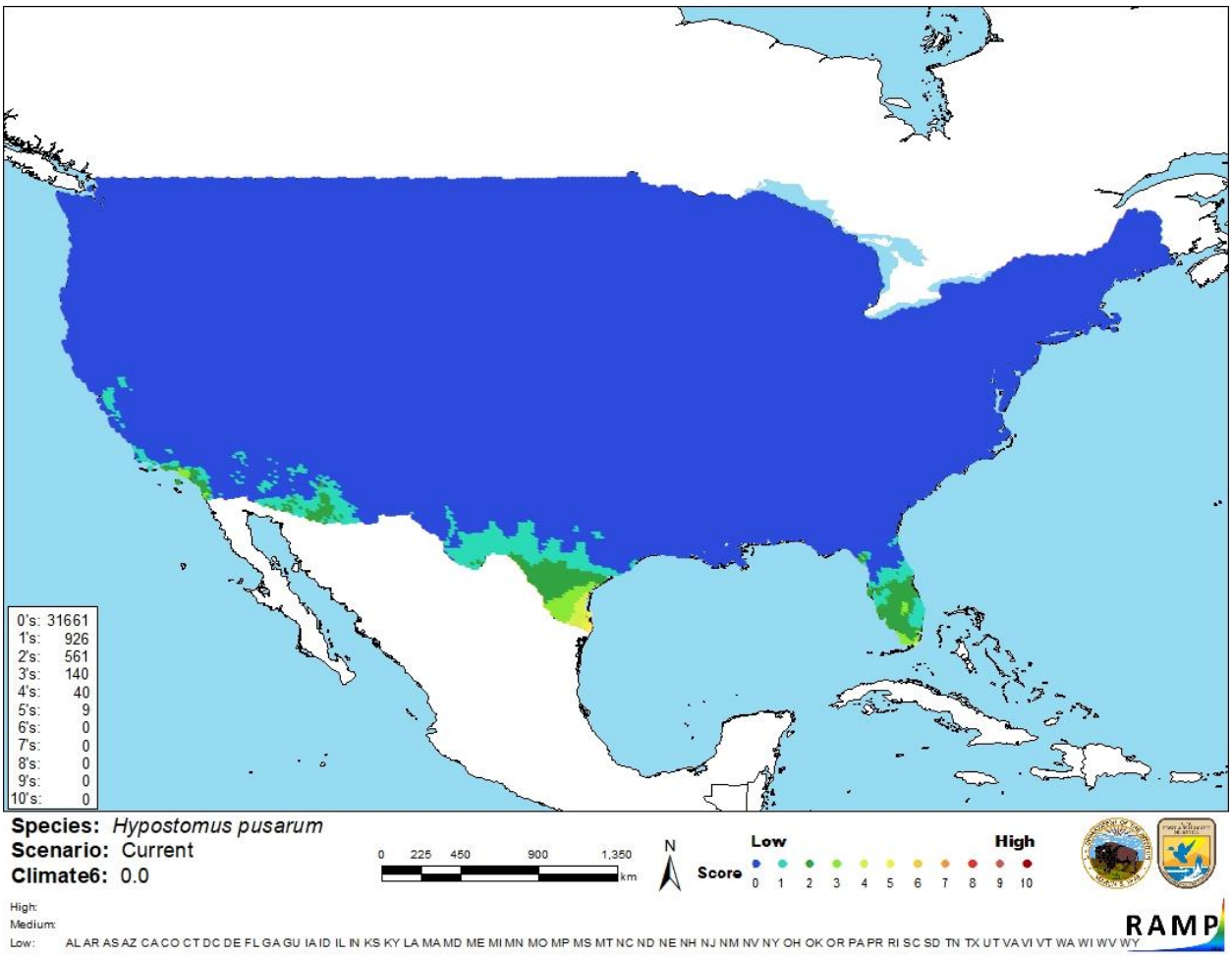

Figure 3. Map of RAMP (Sanders et al. 2018) climate matches for *H. pusarum* in the contiguous United States based on source locations reported by GBIF Secretariat (2017). 0= Lowest match, 10= Highest match.

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≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

Limited information was available on the biology and ecology of *Hypostomus pusarum*. It has not been reported as introduced outside its native range, so no impacts of introduction are known. However, unidentified species of *Hypostomus* have become established in the United States, and it is possible that one or more of those populations could be identified later as *H. pusarum*. There is considerable uncertainty about the taxonomy of this genus and about species-level identification. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Hypostomus pusarum is a catfish native to northeastern Brazil. It is a species of commercial importance and is also used by fishing communities in northeastern Brazil as a food supplement. *H. pusarum* has no documented history of introduction in the United States or elsewhere outside its native range. However, unidentified species of *Hypostomus* are established in the United States. *H. pusarum* is fished commercially and for subsistence. Climate match to the contiguous United States was low overall, with medium match only in southern Texas and extreme southern Florida. Because of the lack of documented introduction history and substantial taxonomic uncertainty, certainty of this assessment is low and overall risk is uncertain.

Assessment Elements

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

Chellappa, S., R. M. X. Bueno, T. Chellappa, N. T. Chellappa, and V. M. F. Almeida-Val. 2009. Reproductive seasonality of the fish fauna and limnoecology of semi-arid Brazilian reservoirs. Limnologica 39:325-329.

Costa, N. K. R., R. E. C. Paiva, M. J. Silva, T. P. A. Ramos, and S. M. Q. Lima. 2017. Ichthyofauna of Ceará-Mirim River basin, Rio Grande do Norte State, northeastern Brazil. ZooKeys 715:39-51.

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. (October 2018).

Froese, R., and D. Pauly, editors. 2018. *Hypostomus pusarum* (Starks, 1913). FishBase. Available: https://www.fishbase.de/summary/Hypostomus-pusarum.html. (October 2018).

GBIF Secretariat. 2017. GBIF backbone taxonomy: *Hypostomus pusarum* (Starks, 1913). Global Biodiversity Information Facility, Copenhagen. Available: https://www.gbif.org/species/5202177. (October 2018).

ITIS (Integrated Taxonomic Information System). 2018. *Hypostomus pusarum* (Starks, 1913). Integrated Taxonomic Information System, Reston, Virginia. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=680225#null. (October 2018).

Nico, L, P. Fuller, and M. Neilson. 2018. *Hypostomus sp.* Lacepède, 1803. USGS Nonindigenous Aquatic Species Database, Gainesville, Florida. Available: https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=762. (October 2018).

Pessoa, E. K. R., N. B. da Silva, N. T. Chellappa, A. A. de Souza, and S. Chellappa. 2013. Anatomy and histology of the digestive tract and feeding habits of the neotropical fish *Hypostomus pusarum* (Starks, 1913) (Osteichthyes: Loricariidae). Animal Biology Journal 4(1):39-50.

Sanders, S., C. Castiglione, and M. Hoff. 2018. Risk Assessment Mapping Program: RAMP, version 3.1. U.S. Fish and Wildlife Service.

Starks, E. C. 1913. The fishes of the Stanford expedition to Brazil. Leland Stanford Jr. University Publications, University Series:1-77, pls. 1-15.

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.

Armbruster, J. W. 1997. Phylogenetic relationships of the sucker-mouth armored catfishes (Loricariidae) with particular emphasis on the Ancistrinae, Hypostominae, and Neoplecostominae. Doctoral dissertation. University of Illinois, Champaign-Urbana, Illinois.

Barron, J. L. 1964. Reproduction and apparent over-winter survival of the sucker-mouth armoured catfish, *Plecostomus* sp., in the headwaters of the San Antonio River. The Texas Journal of Science 16:449.

Burgess, W. E. 1989. An atlas of freshwater and marine catfishes: a preliminary survey of the Siluriformes. Tropical Fish Hobbyist Publications, Inc., Neptune City, New Jersey.

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., D. A. Hensley, J. N. Taylor, and J. A. McCann. 1984. Distribution of exotic fishes in the continental United States. Pages 41-77 *in* W. R. Courtenay, Jr., and J. R. Stauffer, Jr, editors. Distribution, biology, and management of exotic fishes. John Hopkins University Press, Baltimore, Maryland.

Courtenay, W. R., Jr., D. A. Hensley, J. N. Taylor, and J. A. McCann. 1986. Distribution of exotic fishes in North America. Pages 675-698 *in* C. H. Hocutt, and E. O. Wiley, editors. The zoogeography of North American freshwater fishes. John Wiley and Sons, New York.

Courtenay, W. R., Jr., and J. R. Stauffer. 1990. The introduced fish problem and the aquarium fish industry. Journal of the World Aquaculture Society 21(3):145-159.

Courtenay, W. R., Jr., and J. D. Williams. 1992. Dispersal of exotic species from aquaculture sources, with emphasis on freshwater fishes. Pages 49-81 *in* A. Rosenfield, and R. Mann, editors. Dispersal of living organisms into aquatic ecosystems. Maryland Sea Grant, College Park, Maryland.

Devick, W. S. 1989. Disturbances and fluctuations in the Wahiawa Reservoir ecosystem. Project no. F-14-R-13, Job 4, Study I. Division of Aquatic Resources, Hawaii Department of Land and Natural Resources.

Devick, W. S. 1991a. Disturbances and fluctuatuions in the Wahiawa Reservoir ecosystem. Project no. F-14-R-15, Job 4 Study I. Division of Aquatic Resources, Hawaii Department of Land and Natural Resources.

Devick, W.S. 1991b. Patterns of introductions of aquatic organisms to Hawaiian freshwater habitats. Pages 189-213 *in* New directions in research, management and conservation of Hawaiian freshwater stream ecosystems. Proceedings of the 1990 symposium on freshwater stream biology and fisheries management. Division of Aquatic Resources, Hawaii Department of Land and Natural Resources.

Ferraris, C. J., Jr. 1991. Catfish in the aquarium. Tetra Press, Morris Plains, New Jersey.

Hubbs, C., R. J. Edwards, and G. P. Garrett. 1991. An annotated checklist of freshwater fishes of Texas, with key to identification of species. Texas Journal of Science, Supplement 43(4):1-56.

Hubbs, C., T. Luciere, G. P. Garrett, R. J. Edwards, S. M. Dean, and E. Marsh. 1978. Survival and abundance of introduced fishes near San Antonio, Texas. The Texas Journal of Science 30(4):369-376.

López-Fernández, H., and K. O. Winemiller. 2005. Status of *Dionda diaboli* and report of established populations of exotic fish species in lower San Felipe Creek, Val Verde County, Texas. Southwestern Naturalist 50(2):246-251.

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 Company, Boston.

Sabaj, M. H., and R. A. Englund. 1999. Preliminary identification and current distribution of two suckermouth armored catfishes (Loricariidae) intrdouced to Oahu streams. Bishop Museum Occasional Papers 59:50-55.

Weber, C. 2003. Loricariidae - Hypostominae (armored catfishes). Pages 351-372 *in* R. E. Reis, S. O. Kullander, and C. J. Ferraris, Jr., editors. Checklist of the freshwater fishes of South and Central America. EDIPUCRS, Porto Alegre, Brazil.

Whiteside, B. G., and C. Berkhouse. 1992. Some new collections locations for six fish species. The Texas Journal of Science 44(4):494.