

Brown Hoplo (*Hoplosternum littorale*)

Ecological Risk Screening Summary

Web Version – September 2014



Photo: © Alexis, K.R. From EOL (2014)

1 Native Range, and Status in the United States

Native Range

From Nico et al. (2011):

“Tropical America. Widespread in South America east of the Andes and north of Buenos Aires, including the Rio Orinoco, Trinidad, coastal rivers of the Guianas, Rio Amazonas basin, Rio Paraguay, lower Rio Parana and coastal systems in southern Brazil (Reis 1993).

Status in the United States

From Nico et al. (2011):

“A population was discovered in ditches of the Indian River lagoon system of Florida in late 1995 (Nico et al. 1996). Recently, populations have been found in the St. Johns and Kissimmee River drainages (Nico and Muench 2004; Lohrer 2005), and drainages in south Florida (P. Shafland and K. Gestring, personal communication) and southwestern Florida (Charlotte Harbor NEP 2004; Dame, unpublished; Fox, unpublished; Romagosa, unpublished [references cited by Nico et al. 2011, but not accessed for this report]) and Myakka State Park area [found in 2002 by Dames, in 2005 by Call, and Charlotte Harbor NEP in 2004]. Established in St. Johns National

Wildlife Refuge and Merritt Island National Wildlife Refuge (USFWS 2005). The species is rapidly expanding its range throughout the state, and is currently found in Alachua, Brevard, Broward, Charlotte, Collier, DeSoto, Duval, Flagler, Glades, Hardy, Hendry, Highlands, Hillsborough, Indian River, Lee, Manatee, Martin, Miami-Dade, Okeechobee, Orange, Osceola, Palm Beach, Polk, Sarasota, Seminole, St. Lucie, and Volusia counties.”

Means of Introduction in the United States

From Nico et al. (2011):

“Unknown. Possibly released food fish, aquarium release, or escape from aquaculture ponds.”

Remarks

From Nico et al. (2011):

“Established in peninsular Florida (Nico et al. 1996); the species has recently expanded its range throughout south Florida, and as far north as Duval county, near Jacksonville.”

“A small commercial and recreational castnet fishery for *H. littorale* has commenced in Florida, which is a popular food fish in its native range. Part of the species' rapid expansion throughout peninsular Florida may be due illegal movement by castnet fishermen to enhance local fisheries (Gestring et al. 2009).”

“The identity of specimens caught in Florida was confirmed by R. Reis. The distribution, biology, and impacts of introduced populations in Florida are being investigated by U.S. Geological Survey researchers. Voucher specimens: Florida (UF 101746, 101747, 101748; UMMZ 231955).”

2 Biology and Ecology

From ITIS (2011):

“Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysii
Order Siluriformes
Family Callichthyidae
Subfamily Callichthyinae
Genus Hoplosternum

Species *Hoplosternum littorale* (Hancock, 1828) -- brown hoplo

Taxonomic Status: Valid”

Size, Weight, Age

From Froese and Pauly (2010):

“Max length : 24.0 cm TL male/unsexed; (Meunier et al., 2002); max. reported age: 4 years (Meunier et al., 2002).”

Environment

From Froese and Pauly (2010):

“Freshwater; demersal; depth range 1 - ? m (Kenny, 1995)”

Climate/Range

From Froese and Pauly (2010):

“Subtropical; 18°C - 26°C (Baensch et al. 1985); 11°N - 37°S”

Distribution

From Froese and Pauly (2010):

“South America: Most Cis-Andean South American river drainages north of Buenos Aires, Argentina.”

Biology

From Froese and Pauly (2010):

“Inhabits swamps (Kenny 1995). During the rainy season, adults consume a great quantity of chironomids associated with detritus. During the dry season, they feed mostly on terrestrial insects, micro-crustaceans, aquatic Diptera, and detritus. Absorbs a great quantity of anaerobic bacteria from the substrate (Boujard et al 1997). First reproduction occurs after one year (Le Bail et al. 2000. Used to be cultured commercially in Guyana (FAO 1993). Cultured in Trinidad on a semi-commercial scale (Kenny 1995).”

From Nico et al. (2004):

“Twenty-two *H. littorale* nests and nest sites were described in central Florida (Lake Tohopekaliga). Nest habitats were shallow, open marshes. Nests were constructed in the rainy season. Most nests were in areas dominated by *Hydrilla verticillata* (an invasive aquatic plant), and were made from parts of this plant. In August, with rising water levels, nesting shifted from *H. verticillata*-dominated communities to inshore grass zones dominated by *Luziola fluitans*.

Though these were the most common, *H. littorale* also used a variety of other plant materials to construct nests.”

Human uses

From Froese and Pauly (2010):

“Fisheries: commercial; aquaculture: commercial; aquarium: commercial.”

Diseases

None reported

Threat to humans

None reported.

3 Impacts of Introductions

From Duxbury et al. (2010):

Cage experiments were conducted in a Florida stream to discover the effects of the invasive hoplo catfish (*H. littorale*) on macroinvertebrate assemblages. When *H. littorale* was present, macroinvertebrate (principally amphipods and chironomids) abundance and taxa were reduced by 31 and 50% respectively. To support these findings, *H. littorale* stomach contents were used to compare the number of macroinvertebrate taxa found in the stomachs to that found on the substrate. Stomachs contained a smaller subset of taxa than that found on the substrate, supporting the conclusion that *H. littorale* could reduce the number of macroinvertebrate taxa. Such changes in macroinvertebrate assemblages could lead to other ecosystem changes.

From Gestring et al. (2009):

“Electrofishing surveys in Kenansville Lake, Florida yielded no significant negative correlations in catch rates between *H. littorale* and any native or exotic fish species, implying that *H. littorale* has not had deleterious effects on other fish species.”

“*H. littorale* could be, or could potentially be, an important prey item to predators like Largemouth Bass. In this study, only 1% of Largemouth Bass stomachs from the Stickmarsh Reservoir, Florida contained *H. littorale*. However, studies done in other areas have described higher percentages. “

“Laboratory experiments indicated *H. littorale*’s lower lethal temperature was 10°C, indicating that *H. littorale* currently occupies much of its potential range in Florida (peninsular freshwater south of Gainesville).”

From Nico et al. (2011):

“[Impacts are] Largely unknown. In several Florida water bodies this species is locally abundant; because it feeds heavily on benthic invertebrates and detritus, the species has a significant affect on the benthic community, negatively impacting native invertebrates, and competing with native fishes for food (Duxbury et al. 2010; Nico, unpublished data). This species can breathe air and can tolerate a wide range of environmental conditions (e.g., fresh and brackish waters). There is concern that it will eventually invade many natural freshwater wetlands, and coastal marshes in Florida (Nico et al. 1996).”

4 Global Distribution



Figure 1. Global distribution of *H. littorale*. Map from GBIF (2010).

5 Distribution in the United States



Figure 2. Distribution of *H. littorale* in the US. Map from Nico et al. (2011).

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2010, 16 climate variables; Euclidean Distance) was high in Florida, the southern Gulf States, and into the Southeastern states. Medium matches reached into the Mid-Atlantic and the central plains. Low matches covered everywhere else. Climate 6 match indicated that the continental United States has a high climate match. The range for a high climate match is 0.103 and greater, climate match of the *H. littorale* is 0.189.

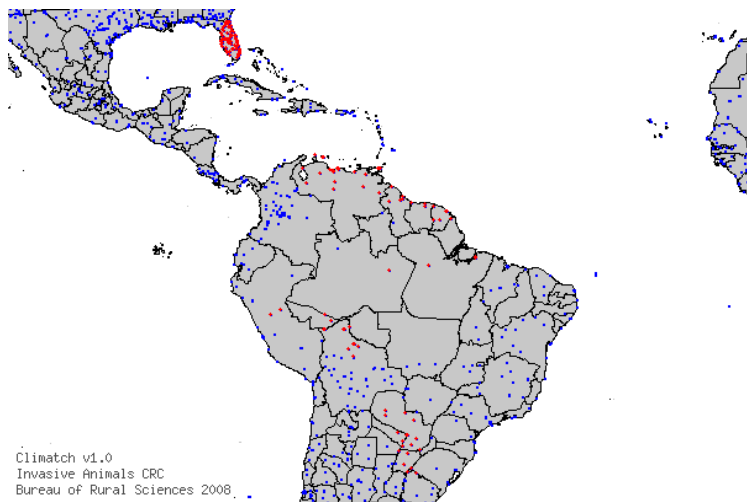


Figure 3. CLIMATCH (Australian Bureau of Rural Sciences 2010) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *H. littorale* climate matching. Source locations from GBIF (2010) and Nico et al. (2011).

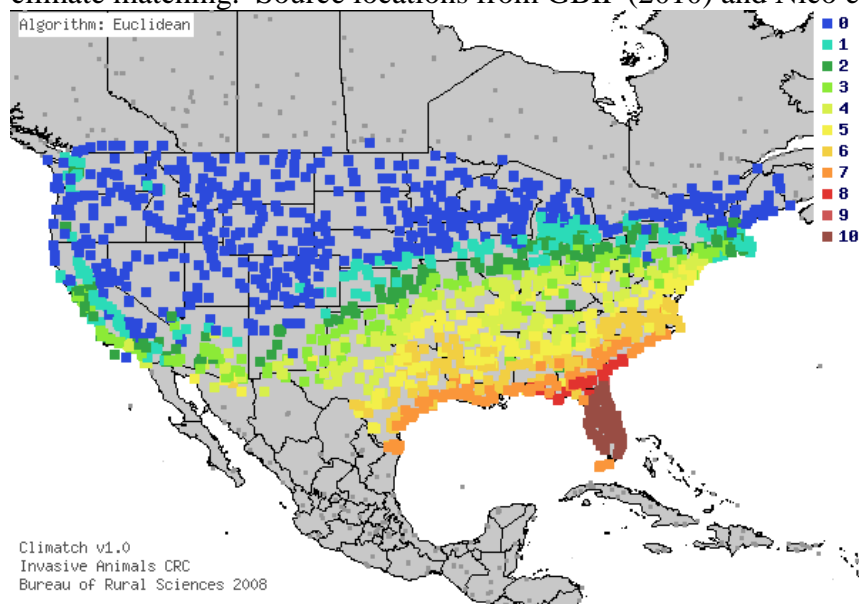


Figure 4. Map of CLIMATCH (Australian Bureau of Rural Sciences 2010) climate matches for *H. littorale* in the continental United States based on source locations reported by GBIF (2010) and Nico et al. (2011). 0= Lowest match, 10=Highest match.

Table 1. CLIMATCH (Australian Bureau of Rural Sciences 2010) climate match scores

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	631	223	188	200	229	184	156	118	28	2	81
Climate 6 Proportion = 0.189 (High)											

7 Certainty of Assessment

H. littorale has many established and expanding populations outside of its native range. However, no evidence of adverse impacts has been reported, though researchers have identified potential impacts from this species in their newly established habitats. The risk level is therefore uncertain, and the certainty of this risk is low.

8 Risk Assessment

Summary of Current U.S. Status

H. littorale has been established in Florida since 1995 and has expanded its range to cover much of the state. Cage field studies have shown it to impact macroinvertebrate assemblages (Duxbury et al. 2010); field studies showed it utilized different plant materials to construct nests (Nico and Muench 2004); and it has been found in the stomachs of Largemouth Bass (Gestring et al. 2009). These ecosystem interactions could lead to adverse impacts, but as of yet, there is no direct evidence of this. Furthermore, preliminary electrofishing data found no deleterious effects on other fish species in Florida (Gestring et al. 2009).

Assessment Elements

- **History of Invasiveness (See Section 3):** Uncertain
- **Climate Match (See Section 6):** High
- **Certainty of Assessment (See Section 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.

Australian Bureau of Rural Sciences. CLIMATCH. 2010. (<http://adl.brs.gov.au:8080/Climatch/>;
 accessed on Nov. 17, 2010).

Duxbury, C., J. Holland, and M. Pluchino. 2010. Experimental evaluation of the impacts of the invasive catfish *Hoplosternum littorale* (Hancock, 1828) on aquatic macroinvertebrates. *Aquatic Invasions* 5(1):97-102.

- Encyclopedia of Life (EOL). 2014. *Hoplosternum littorale*. Available:
http://eol.org/data_objects/27156558. Photo license available:
<http://creativecommons.org/licenses/by-nc/3.0/legalcode>. (September 2014).
- Froese, R., and D. Pauly. Editors. 2010. FishBase. Available:
<http://www.fishbase.org/summary/Hoplosternum-littorale.html>. (November 2011).
- Gestring, K.B., P.L. Shafland, M.S. Stanford, and R.L. Eisenhauer. 2009. Status and selected life history attributes of the illegally introduced brown hoplo (*Hoplosternum littorale*) in Florida. *Florida Scientist* 72: 37-47.
- GBIF (Global Biodiversity Information Facility). 2010. (<http://data.gbif.org/species/13543181>; accessed on Nov. 17, 2010).
- ITIS (Integrated Taxonomic Information System). 2012. Available:
http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=679689 (Accessed August 21, 2012).
- Nico, L., P. Fuller, and M. Neilson. 2011. *Hoplosternum littorale*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. Available:
<http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=338>. (November 2011).

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.

- Baensch, H.A. and R. Riehl 1985 *Aquarien atlas*. Band 2. Mergus, Verlag für Natur- und Heimtierkunde GmbH, Melle, Germany. 1216 p.
- Boujard, T., M. Pascal, F.J. Meunier and P.-Y. Le Bail 1997 *Poissons de Guyane*. Guide écologique de l'Approuague et de la réserve des Nouragues. Institut National de la Recherche Agronomique, Paris, 219 p.
- Call, C.L. 2003. Exotic catfish invade Myakka River. *Venice Gondolier Sun*, April 26, 2003.
- Charlotte Harbor NEP. 2004. [Minutes of the Technical Advisory Committee, Habitat Conservation Subcommittee](#). February 19, 2004, Punta Gorda.
- Dames. 2002. *[Source material did not give full citation for this reference]*

- FAO Fishery Information, Data and Statistics Service 1993 Aquaculture production (1985-1991).
FAO Fish. Circ. 815, Rev. 5. 213 p.
- Gestring, K. [Date not given]. Florida Fish and Wildlife Conservation Commission, Non-native
Fish Lab, Boca Raton, FL.
- Kenny, J.S. 1995 Views from the bridge: a memoir on the freshwater fishes of Trinidad. Julian S.
Kenny, Maracas, St. Joseph, Trinidad and Tobago. 98 p.
- Le Bail, P.-Y., P. Keith and P. Planquette 2000 Atlas des poissons d'eau douce de Guyane (tome
2, fascicule II). Publications scientifiques du Muséum national d'Histoire naturelle, Paris:
307 p.
- Lohrer, F.E. 2005. Fishes of Buck Island Ranch, Lake Placid, Florida: A preliminary checklist.
Available: <http://www.archbold-station.org/abs/maerc/ranchfishes.htm>. (November
2011).
- Meunier, F.J., N. Journiac, S. Lavoué and N. Rabet 2002 Histological characteristics of the
skeletal growth marks of the Atipa, *Hoplosternum littorale* (Hancock, 1828) (Teleostei,
Siluriformes), in the swamp of Kaw (French Guiana). Bull. Fr. Piscic. 364:71-86
- Nico, L. G., S. J. Walsh, and R. H. Robins. 1996. An introduced population of the South
American callichthyid catfish *Hoplosternum littorale* in the Indian River Lagoon system,
Florida. Florida Scientist 59(3):189-200.
- Nico, L.G. and A.M. Muench. 2004. Nests and Nest Habitats of the Invasive Catfish
Hoplosternum littorale in Lake Tohopekaliga, Florida: A Novel Association with Non-
native *Hydrilla verticillata*. Southeastern Naturalist 3(3):451-466.
- Reis, R. E. 1993. Filogenia da familia Callichthyidae (Ostariophysi, Siluriformes), com uma
revisao taxonomica do genero *Hoplosternum*. Unpublished Ph.D. dissertation, University
of Sao Paulo, Brazil.
- Shafland, P. [Date not given]. Florida Fish and Wildlife Conservation Commission, Non-native
Fish Lab, Boca Raton, FL.
- USFWS. 2005. National Wildlife Refuge System Invasive Species. Available:
<http://www.nwrinvasives.com/index.asp>. (November 2011).